Exhibits

Exhibit A – Project Implementation Schedule

Exhibit B – Payment Schedule

Exhibit C – Price Proposal Instructions

Exhibit D - Forms

Exhibit A
Project Implementation Schedule

Exhibit A - Project Implementation Schedule		
Major Milestone Description	**Projected Start**	**Projected End**
Notice to Proceed	~~*4/16*~~*5/7/2018*	--
Project Kickoff Meeting	~~*4/30*~~*5/21/2018*	--
Project Planning Documentation (Project Schedule, Project Management Plan, Master Test Plan)	~~Apr.~~May 2018	~~May~~ Jun. 2018
System Design (Triangle Expressway (TriEx) and the Complete 540 (C540))		
Requirements Review / Business Rules Workshops	~~May~~ Jun. 2018	~~Jun~~Jul. 2018
Reports Design Workshops	~~Jun~~Jul. 2018	~~Jun~~Aug. 2018
System Detailed Design Review		~~Jun~~Aug. 2018
Bill of Materials		~~Jun~~Aug. 2018
Third Party Hardware and Software Documentation Submitted		~~Jun~~Aug. 2018
Draft System Detailed Design Document (SDDD) Approved		~~Jul~~Aug. 2018
Final System Detailed Design Document (SDDD) Submitted		~~Aug~~Sep. 2018
RTCS Installation Design and Documentation Package Approved		~~Aug~~Sep. 2018
Intelligent Transportation System (ITS) Implementation		
Triangle Expressway ITS Equipment Refresh	Aug. 2018	Jan. 2019
Morrisville Parkway Interchange ITS Implementation	Aug. 2019	Sep. 2019
Complete 540 ITS Implementation	Feb. 2021	Sep. 2022
System Development, Installation and Test (TriEx)		
Software Development	~~Jul~~Aug. 2018	~~Sep~~Oct. 2018
System Formal Demonstration		~~Sep~~Oct. 2018
System HW & SW Procurement	~~Aug~~Sep. 2018	~~Oct~~Nov. 2018
Factory Acceptance Test (FAT)	~~Oct~~Nov. 2018	~~Oct~~Nov. 2018
Final Installation Plan Approved		~~Oct~~Nov. 2018
Installation of Triangle Expressway - First Plaza	~~Oct 29~~Nov 26, 2018	~~Nov 16~~Dec 14, 2018
Onsite Installation Test (OIT)	~~Nov~~Dec. 2018	~~Dec. 2018~~Jan. 2019
NCTA Back Office Interface Test		Jan. 2019~~Dec. 2018~~
Installation and Commissioning Test	Jan. 2019~~Dec. 2018~~	Jan. 2019~~Dec. 2018~~
Maintenance Plan		Jan. 2019~~Dec. 2018~~
Training Complete		Jan. 2019~~Dec. 2018~~
Go-Live – First Plaza		Jan. 2019~~Dec. 2018~~
Remaining Installations on Triangle Expressway:	Jan. 2019	~~Jun~~Jul. 2019
Triangle Expressway - Second Plaza	Jan. ~~2~~30, 2019	~~Jan. 18~~Feb. 15, 2019

Exhibit A - Project Implementation Schedule		
Major Milestone Description	**Projected Start**	**Projected End**
→ Installation and Commissioning Test		~~Jan~~Feb. 2019
Triangle Expressway - Third Plaza	~~Jan~~Feb. 2019	~~Feb~~Mar. 2019
→ Installation and Commissioning Test		~~Feb~~Mar. 2019
Triangle Expressway - Fourth Plaza	~~Feb~~Mar. 2019	~~Feb~~Apr. 2019
→ Installation and Commissioning Test		~~Mar~~Apr. 2019
Triangle Expressway - Fifth Plaza	~~Mar~~Apr. 2019	~~Mar~~Apr. 2019
→ Installation and Commissioning Test		~~Mar~~May. 2019
Triangle Expressway - Sixth Plaza	~~Mar~~May. 2019	~~Apr~~May. 2019
→ Installation and Commissioning Test		~~Apr~~May. 2019
Triangle Expressway - Seventh Plaza	~~Apr~~May. 2019	~~May~~ Jun. 2019
→ Installation and Commissioning Test		~~May~~ Jun. 2019
Triangle Expressway – Eighth Plaza	~~May~~ Jun. 2019	~~May~~ Jul. 2019
→ Installation and Commissioning Test		~~May~~ Jul. 2019
Triangle Expressway Go-Live Complete		***~~6/15~~7/12/2019***
Installation of Morrisville Parkway and Interchange	Aug. 2019	Aug 2019
→ Installation and Commissioning Test		Sep. 2019
Morrisville Parkway and Interchange Go-Live Complete		***10/1/2019***
Final Testing and Phase Closeout (TriEx)		
Formal Operational and Acceptance Testing	***~~6/15~~7/12/2019***	~~10~~11/15/2019
As-Built System Detailed Design Document (SDDD) Approved		~~Oct~~Nov. 2019
As-Built Drawing Package Approved		~~Oct~~Nov. 2019
System Operations / Acceptance (Start of Maintenance Phase for TriEx)		*~~Oct~~Nov. 2019*
System Development, Installation and Test (Complete 540)		
Software Development	Jan. 2020	Mar. 2020
System Formal Demonstration		Apr. 2020
System HW & SW Procurement	May 2020	Oct. 2020
Factory Acceptance Test (FAT)	Nov. 2020	Dec. 2020
Final Installation Plan Approved		Jan. 2021
Installation of Complete 540 - First Toll Location	Feb. 2021	Feb. 2021
Onsite Installation Test (OIT)	Mar. 2021	Mar. 2021
NCTA CSC Back Office Interface Test		Apr. 2021
Installation and Commissioning Tests (*Remaining C540 Toll Locations*)	Apr. 2021	Sep. 2022
Maintenance Plan		Oct. 2021
Training Complete		Nov. 2021
Complete 540 Go-Live (All Segments)		***2022***
Final Testing and Phase Closeout (C540)		

Exhibit A - Project Implementation Schedule		
Major Milestone Description	**Projected Start**	**Projected End**
Formal Operational and Acceptance Testing	***9/1/2022***	11/15/2022
As-Built System Detailed Design Document (SDDD) Approved		Oct. 2022
As-Built Drawing Package Approved		Oct. 2022
System Operations / Acceptance (Start of Maintenance Phase for C540)		Nov. 2022

NOTE: Proposers may identify and propose changes to the interim milestones on the Project Schedule; however, it is critical that the milestone dates in ***italicized & bold font*** are achieved on the dates shown in the schedule.

Exhibit B
Payment Schedule

Exhibit B - Payment Schedule

A. Payments for Implementation Roadside Toll Collection System Design and Development					$ -			$ -
Payment Number	**Payment Milestone**	**Pay Items**	**% Paid**	**Cum % Paid**	**Triangle Expressway**	**% Paid**	**Cum % Paid**	**Complete 540**
A-1	Notice to Proceed	Notice to Proceed	5.00%	5.00%	$ -			
A-2	Roadside Toll System Development and Administration	Project Management Documents Approved (PMP, Project Schedule, QA Plan and SDP, SRD)	10.00%	15.00%	$ -			
A-3	Roadside Toll System Design	Business Rules and Design Documents Approved (BRD and SDDD)	10.00%	25.00%	$ -	6.00%	6.00%	$ -
A-4	Roadside Toll System Factory Acceptance Testing (FAT)	Test Documentation and Factory Acceptance Testing Approved	12.00%	37.00%	$ -	12.00%	18.00%	$ -
A-5	Roadside Toll System Onsite Installation Testing (OIT)	Installation Plan Approved, Test Documentation and Onsite Installation Testing Approved - First Site	12.00%	49.00%	$ -	12.00%	30.00%	$ -
A-6	Roadside Toll System Manuals and Training	Manuals Approved and Training Approved	4.00%	53.00%	$ -	2.00%	32.00%	$ -
A-7	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live						
A-7a	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 1	3.00%	56.00%	$ -			
A-7b	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 2	3.00%	59.00%	$ -			
A-7c	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 3	3.00%	62.00%	$ -			
A-7d	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 4	3.00%	65.00%	$ -			
A-7e	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 5	3.00%	68.00%	$ -			
A-7f	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 6	3.00%	71.00%	$ -			
A-7g	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 7	3.00%	74.00%	$ -			
A-7h	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 8	3.00%	77.00%	$ -			
A-7i	Roadside Toll System Commissioning - Morrisville Parkway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 9	3.00%	80.00%	$ -			
A-8a	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 10				8.00%	40.00%	$ -
A-8b	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 11				8.00%	48.00%	$ -
A-8c	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 12				8.00%	56.00%	$ -
A-8d	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 13				8.00%	64.00%	$ -
A-8e	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 14				8.00%	72.00%	$ -
A-8f	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 15				8.00%	80.00%	$ -
A-9	Roadside Toll System Acceptance	Operational and Acceptance Test Approved, As-builts Approved and Implementation Phase Closed Out	20.00%	100.00%	$ -	20.00%	100.00%	$ -

Exhibit B - Payment Schedule

B. Payments Related to Hardware, Equipment and Off-the-Shelf Software				
Payment Number	**Payment Milestone**	**% Paid**	**Cum.% Paid**	
	Triangle Expressway			**$ -**
B-1	Ordering Verified Triangle Expressway	10.00%	10.00%	$ -
B-2	Purchased, Received and Verified Triangle Expressway	18.00%	28.00%	$ -
B-3	Installation Approved Triangle Expressway			
B-3a	Installation Approved Triangle Expressway - Tolling Location 1	8.00%	36.00%	$ -
B-3b	Installation Approved Triangle Expressway - Tolling Location 2	8.00%	44.00%	$ -
B-3c	Installation Approved Triangle Expressway - Tolling Location 3	8.00%	52.00%	$ -
B-3d	Installation Approved Triangle Expressway - Tolling Location 4	8.00%	60.00%	$ -
B-3e	Installation Approved Triangle Expressway - Tolling Location 5	8.00%	68.00%	$ -
B-3f	Installation Approved Triangle Expressway - Tolling Location 6	8.00%	76.00%	$ -
B-3g	Installation Approved Triangle Expressway - Tolling Location 7	8.00%	84.00%	$ -
B-3h	Installation Approved Triangle Expressway - Tolling Location 8	8.00%	92.00%	$ -
B-3i	Installation Approved Morrisville Parkway - Tolling Location 9	8.00%	100.00%	$ -
	Complete 540			**$ -**
B-4	Ordering Verified Complete 540	10.00%	10.00%	$ -
B-5	Purchased, Received and Verified Complete 540	18.00%	28.00%	$ -
B-6	Installation Approved Complete 540			
B-6a	Installation Approved Complete 540 - Tolling Location 10	12.00%	40.00%	$ -
B-6b	Installation Approved Complete 540 - Tolling Location 11	12.00%	52.00%	$ -
B-6c	Installation Approved Complete 540 - Tolling Location 12	12.00%	64.00%	$ -
B-6d	Installation Approved Complete 540 - Tolling Location 13	12.00%	76.00%	$ -
B-6e	Installation Approved Complete 540 - Tolling Location 14	12.00%	88.00%	$ -
B-6f	Installation Approved Complete 540 - Tolling Location 15	12.00%	100.00%	$ -

Exhibit B - Payment Schedule

C. Payments Related to ITS Implementation				
Payment Number	**Payment Milestone**	**% Paid**	**Cum.% Paid**	
	Triangle Expressway ITS & NCTA Offices ITS Implementation			**$ -**
C-1	Ordering Verified Triangle Expressway ITS & NCTA Offices ITS Implementation	10.00%	10.00%	$ -
C-2	Purchased, Received and Verified Triangle Expressway ITS & NCTA Offices ITS Implementation	50.00%	60.00%	$ -
C-3	Installation Approved Triangle Expressway ITS	35.00%	95.00%	$ -
C-4	Installation Approved NCTA Offices ITS Implementation	5.00%	100.00%	$ -
	New ITS Implementation for Complete 540			**$ -**
C-5	Ordering Verified Complete 540 ITS	10.00%	10.00%	$ -
C-6	Purchased, Received and Verified Complete 540 ITS	50.00%	60.00%	$ -
C-7	Installation Approved Complete 540 ITS	40.00%	100.00%	$ -
	New ITS Implementation for Morrisville Parkway Interchange			**$ -**
C-8	Ordering Verified Morrisville Parkway Interchange ITS	10.00%	10.00%	$ -
C-9	Purchased, Received and Verified Morrisville Parkway Interchange ITS	50.00%	60.00%	$ -
C-10	Installation Approved Morrisville Parkway Interchange ITS	40.00%	100.00%	$ -

Exhibit C
Price Proposal Instructions

Table of Contents

1 GENERAL INSTRUCTIONS

Proposers shall complete their Price Proposals in accordance with the following instructions:

1. The Price Proposal Forms are provided in Excel format worksheets for ease of completion and checking. The Excel version of the Price Proposal shall be downloaded from the NCTA's Website at: https://connect.ncdot.gov/business/Turnpike/Pages/default.aspx.
2. Proposers shall submit their Price Proposals on the Price Proposal Forms included in RFP, Exhibit D - Forms. Price Proposals shall be sealed and submitted separate from the Technical Proposal as further instructed in the RFP. Price Proposals shall be submitted in the quantities and manner identified in the RFP.
3. The Price Proposal Forms shall constitute the full and complete Price Proposal for compensation for performance of the Contractor's obligations and Work under the Roadside Toll Collection System project.
4. Proposers must complete the Price Proposal Forms in their entirety. The Price Proposal Forms for the Project are as follows:
    - **NCTA TriEx and Complete 540 RTCS Project Summary** – Sheet 1
    - **Roadside System Cost by Roadway** – Sheets 2, 2-1, 2-1a, 2-2, 2-2a, 2-3, 2-3a, 2-4a1, 2-4a2, 2-4b1, 2-4b2, and 2-5
    - **Roadway Support System Cost** – Sheets 3, 3-1, 3-1a, 3-2, 3-2a, and 3-3
    - **Roadside System Hardware Maintenance and Software Support Services Cost** – Sheets 4, 4-1, 4-2, 4-2a, 4-3, 4-3a, 4-4 and 4-4a
    - **Roadway Support System Maintenance and Software Support Services Cost** – Sheets 5, 5-1, 5-1a, 5-2, and 5-2a
    - **Intelligent Transportation System (ITS) Maintenance Cost** –Sheet 6, 6-1, 6-2, 6-3 and 6-4
    - **Toll Facilities Maintenance Cost** – Sheet 7, 7-1, 7-2, 7-3 and 7-4
    - **Transaction Processing Operations Cost** – Sheet 8, 8-1, 8-2, 8-3, and 8-4
    - **Future Roadside AET Zone System Implementation and Maintenance Cost** – Sheets 9, 9-1 and 9-2
    - **Estimated Lost Revenue** – Sheet 10-1
    - **Additional Services Rates** – Sheet 11-1
    - **Intelligent Transportation System (ITS) Implementation Cost** – Sheet 12
    - **Payment Schedule** – Exhibit B
5. Proposers should not fill in any grayed-out cells on the Price Proposal Forms, nor shall Proposers make any other entry on or alteration to the Price Proposal Forms other than in accordance with these Price Proposal Instructions.
6. NCTA may waive or correct any error appearing in a Proposer's completed Price Proposal Forms if the correct amount can be clearly ascertained from the information provided; however, NCTA is under no obligation to do so. In the event of an inconsistency between the amount stated in

numbers and the amount stated in written words, the amount stated in written words will control. In the event of a mathematical miscalculation, the correct sum will control.

7. An officer of the Proposer or an individual otherwise authorized in writing by an officer of the Proposer must sign and date Sheet 1 in the appropriate place as identified.
8. All elements of the Price Proposal must be completed. If zero quantities are included for a line item in the Proposal, a zero must be entered into the corresponding cell. In addition, all items identified by NCTA in the Price Proposal Forms will be assumed to be included in the Price Proposal.
9. NCTA reserves the right to reject Price Proposals that are not completed in accordance with the instructions set forth herein.
10. Instructions for completion of each of the Price Proposal Forms are provided in Sections 2 through 16 below.
11. The Price Proposal shall be inclusive of all costs, fees and applicable taxes needed to meet the requirements of the RFP, included in **Section III, Scope of Work and Requirements**. Implementation and "Future Zone Type" pricing should be entered in ~~2017~~ 2018 dollar values. Maintenance labor costs should be entered in 2018 dollar values. No price escalation will be allowed above the costs provided on the Price Proposal Forms to complete the Work, with the exception of the CPI as specifically identified herein.

2 INSTRUCTIONS ON COMPLETING THE PRICE PROPOSAL FORMS

1. There are fifty-~~one~~ two (~~55~~52) Price Proposal Forms, as detailed above, including nine pricing summary sheets (Sheets 1, 2, 3, 4, 5, 6, 7, 8 and 9) and associated Backup information on Backup sheets for each pricing sheet. Backup sheets for each summary sheet are labeled to identify the corresponding summary pricing sheet; for example, Sheet 2-1 is a Backup sheet to pricing Sheet 2. Backup sheets are located following summary sheets 1 through 9. The Estimated Lost Revenue Sheet 10-1 and Additional Services Rates Sheet 11-1 are standalone sheets and do not require summary sheets.
2. Table 1 below summarizes the ~~51~~ 52 Price Proposal forms that shall be completed by all Proposers. Each form is located on a unique sheet in an Excel workbook. The table provides the following information for each form:
    a. The sheet number (e.g. 2, 2-1, etc.)
    b. The sheet title listed at the top of each sheet

Table 1 – Price Proposal Form Summary

Sheet Number	Sheet Title
1	NCTA Triangle Expressway and Complete 540 RTCS Project Summary
2	Roadside System Cost by Roadway
2-1	Backup - Ramp 1: Roadside System Cost Schedule
2-1a	Backup - Ramp 1: Roadside System - Staff and Position Classifications with Rates
2-2	Backup - Ramp 2: Roadside System Cost Schedule
2-2a	Backup - Ramp 2: Roadside System - Staff and Position Classifications with Rates

Sheet Number	Sheet Title
2-3	Backup - Ramp 3: Roadside System Cost Schedule
2-3a	Backup - Ramp 3: Roadside System - Staff and Position Classifications with Rates
2-4a1	Backup - AET 3: Roadside System Cost Schedule
2-4a2	Backup - AET 3: Roadside System - Staff and Position Classifications with Rates
2-4b1	Backup - AET 4: Roadside System Cost Schedule
2-4b2	Backup - AET 4: Roadside System - Staff and Position Classifications with Rates
2-5	Backup - Facility Server by Location Cost Schedule
3	Roadway Support System Cost
3-1	Backup - Triangle Expressway: Roadway Support System Cost Schedule
3-1a	Backup - Triangle Expressway: Roadway Support System - Staff and Position Classifications with Rates
3-2	Backup - Complete 540: Roadway Support System Cost Schedule
3-2a	Backup - Complete 540: Roadway Support System - Staff and Position Classifications with Rates
3-3	Backup - Roadside System and Roadway Support System Initial Spare Parts and Equipment Cost
4	Base Contract and Optional Extensions - Roadside System Hardware Maintenance and Software Support Services Cost
4-1	Backup - Base Contract and Optional Extensions - Roadside System Hardware Maintenance and Software Support Services Schedule
4-2	Backup - Base Contract and Optional Extensions - Triangle Expressway Roadside System Hardware Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month
4-2a	Backup - Base Contract and Optional Extensions - Triangle Expressway Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates
4-3	Backup - Base Contract and Optional Extensions - Morrisville Parkway Interchange Roadside System Hardware Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month
4-3a	Backup - Base Contract and Optional Extensions - Morrisville Parkway Interchange Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates
4-4	Backup - Base Contract and Optional Extensions - Complete 540 Roadside System Hardware Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month
4-4a	Backup - Base Contract and Optional Extensions - Complete 540 Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates
5	Base Contract and Optional Extensions - Roadway Support System Maintenance and Software Support Services Cost
5-1	Backup - Base Contract and Optional Extensions - Triangle Expressway Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month

Sheet Number	Sheet Title
5-1a	Backup - Base Contract and Optional Extensions - Triangle Expressway Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates
5-2	Backup - Base Contract and Optional Extensions - Complete 540 Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month
5-2a	Backup - Base Contract and Optional Extensions - Complete 540 Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates
6	Base Contract and Optional Extensions - Intelligent Transportation System (ITS) Maintenance Cost
6-1	Backup - Base Contract and Optional Extensions - Triangle Expressway, Morrisville Parkway Interchange, and Complete 540 Intelligent Transportation System (ITS) Maintenance
6-2	Backup - Base Contract and Optional Extensions - Triangle Expressway ITS Maintenance Cost Schedule Per Device - Labor and Other Direct Cost Items by Month
6-3	Backup - Base Contract and Optional Extensions - Morrisville Parkway Interchange ITS Maintenance Cost Schedule Per Device – Labor and Other Direct Cost Items by Month
6-4	Backup - Base Contract and Optional Extensions - Complete 540 ITS Maintenance Cost Schedule Per Device - Labor and Other Direct Cost Items by Month
7	Base Contract and Optional Extensions Toll Facilities Maintenance Cost
7-1	Backup - Base Contract and Optional Extensions - Triangle Expressway, Morrisville Parkway Interchange, and Complete 540 Toll Facilities Maintenance Cost
7-2	Backup - Base Contract and Optional Extensions - Triangle Expressway Toll Facilities Maintenance - Labor and Other Direct Cost Items by Month
7-3	Backup - Base Contract and Optional Extensions - Morrisville Parkway Interchange Toll Facilities Maintenance - Labor and Other Direct Cost Items by Month
7-4	Backup - Base Contract and Optional Extensions - Complete 540 Toll Facilities Maintenance - Labor and Other Direct Cost Items by Month
8	Base Contract and Optional Extensions - Transaction Processing Operations Cost
8-1	Backup - Base Contract and Optional Extensions - Triangle Expressway AVI Transaction Processing Costs Including all Labor and Other Direct Cost Items per Transaction
8-2	Backup - Base Contract and Optional Extensions - Complete 540 AVI Transaction Processing Costs Including all Labor and Other Direct Cost Items per Transaction
8-3	Backup - Base Contract and Optional Extensions - Triangle Expressway Image-based Transaction Processing Costs Including all Labor and Other Direct Cost Items per Image-based Transaction
8-4	Backup - Base Contract and Optional Extensions - Complete 540 Image-based Transaction Processing Costs Including all Labor and Other Direct Cost Items per Image-based Transaction
9	Future Roadside AET Zone System Implementation and Maintenance Cost
9-1	Backup - Future Zone Types Roadside System Cost Schedule Per Zone
9-2	Backup - Future Roadside System Hardware Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month Per Zone Type

Sheet Number	Sheet Title
10-1	Estimated Lost Revenue
11-1	Additional Services Rates (2018 Values)
12	Intelligent Transportation System (ITS) Implementation Cost
Exhibit B	Payment Schedule

3. The Price Proposal Forms are password protected and shall not be unlocked by Proposers. Only in the unlocked cells may the Proposers enter data.
4. Blue colored tabs represent summary sheets that do *not* require Proposer input. Green tabs represent worksheets that require Proposer input.
5. On most sheets there are formulas that are automatically calculated based on data entered from elsewhere in the sheet or workbook. Font and background colors are used to indicate different types of cells as follows:
    - Black font – Indicates the cell cannot be altered by Proposer.
    - Red font – Indicates the Proposer should enter data.
    - Light red background – Indicates input required. All such cells should be completed accordingly.
    - Light yellow background – Indicates optional input, if Proposers need to provide additional detail.
    - Light green background – Indicates that data has been entered into the cell. Light red and light yellow background will change to light green when any non-zero data is entered. The background for any cells where the Proposer enters zero (0) will not change colors in this manner.
6. While NCTA has made every effort to ensure the Price Proposal Forms contain accurate formulas and calculation, Proposers are required to independently verify that formulas and calculations are being performed correctly.

3 TOTAL PROJECT COSTS

The Proposer's proposed total price shall be the aggregate of all costs included in Sheet 1. Sheet 1 will automatically roll-up and present the totals from Sheets 2 through Sheet 8, and Sheet 12. These costs will be totaled and presented in the Grand Total Cost column in the line entitled Total Implementation, Operations and Maintenance Cost including Optional Extension Phases.

4 COMPLETION OF THE ROADSIDE SYSTEM COST SUMMARY - SHEETS 2, 2-1, 2-1a, 2-2, 2-2a, 2-3, 2-3a, 2-4a1, 2-4a2, 2-4b1, 2-4b2, AND 2-5

The Proposer's total price for the Roadside System portion of the Implementation Phase shall be the aggregate of all costs included in Sheet 2 which covers all costs associated with the Roadside System portion of the Work for the Triangle Expressway, Morrisville Parkway Interchange, and Complete 540.

The costs for Sheet 2 shall include (without limitation) all Equipment, supplies, Software, parts and materials, overhead, burden, profit, taxes, duties, fees, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Roadside portion of the System. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work except as set forth in Section 15.

The prices on Sheet 2 and related Backup sheets shall not include charges and costs associated with the Roadway Support System or the Operations and Maintenance Phase. These costs shall be provided on separate Price Proposal Sheets as described below.

To complete Sheets 2, 2-1, 2-1a, 2-2, 2-2a, 2-3, 2-3a, 2-4a1, 2-4a2, 2-4b1, 2-4b2, and 2-5 Proposers should do the following:

1. **Sheets 2-1, 2-2, 2-3, 2-4a1 and 2-4b1**. In the columns provided under each cost component (Items 1- 9), enter a description for each price element for each component in as much detail as space allows. Moving to the right in the 2nd column (B) enter the quantity for each item and in the 3rd column (C) enter the unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the 5th column (E), enter the labor costs associated with each of the price elements. The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 2. The proposer must complete this process for Zone Type Ramp 1 (Sheet 2-1), Type Ramp 2 (Sheet 2-2), Type Ramp 3 (Sheet 2-3), Type AET 3 (Sheet 2-4a1) and Type AET 4 (Sheet 2-4b1).

2. **Sheet 2-5.** In the columns provided under each cost component Items 1 - 8 for Triangle Expressway and Items 10 – 15 for Complete 540, enter a description for each price element for each component in as much detail as space allows. (NOTE: Item 9 for Morrisville Parkway Interchange should be included as part of Item 4.) Moving to the right in the 2nd column (B) enter the quantity for each item and in the 3rd column (C) enter the unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the 5th column (E), enter the labor costs associated with each of the price elements. The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 2.

3. **Sheet 2**. This sheet will be automatically populated from Sheet 2-1, 2-2, 2-3, 2-4a1, 2-4b1, and 2-5. No Proposer input is required.

4. **Sheets 2-1a, 2-2a, 2-3a, 2-4a2, and 2-4b2a**. Enter specific names for the Key Team positions (Items 1-8) for Roadside System labor costs related to the Implementation Phase. Enter their specific loaded labor rate in the rate column and their number of hours. Moving down the sheet, enter additional labor categories for all labor to be used to complete this Work, including rates and hours. The staff names are not required for these additional positions (i.e. the staff name cell that are not highlighted in a light red). The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated. The labor dollar grand total must match the Total on the corresponding zone type sheet (Sheet 2-1, 2-2, 2-3, 2-4a1, and 2-4b1). A labor check cell is provided to assist Proposers with verifying that the two (2) labor totals are equal. The proposer must complete this process for Zone Type Ramp 1 (Sheet 2-1a), Type Ramp 2 (Sheet 2-2a), Type Ramp 3 (Sheet 2-3a), Type AET 3 (Sheet 2-4a2) and Type AET 4 (Sheet 2-4b2a).

5 COMPLETION OF ROADWAY SUPPORT SYSTEM COST - SHEETS 3, 3-1, 3-1a, 3-2, 3-2a, and 3-3

The Proposer's proposed total price for the Roadway Support System portion of the Implementation Phase shall be the aggregate of all costs included in Sheet 3. This sheet covers all costs associated with the Roadway Support System for the Triangle Expressway (including the Morrisville Parkway Interchange), and Complete 540 (which is assumed to be an incremental cost for the Roadway Support System once the Triangle Expressway Roadway Support System is implemented), to complete the implementation, such as project management, engineering and Design, Software and Testing.

The Roadway Support System cost shall include all costs for items identified in line items 1 through 18 of Sheet 3 associated with the Roadway Support System cost component. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, and other items necessary for the Contractor to complete the Work. The costs shall also include (without limitation) all Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Roadway Support System Cost. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete this Work except as set forth in Section 15.

The prices on Sheet 3 and related Backup shall not include charges and costs associated with the Roadside System or the Operations and Maintenance Phase. These costs shall be set forth on separate Price Proposal Forms as described in Section 2 above.

Proposers shall complete Sheets 3, 3-1, 3-1a, 3-2, 3-2a, and 3-3 as follows:

1. **Sheet 3-3.** This sheet includes Initial Spare Parts and Equipment items for the Roadside System and Roadway Support System include at a minimum spares equivalent to one (1) tolling location of equipment for Triangle Expressway (including the Morrisville Parkway Interchange) for up to six lanes of traffic and (1) tolling location of equipment for Complete 540 for up to six lanes of traffic.

   In the columns provided under each cost component (Items 1-11 for the Roadside System and Items 1-2 for Roadway Support System), enter the total quantity in the 2nd column (B) for each listed element required for the Triangle Expressway Initial Spare Parts and Equipment. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in the 3rd column (C), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above. Total item costs will be calculated automatically for each item.

   Moving to the right in the columns provided under each cost component (Items 1-11 for the Roadside System and Items 1-2 for Roadway Support System), enter the total quantity in the 5th column (E) for each listed element required for Complete 540 Initial Spare Parts and Equipment. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in the 6th column (F), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above. Total item costs will be calculated automatically for each item.

   The Total Roadside and Roadway Support System Initial Spare Parts and Equipment costs will then automatically be calculated and shown in the appropriate line item within item 13 on Sheet 3-1 for Triangle Expressway and Sheet 3-2 for Complete 540.

2. **Sheet 3-1**. This sheet provides back up for Sheet 3 cost components 1-12 and 14-17 for Triangle Expressway. Enter a description for each cost component in as much detail as space allows in column (A). In column (B), enter the number of units for each component. In column (C) enter the unit cost for the associated component. If the item is provided as a lump sum, the quantity

should be shown as 1. Total unit costs will be calculated automatically. Moving to the right, in the 6th column (F), enter the labor costs associated with each of the price elements. Please note the following regarding Sheet 3-1:

- Line item 13 – Initial Spare Parts and Equipment – One Tolling Location is automatically populated from Sheet 3-3.

The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 3.

3. **Sheet 3-2**. This sheet provides back up for Sheet 3 cost components 1-12 and 14-17 for Complete 540. Enter a description for each cost component in as much detail as space allows in column (A). In column (B), enter the number of units for each component. In column (C) enter the unit cost for the associated component. If the item is provided as a lump sum, the quantity should be shown as 1. Total unit costs will be calculated automatically. Moving to the right, in the 6th column (F), enter the labor costs associated with each of the price elements. Please note the following regarding Sheet 3-2:

   - Line item 13 – Initial Spare Parts and Equipment – One Tolling Location is automatically populated from Sheet 3-3.

   The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 3.

4. **Sheet 3.** This sheet is automatically populated from Sheets 3-1 and 3-2. No Proposer input is required.

5. **Sheets 3-1a and 3-2a.** Enter specific names for the Key Team positions (Items 1-8) for the Roadway Support System labor costs related to the Implementation Phase. Enter the specific loaded labor rate in the rate column and their number of hours. Moving down the sheet, enter additional labor categories for all labor to be used to complete this Work, including rates and hours. The staff names are not required for these additional positions (i.e. the staff name cells that are not highlighted in a light red). The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated**.** The labor dollar grand total must match the Total labor dollars on the corresponding sheet (Sheet 3-1 and 3-2). A labor check cell is provided on the bottom of each sheet to assist Proposers with the verifying that the two (2) labor totals are equal. The proposer must complete this process for Triangle Expressway (Sheet 3-1a) and Complete 540 (Sheet 3-2a).

6 COMPLETION OF ROADSIDE SYSTEM HARDWARE MAINTENANCE AND SOFTWARE SUPPORT SERVICES COST (BASE AND OPTIONAL EXTENSIONS) SHEETS 4, 4-1, 4-2, 4-2a, 4-3, 4-3a, 4-4 AND 4-4a

The Proposer's proposed total price for the Roadside System Hardware Maintenance and Software Support Services shall be the aggregate of all costs included in Sheet 4. This sheet covers all costs associated with the Maintenance of the Roadside System for Triangle Expressway, Morrisville Parkway Interchange, and Complete 540.

The costs shall include (without limitation) all Contractor management, administrative and support labor costs, as well as all direct costs associated with maintaining the RTCS system. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and all other items

necessary to meet the Contractor contractual requirements associated with the Roadside System Maintenance. All labor rates shall be entered in 2018 dollar values and are to include overhead, burden and profit ("2018 Loaded Labor Rate"). No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work, except as provided in Section 15.

Proposers shall complete Sheets 4, 4-1, 4-2, 4-2a, 4-3, 4-3, 4-4 and 4-4a as follows:

1. **Sheet 4-2**. For the Base Contract for Maintenance (Years 1–5), as well as for the Optional Extension 1 (Years 1-3) and the Optional Extension 2 (Years 1-3) for Triangle Expressway, each year is identified with a corresponding set of Work elements. Starting in column (B), enter the monthly per-zone cost associated with each price element. (Please note that the monthly labor cost per zone is automatically populated from Sheet 4-2a and therefore requires no input from the Proposer.) Include all other direct, non-labor costs required for each price element. The Total Monthly costs for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 4-1.
2. **Sheet 4-3**. For the Base Contract for Maintenance (Years 1–5), as well as for the Optional Extension 1 (Years 1-3) and the Optional Extension 2 (Years 1-3) for Morrisville Parkway Interchange, each year is identified with a corresponding set of Work elements. Starting in column (B), enter the monthly per-zone cost associated with each price element. (Please note that the monthly labor cost per zone is automatically populated from Sheet 4-3a and therefore requires no input from the Proposer.) Include all other direct, non-labor costs required for each price element. The Total Monthly costs for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 4-1.
3. **Sheet 4-4**. For the Base Contract for Maintenance (Years 4–5), as well as for the Optional Extension 1 (Years 1-3) and the Optional Extension 2 (Years 1-3) for Complete 540, each year is identified with a corresponding set of Work elements. Starting in column (B), enter the monthly per-zone cost associated with each price element. (Please note that the monthly labor cost per zone is automatically populated from Sheet 4-4a and therefore requires no input from the Proposer.) Include all other direct, non-labor costs required for each price element. The Total Monthly costs for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 4-1.
4. **Sheet 4-1.** This sheet is automatically populated from Sheets 4-2, 4-3 and 4-4; it requires no input from the Proposer.
5. **Sheet 4**. This sheet is automatically populated from Sheet 4-1; it requires no input from the Proposer.
6. **Sheets 4-2a, 4-3a and 4-4a**, the Proposer shall do the following:
    - Enter specific names for the Key Team positions (Items 1-8) required for the Roadside System Hardware Maintenance and Software Support Services portion of the Maintenance Phase.
    - Moving down the sheet, enter the names of additional labor categories for all labor to be used. Staff names are not required for these additional positions.
    - Enter the 2018 specific loaded labor rate for each Key Team staff member and labor category in the 2018 Loaded Labor Rate column.
    - For evaluation purposes the Maintenance Year 1 Rate will automatically be populated based on the 2018 Loaded Labor Rate and no assumed annual escalation.
    - Next, enter the annual number of hours for each position/classification required for all tolling zones for Year 1 and Year 2. Hours for Base Contract Years 3 through 5 and Optional

Extensions Years will automatically populate based on Year 2. Labor rates for Maintenance Years 2 through 5 and Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 2% to 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 15.

- The total labor dollars will be calculated for each staff person and labor category for Years 1 through 5 and each year of the Optional Extensions periods. A grand total will be calculated for each year**.** The Total Monthly Per Zone Cost for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 4-2 (Triangle Expressway), 4-3 (Morrisville Parkway Interchange), and 4-4 (Complete 540).

7 COMPLETION OF ROADWAY SUPPORT SYSTEM MAINTENANCE AND SOFTWARE SUPPORT SERVICES COST (BASE AND OPTIONAL EXTENSIONS) SHEETS 5, 5-1, 5-1a, 5-2, AND 5-2a

The Proposer's proposed total price for the Roadway Support System Maintenance and Software Support Services shall be the aggregate of all costs included in Sheet 5. This sheet covers all costs associated with the Maintenance of the Roadway Support System for Triangle Expressway (which will eventually include the Morrisville Parkway Interchange once implemented) and for Complete 540.

The costs shall include (without limitation) all Contractor management, administrative and support labor costs, as well as all direct costs associated with maintaining the Roadway Support System Maintenance. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and all other items necessary to meet the Contractor contractual requirements associated with the Roadway Support System Maintenance. All labor rates shall be entered in 2018 dollar values and are to include overhead, burden and profit ("2018 Loaded Labor Rate"). No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work, except as provided in Section 15.

Proposers shall complete Sheets 5, 5-1, 5-1a, 5-2, and 5-2a as follows:

1. **Sheet 5-1**. For the Base Contract for Maintenance (Years 1–5), as well as for the Optional Extension 1 (Years 1-3) and for the Optional Extension 2 (Years 1-3) for Triangle Expressway, each year is identified with a corresponding set of Work elements. Starting in the 2nd column (B), enter the monthly quantity for each item. In the 3rd column (C) enter the unit cost. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the 5th column (E), enter the labor costs associated with each of the price elements. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total monthly quantity and unit cost as described above. Include all monthly labor costs and other direct, non-labor costs required for each price element. The monthly costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 5.
2. **Sheet 5-2**. For the Base Contract for Maintenance (Years 4–5), as well as for the Optional Extension 1 (Years 1-3) and for the Optional Extension 2 (Years 1-3) for Complete 540, each year is identified with a corresponding set of Work elements. Starting in the 2nd column (B), enter the monthly quantity for each item. In the 3rd column (C) enter the unit cost. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the 5th column (E), enter the labor costs associated with each of the price

elements. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total monthly quantity and unit cost as described above. Include all monthly labor costs and other direct, non-labor costs required for each price element. The monthly costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 5.

3. **Sheet 5.** This sheet is automatically populated from Sheets 5-1 and 5-2; it requires no input from the Proposer.
4. **Sheets 5-1a and 5-2a**. Proposers shall do the following:
   - Enter specific names for the Key Team positions (Items 1-8) to be used for these Roadway Support System Maintenance and Software Support Services.
   - Moving down the sheet, enter the names of additional labor categories for all labor to be used. Staff names are not required for these additional positions.
   - Enter the 2018 specific loaded labor rate for each Key Team staff member and labor category in the 2018 Loaded Labor Rate column.
   - For evaluation purposes, the Maintenance Year 1 Rate will automatically be populated from the 2018 Loaded Labor Rate and no assumed annual escalation.
   - Next, enter the annual number of hours for each position/classification required for the Roadway Support System Maintenance and Software Support Services for Year 1 and Year 2. Hours for Base Contract Years 3 through 5 and Optional Extensions Years will automatically populate based on Year 2. Labor rates for Maintenance Years 2 through 5 and Optional Extension Years 1 and 2 will then automatically populate using an assumed annual escalation of 2% to 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 15.
   - The total labor dollars will be calculated for each staff person and labor category for Years 1 through 5 and each year of the Optional Extensions periods. A grand total will be provided for each year.
     i. Sheet 5-1a (Triangle Expressway, including Morrisville Parkway Interchange) - This labor dollar total must match the total labor dollars for each year on Sheet 5-1. A labor check cell is provided on the right-hand column of Sheet 5-1to assist Proposers with verifying that the two labor totals are equal.
     ii. Sheet 5-2a (Complete 540) - This labor dollar total must match the total labor dollars for each year on Sheet 5-2. A labor check cell is provided on the right-hand column of Sheet 5-2 to assist Proposers with verifying that the two labor totals are equal.

8 COMPLETION OF INTELLIGENT TRANSPORTATION SYSTEM (ITS) MAINTENANCE COST (BASE AND OPTIONAL EXTENSIONS) SHEETS 6, 6-1, 6-2, 6-3 AND 6-4

The Proposer's proposed total price for the ITS Maintenance Cost shall be the aggregate of all per device Maintenance costs and the Program Management/Administration fee associated with the oversight included in Sheet 6. This sheet covers all costs associated with the ITS Maintenance for Triangle Expressway, Morrisville Parkway Interchange, and Complete 540.

The costs shall include (without limitation) all Contractor management, administrative and support labor costs, as well as all direct costs associated with maintaining the ITS equipment. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and all other items necessary to meet the Contractor contractual requirements associated with the ITS Maintenance. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work described in Sheets 6, 6-1, 6-2, 6-3 and 6-4.

Proposers shall complete Sheets 6, 6-1, 6-2, 6-3 and 6-4 as follows:

1. **Sheet 6-2**. For the Base Contract for Maintenance (Years 1–5), as well as for the Optional Extension 1 (Years 1-3) and for the Optional Extension 2 (Years 1-3) for Triangle Expressway, each year has a corresponding set of ITS devices requiring maintenance. The monthly item quantity for the project has been provided. Starting in the 4th column (D), enter the monthly unit cost to maintain the device type. Total item costs will be calculated automatically. Next, provide the monthly Program Management/Administration cost for each maintenance year. The monthly costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6-1.
2. **Sheet 6-3.** For the Base Contract for Maintenance (Years 1–5), as well as for the Optional Extension 1 (Years 1-3) and for the Optional Extension 2 (Years 1-3) for Morrisville Parkway Interchange, each year has a corresponding set of ITS devices requiring maintenance. The monthly item quantity for the project has been provided. Starting in the 4th column (D), enter the monthly unit cost to maintain the device type. Total item costs will be calculated automatically. Next, provide the monthly Program Management/Administration cost for each maintenance year. The monthly costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6-1.
3. **Sheet 6-4.** For the Base Contract for Maintenance (Years 4–5), as well as for the Optional Extension 1 (Years 1-3) and for the Optional Extension 2 (Years 1-3) for Complete 540, each year has a corresponding set of ITS devices requiring maintenance. The monthly item quantity for the project has been provided. Starting in the 4th column (D), enter the monthly unit cost to maintain the device type. Total item costs will be calculated automatically. Next, provide the monthly Program Management/Administration cost for each maintenance year. The monthly costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6-1.
4. **Sheet 6-1**. This sheet is automatically populated from Sheets 6-2, 6-3 and 6-4 and the annual cost is calculated; it requires no input from the Proposer.
5. **Sheet 6**. This sheet is automatically populated from Sheet 6-1; it requires no input from the Proposer.

9 COMPLETION OF TOLL FACILITIES MAINTENANCE COST (BASE AND OPTIONAL EXTENSIONS) SHEETS 7, 7-1, 7-2, 7-3 AND 7-4

The Proposer's proposed total price for the Toll Facilities Maintenance Cost shall be the aggregate of all facilities maintenance items and the program management/administration fee associated with the Toll Facilities Maintenance included in Sheet 7. This sheet covers all costs associated with the Toll Facilities Maintenance for Triangle Expressway, Morrisville Parkway Interchange, and Complete 540.

The costs shall include (without limitation) all Contractor management, administrative and support labor costs, as well as all direct costs associated with maintaining the Toll Facilities. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and all other items necessary to meet the Contractor contractual requirements associated with the Toll Facilities Maintenance. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work described in Sheets 7, 7-1, 7-2, 7-3 and 7-4.

Proposers shall complete Sheets 7, 7-1, 7-2, 7-3 and 7-4 as follows:

1. **Sheet 7-2.** For the Base Contract for Maintenance (Years 1–5), as well as for the Optional Extension 1 (Years 1-3) and for the Optional Extension 2 (Years 1-3) for Triangle Expressway, each year has a corresponding set of facilities maintenance items. The monthly item quantity per tolling location has been provided. Starting in the 4th column (D), enter the unit cost to maintain the items. Total item costs will be calculated automatically. Next, provide the monthly Program Management/Administration cost for each maintenance year. The monthly costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 7-1.
2. **Sheet 7-3.** For the Base Contract for Maintenance (Years 1–5), as well as for the Optional Extension 1 (Years 1-3) and for the Optional Extension 2 (Years 1-3) for Morrisville Parkway Interchange, each year has a corresponding set of facilities maintenance items. The monthly item quantity per tolling location has been provided. Starting in the 4th column (D), enter the unit cost to maintain the items. Total item costs will be calculated automatically. Next, provide the monthly Program Management/Administration cost for each maintenance year. The monthly costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 7-1.
3. **Sheet 7-4.** For the Base Contract for Maintenance (Years 4–5), as well as for the Optional Extension 1 (Years 1-3) and for the Optional Extension 2 (Years 1-3) for Complete 540, each year has a corresponding set of facilities maintenance items. The monthly item quantity per tolling location has been provided. Starting in the 4th column (D), enter the unit cost to maintain the items. Total item costs will be calculated automatically. Next, provide the monthly Program Management/Administration cost for each maintenance year. The monthly costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 7-1.
4. **Sheet 7-1**. This sheet is automatically populated from Sheets 7-2, 7-3 and 7-4, and the annual cost for all tolling locations is calculated; it requires no input from the Proposer.
5. **Sheet 7**. This sheet is automatically populated from Sheet 7-1; it requires no input from the Proposer.

10 COMPLETION OF TRANSACTION PROCESSING OPERATIONS COST (BASE AND OPTIONAL EXTENSIONS) SHEET 8, 8-1, 8-2, 8-3, AND 8-4

The Proposer's proposed total price for the Transaction Processing Operations shall be the aggregate of all costs included in Sheet 8. Sheet 8 Base Contract and Optional Extensions Transaction Processing Operations Cost, shall include, without limitation, all charges and costs associated with the provision of all Operations Services as set forth in **Section III, Scope of Work and Requirements**. The costs shall also include without limitation, all labor, supplies, normal operating parts and materials, overhead, burden,

profit, taxes, duties, rent, utilities, service cost, third-party fees, postage, Contractor-acquired permits, licenses, warranties and other items necessary to meet the Contract requirements.

This Operations section of the Price Proposal requires the proposal of per-item costs for AVI Transaction Processing and Image-based Transaction Processing for the Triangle Expressway (including the Morrisville Parkway Interchange) and the Complete 540. While procuring services for the transaction processing, Proposers should carefully consider pricing each of the cost categories in a manner that is reflective of the Proposer's actual costs related to that cost category. Each cost category is expected to stand on its own in terms of pricing, with the per-item costs at the levels provided being reflective of the Proposer's actual costs related to the Services being provided. To the extent there are certain costs which cannot be attributed directly to a cost category. Proposers should include an equitable allocation of such costs to each of the two cost categories.

The Price Proposal for each cost category should reflect the cost of managing each category, with no one category bearing a disproportionate burden of shared or other costs.

10.1 DESCRIPTION OF MONTHLY VARIABLE FEE TYPES - TRIANGLE EXPRESSWAY (INCLUDING MORRISVILLE PARKWAY INTERCHANGE)

The Base Contract for Operations (Years 1–5), as well as for Optional Extension 1 (Years 1-3) and for Optional Extension 2 (Years 1-3) for Transaction Processing for Triangle Expressway is divided into two (2) separate categories AVI Transactions on Sheet 8-1 and Image-based Transactions on Sheet 8-3 with each category tiered to four (4) levels:

1. AVI Transaction Processing Costs per Transaction Level 1 – Level 1 for this category has been established at 3.0 million transactions per month. The Contractor will be compensated at the established Level 1 unit rate for AVI Transactions less than or equal to 3.0 million for the given month.
2. AVI Transaction Processing Costs per Transaction Level 2 – For AVI Transactions greater than 3.0 million but less than or equal to 3.5 million, the Contractor will be compensated at the established Level 2 unit rate for those transactions for the given month.
3. AVI Transaction Processing Costs per Transaction Level 3 – For AVI Transactions greater than 3.5 million but less than or equal to 4.0 million, the Contractor will be compensated at the established Level 3 unit rate for those transactions for the given month.
4. AVI Transaction Processing Costs per Transaction Level 4 – For AVI Transactions greater than 4.0 million, the Contractor will be compensated at the established Level 4 unit rate for those transactions for the given month.
5. Image-based Transaction Processing Costs per Transaction Level 1 – Level 1 for this category has been established at 2.0 million transactions per month. The Contractor will be compensated at the established Level 1 unit rate for Image-based Transactions less than or equal to 2.0 million for the given month.
6. Image-based Transaction Processing Costs per Transaction Level 2 – For Image-based Transactions greater than 2.0 million but less than or equal to 2.5 million, the Contractor will be compensated at the established Level 2 unit rate for those transactions for the given month.
7. Image-based Transaction Processing Costs per Transaction Level 3 – For Image-based Transactions greater than 2.5 million but less than or equal to 3.0 million, the Contractor will be compensated at the established Level 3 unit rate for those transactions for the given month.

8. Image-based Transaction Processing Costs per Transaction Level 4 – For Image-based Transactions greater than 3.0 million, the Contractor will be compensated at the established Level 4 unit rate for those transactions for the given month.

10.2 DESCRIPTION OF MONTHLY VARIABLE FEE TYPES - COMPLETE 540

The Base Contract for Operations (Years 4–5), as well as for Optional Extension 1 (Years 1-3) and for Optional Extension 2 (Years 1-3) for Transaction Processing for Complete 540 is divided into two (2) separate categories AVI Transactions on Sheet 8-2 and Image-based Transactions on Sheet 8-4 with each category tiered to four (4) levels:

1. AVI Transaction Processing Costs per Transaction Level 1 – Level 1 for this category has been established at 1.0 million transactions per month. The Contractor will be compensated at the established Level 1 unit rate for AVI Transactions less than or equal to 1.0 million for the given month.
2. AVI Transaction Processing Costs per Transaction Level 2 – For AVI Transactions greater than 1.0 million but less than or equal to 2.0 million, the Contractor will be compensated at the established Level 2 unit rate for those transactions for the given month.
3. AVI Transaction Processing Costs per Transaction Level 3 – For AVI Transactions greater than 2.0 million but less than or equal to 3.0 million, the Contractor will be compensated at the established Level 3 unit rate for those transactions for the given month.
4. AVI Transaction Processing Costs per Transaction Level 4 – For AVI Transactions greater than 3.0 million, the Contractor will be compensated at the established Level 4 unit rate for those transactions for the given month.
5. Image-based Transaction Processing Costs per Transaction Level 1 – Level 1 for this category has been established at 500 thousand transactions per month. The Contractor will be compensated at the established Level 1 unit rate for Image-based Transactions less than or equal to 500 thousand for the given month.
6. Image-based Transaction Processing Costs per Transaction Level 2 – For Image-based Transactions greater than 500 thousand but less than or equal to 1.0 million, the Contractor will be compensated at the established Level 2 unit rate for those transactions for the given month.
7. Image-based Transaction Processing Costs per Transaction Level 3 – For Image-based Transactions greater than 1.0 million but less than or equal to 2.0 million, the Contractor will be compensated at the established Level 3 unit rate for those transactions for the given month.
8. Image-based Transaction Processing Costs per Transaction Level 4 – For Image-based Transactions greater than 2.0 million, the Contractor will be compensated at the established Level 4 unit rate for those transactions for the given month.

To complete Sheets 8, 8-1, 8-2, 8-3 and 8-4 Proposers must do the following:

1. **Sheets 8-1and 8-2.** Each year has four (4) AVI Transaction Processing levels as explained above. The sample monthly units for evaluation purposes for each level have already been populated and should not be altered or deleted. Starting with column (C), enter the proposed unit cost for AVI transactions for each level for each year. Each entered amount should include total per item costs, including labor and other direct, non-labor costs. The Total Monthly Cost and the Total Annual Cost for each level evaluated will then automatically calculate and the summary will be shown in the appropriate line item on Sheet 8.

2. **Sheets 8-3 and 8-4.** Each year has four (4) Image-based Transaction Processing levels as explained above. The sample monthly units for evaluation purposes for each level have already been populated and should not be altered or deleted. Starting with column (C), enter the proposed unit cost for Image-based transactions for each level for each year. Each entered amount should include total per item costs, including labor and other direct, non-labor costs. The Total Monthly Cost and the Total Annual Cost for each level evaluated will then automatically calculate and the summary will be shown in the appropriate line item on Sheet 8.
3. **Sheet 8**. This sheet is automatically populated from Sheets 8-1, 8-2, 8-3, and 8-4; it requires no input from the Proposer.

11 COMPLETION OF FUTURE ROADSIDE ZONE SYSTEM IMPLEMENTATION AND MAINTENANCE COST SHEETS 9, 9-1 AND 9-2

The Proposer's price for Future Roadside AET Zone System Implementation and Maintenance Cost shall be the aggregate of all costs included in Sheet 9. This sheet covers all costs required for potential future zone type(s) which may be implemented during the term of the Contract. These future prices are for the purpose of evaluation only.

The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and all other items necessary to meet the Contractor contractual requirements of the Implementation and Maintenance of any optional facilities.

Proposers shall complete Sheets 9, 9-1 and 9-2 as follows:

1. **Sheet 9-1**. In the rows provided under each future zone type, enter the quantity for each item in the Quantity per Toll Zone column (B) and enter the unit cost in the Units ($) column (C). If the item is provided as a lump sum, the quantity should be shown as 1. For AVI System only a quantity per toll zone is required. Include all monthly labor costs and other direct, non-labor costs required for each price element. The costs for each price element will automatically be calculated and the summary cost will be shown in the appropriate line item on Sheet 9.
2. **Sheet 9-2.** In the rows provided under each future maintenance zone type, each zone type has a corresponding set of Work elements. Starting in column (B), enter the monthly per-zone cost associated with each price element in 2018 values. Include all labor and other direct, non-labor costs required for each price element. The Total Monthly costs for each future zone type will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 9.
3. **Sheet 9**. This sheet is automatically populated from Sheets 9-1 and 9-2; it requires no input from the Proposer.

12 COMPLETION OF ESTIMATED LOST REVENUE - SHEET 10-1

The Proposer's price for Estimated Lost Revenue shall be the aggregate of all estimated costs included in Sheet 10-1. These estimated lost revenue costs are for the purpose of evaluation only.

Proposers shall complete Sheet 10-1 as follows:

1. **Sheet 10-1**. In the rows provided for each TriEx Toll Zone location (T1, T2, … T34), enter the quantity of hours that the Contractor require to have the Toll Zone completely unavailable for revenue collection during the transition period to install the RTCS for each Toll Zone. As,

necessary for installation, entries are required for each indicated Weekday and Weekend time period and shall be entered in quantity of hours in columns (B), (E), (H) and (K), which represent the Weekday and Weekend time periods divided into simplified typical peak and off-peak traffic periods.

When determining the quantity of hours to input, the Contractor shall be required to secure proper MOT as stated in **Section III, Scope of Work and Requirements** and **Attachment 16: Lane Closure Restrictions**.

13 COMPLETION OF ADDITIONAL SERVICES RATES - SHEET 11-1

On Sheet 11-1, the Proposer shall provide a listing of staff positions and loaded hourly labor rates for the purpose of providing pricing for future Work not currently included in **Section III, Scope of Work and Requirements**. All changes to the Contract involving labor shall use the hourly labor rates in this table. All hourly labor rates shall be stated for the year 2018 and shall be inclusive of burden/overhead and profit. Hourly labor rates shall be adjusted based on changes to the CPI for the previous year as described below.

The Proposer shall also provide the current associated Overhead including burden and Profit rates in the cells identified.

14 COMPLETION OF INTELLIGENT TRANSPORTATION SYSTEM (ITS) IMPLEMENTATION COST – SHEET 12

The Proposer's total price for the Intelligent Transportation System (ITS) portion of the Implementation Phase shall be the aggregate of all costs included in Sheet 12 which covers all costs associated with the ITS portion of the Work for the Triangle Expressway, Complete 540, and Morrisville Parkway Interchange.

The costs for Sheet 12 shall include (without limitation) all Equipment, supplies, Software, parts and materials, overhead, burden, profit, taxes, duties, fees, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the ITS portion of the System. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work except as set forth in Section 15.

The prices on Sheet 12 shall not include charges and costs associated with the Roadside System, Roadway Support System, or the Operations and Maintenance Phase. These costs shall be provided on separate Price Proposal Sheets as described below.

To complete Sheet 12 Proposers should do the following:

1. Sheets 12. The description for each cost component item is provided in the 1st column (A) as required for the implementation for each facility component (Items 1 - 4). Moving to the right in the 2nd column (B), the quantity for each item is already populated based on the anticipated need for each facility. In the 3rd column (C) enter the unit costs for each item. The total item costs will be calculated automatically. Moving to the right, in the 5th column (E), enter any labor costs associated with each of the price elements. The costs for each price element will then automatically be calculated and the summed total will be shown in the appropriate line item on Sheet 1. NOTE: The cost of all surge suppression, the RPU, testing, and all supporting hardware and accessories shall be included in the cost per component item.

~~14~~15 COMPLETION OF PAYMENT SCHEDULE – EXHIBIT B

The Payment Schedule sheet applies the Implementation Roadside Toll Collection System Design and Development Costs and Hardware, Equipment and Off-the Shelf Software to payment milestones and associated percentages shown in RFP Exhibit B - Payment Schedule. The sheet takes the Proposer's Implementation price shown on Sheets 2 and 3 and multiplies it by the percentage associated with each payment milestone. The result is a dollar amount to be paid for each milestone. No Proposer input is required.

~~15~~16 COMPLETION OF PROJECT SUMMARY - SHEET 1

Sheet 1 will automatically summarize the costs and pricing detailed in Sheets 2 through 8, and Sheet 12. These costs will be totaled and presented in the line entitled Total Implementation, Operations and Maintenance Cost including Optional Extension Phases.

Sheet 9 Future Roadside System Cost by Zone Type is automatically populated onto Sheet 1 for consideration of future work. These future prices are for the purpose of evaluation only.

Sheet 10-1 Estimated Lost Revenue is automatically populated onto Sheet 1 for the purpose of evaluation only.

To complete Sheet 1, Proposers must do the following:

1. An officer of the Proposer or an individual otherwise authorized in writing by an officer of the Proposer is required to enter the price written out in words for the Grand Total Cost.
2. The sheet will need to include a signature and date, along with the authorized officer's name, title, address and phone number.

~~16~~17 COST ESCALATION

Pricing that is noted above as subject to adjustment shall be adjusted up or down from the Proposal pricing using the following Bureau of Labor Statistics' (BLS) Employment Cost (CPI) indices as applicable:

CPI: CUUR0400SA0 Consumer Price Index - All Urban Consumers; West Urban All Items

NOTE: The above index names and numbers were obtained from the Bureau of Labor Statistics (BLS) and were current as of the date this RFP was written. In the event that the BLS updates an index name or number, NCTA shall consult the BLS web site to determine the new name and number of the index. More information about the index can be found on the U.S. Bureau of Labor's website (see http://www.bls.gov/cpi/).

For the purposes of the price proposal calculations, an assumed rate has been included. Adjustments shall be made to future prices based on actual CPI (Labor) for each applicable year. The basis for calculating the actual CPI to be applied shall be as follows:

1. Annual adjustment to prices shall be made using the anniversary date of the start of the Maintenance Phase at which each new Maintenance year begins.
2. In the first applicable year for adjustments (Year 2 of the Maintenance Phase) the reference for the adjustment calculation shall be the 2018 Loaded Labor Rate provided by Proposers.

The assumed CPI index for evaluation purposes has been applied to the following Cost Worksheets ONLY:

1. Sheet 4 (including Backup sheets 4-1, 4-2, 4-2a, 4-3, 4-3a, 4-4, and 4-4a) and

2. Sheet 5 (including Backup sheets 5-1, 5-1a, 5-2 and 5-2a).

Adjustments shall be made to future prices in the above sheets based on actual CPI (Labor) for each applicable year. The basis for calculating the actual CPI to be applied shall be as follows:

1. Annual adjustment to prices shall be made using the anniversary date of start of the Maintenance Phase at which each new Maintenance year begins.
2. In the first applicable year for adjustments (Year 2 of Maintenance) the reference period for the adjustment calculation shall be the 2018 Loaded Labor Rate.
3. For the subsequent applicable years of Maintenance, as well as for Optional Extension 1 (Extension Years 1-3) and for Optional Extension 2 (Extension Years 1-3), the CPI adjustments shall be applied against the previous reference year. For example, Maintenance and Software Support Services pricing shall be adjusted using the index change from Maintenance Year 2 as a reference point for adjusting each of the pricing elements identified in the above table).
4. The annual adjustment shall be equal to the cumulative change in the applicable index for the latest previous 12-month period available at the time of the anniversary date.
5. The applicable index shall be applied as follows:
    a. CPI shall be applied when the entire component of the cost is direct Contractor labor.

Exhibit D
Forms

Form D-1	Proposal Cover Sheet
Form D-2	List of Subcontractors and RS-2 Form
Form D-3	Recent Client List
Form D-4	Reference Forms Part 1
Form D-5	Reference Forms Part 2
Form D-6	Requirements Conformance Matrix
Form D-7	Price Proposal Form
Form D-8	Proposer Questions Form
Form D-9	Non-Collusion Forms
Form D-10	Surety Commitment Letter
Form D-11	Acknowledgement of Receipt of Addenda

Form D-1
Proposal Cover Sheet

NORTH CAROLINA TURNPIKE AUTHORITY
ROADSIDE TOLL COLLECTION SYSTEM
REQUEST FOR PROPOSALS
Triangle Expressway and
Complete 540

EXECUTION: In compliance with this Request for Proposal, and subject to all the conditions herein, the undersigned offers and agrees to furnish any or all Services or goods upon which prices are offered, at the price(s) offered herein, within the time specified herein. By executing this offer, I certify that this offer is submitted competitively and without collusion.

Failure to execute/sign offer prior to submittal shall render Proposal invalid. Late offers are not acceptable.

<table>
<tr><td colspan="3">BIDDER:</td></tr>
<tr><td colspan="2">STREET ADDRESS:</td><td>P.O. BOX:
ZIP:</td></tr>
<tr><td colspan="2">CITY & STATE & ZIP:</td><td>TELEPHONE NUMBER:
TOLL FREE TEL. NO:</td></tr>
<tr><td colspan="2">PRINT NAME & TITLE OF PERSON SIGNING:</td><td>FAX NUMBER:</td></tr>
<tr><td>AUTHORIZED SIGNATURE:</td><td>DATE:</td><td>E-MAIL:</td></tr>
</table>

Offer valid for two hundred and forty days (240) days from Proposal Due Date.

Form D-2

List of Subcontractors and RS-2 Form

(PDFs of all forms are presented below. A fillable PDF of the RS-2 form is "paper clipped" to the RFP file for ease of completion.)

Please duplicate this page as necessary to provide the requested information.

	SUBCONTRACTOR	SUBCONTRACTOR	SUBCONTRACTOR
Legal Name of Company			
Company's FEID Number			
Company Contact Name			
Company Address			
City, State, Zip Code			
Company Telephone No.			
Company Fax Number			
Company E-mail address			
Legal Name of Principal(s)			
Address of Principal(s)			
City, State, Zip Code			
Telephone No. of Principal(s)			
Fax Number of Principal(s)			
E-mail address of Principal(s)			
Corporate Number (if applicable)			
License Number (if applicable)			
Status of License (if applicable)			
Work to be Performed			
Expected Percentage of Total Work			

By: _____ Signature: (1) _____
President or Vice President

Attest: _____ Signature: (2) _____
Secretary (or Assistant Secretary)

(Affix Corporate Seal)
****

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
SUBCONSULTANT
TO BE USED WITH PROFESSIONAL SERVICES CONTRACT ONLY
RACE AND GENDER NEUTRAL

_____
TIP No. and/or Type of Work (Limited Services)

_____
(Consultant/Firm Name and Federal Tax Id)

_____
(Subconsultant/Firm Name and Federal Tax Id)

SERVICE / ITEM DESCRIPTION		***Anticipated Utilization***
	TOTAL UTILIZATION:	
SUBMITTED BY: SUBCONSULTANT:	**RECOMMENDED BY:** CONSULTANT:	
*BY:	*BY:	
TITLE:	TITLE:	
SPSF Status: Yes ☐ No ☐		

"SUBCONCONSULTANT" (FORM RS-2)
RACE AND GENDER NEUTRAL

Instructions for completing the Form RS-2:

1. Complete a Subconsultant Form RS-2 for each Subconsultant firm to be utilized by your firm.
2. Insert TIP Number and /or Type of Work (Limited Services)
3. Complete the Consultant/Firm name and Federal Tax ID Number for the primary firm information.
4. Complete the Subconsultant/Sub Firm name and Federal Tax ID Number for the sub firm information.
5. Enter Service/Item Description – describe work to be performed by the Sub Firm
6. Enter Anticipated Utilization – Insert dollar value or percent of work to the Subconsultant/Sub Firm
7. *Signatures of both Subconsultant and Prime Consultant **are required** on each RS-2 Form to be submitted with the Letter of Interest (LOI) to be considered for selection
8. Complete "SPSF Status" section - Subconsultant shall check the appropriate box regarding SPSF Status, check Yes if SPSF or No if not SPSF

In the event the firm has **no** subconsultant, **it is required that this be indicated on the Subconsultant Form RS-2 form by entering the word "None" or the number "ZERO" and signing the form.**

Form D-3
Recent Client List

(A Word version of the ~~Proposer Questions Form~~Recent Client List is "paper clipped" to this NCTA RTCS Exhibits file for ease of completion.)

#	Name of Client including Address and Telephone #	Project Name	Project Description	Start Date	End Date	Contract Amount
001						
002						

Form D-4

Reference Forms Part 1

(A Word version of the Reference Forms Part 1 is "paper clipped"
to this NCTA RTCS Exhibits file for ease of completion.)

a) Proposer Minimum Experience for AET/ORT

Proposer shall use this from to clearly demonstrate how it meets the minimum qualification requirements for Proposals with regard to AET or ORT Proposer project experience. Each reference provided may be contacted by NCTA. Copy this form as needed to comply with the requirements outlined in the RFP for each of the Implementation and Operations and Maintenance Phase minimum requirements.

Proposer's Name: _____

Please check off which qualifications requirement this reference is intended to address (you may check more than one box to cover both Implementation and Maintenance requirements as long as the explanation below is sufficiently detailed to cover both).

☐ Implementation ☐ Operations and Maintenance

Reference Company/Agency Name:		
Address:		
City:	State:	Zip Code:
Phone Number:	Fax Number:	
Project Manager Reference:		
E-mail:		

Alternate Reference*:		
Phone Number:	Fax Number:	
E-mail:		
Alternate Reference Role on Reference Project:		
***Must be completed in addition to the Project Manager reference**		

Proposer's role on project and years of participation (mm/dd/yy to mm/dd/yy):

Project location, scope, cost, start / end dates:
Operational functionality, facility types (AET, ORT, Express Lanes) number of lanes / plazas, revenue collected, etc.:
Relevant equipment and systems used:
Comparison to NCTA requirements:
Installed System and Operations and Maintenance documented performance, as applicable:
Key Personnel involved and role who are also proposed on NCTA project:

b) Proposer Minimum Experience for Dynamically Priced Project with ITS Elements

Proposer shall use this from to clearly demonstrate how it meets the minimum qualification requirements for Proposals with regard to dynamically priced projects with ITS elements. Each reference provided may be contacted by NCTA. Copy this form as needed to comply with the requirements outlined in the RFP for each of the Implementation and Operations and Maintenance Phase minimum requirements.

Proposer's Name: _____

Please check off which qualifications requirement this reference is intended to address (you may check more than one box to cover both Implementation and Maintenance requirements as long as the explanation below is sufficiently detailed to cover both).

☐ Implementation ☐ Operations and Maintenance

Reference Company/Agency Name:	
Address:	
City:	State: Zip Code:
Phone Number:	Fax Number:
Agency Project Manager Reference:	
E-mail:	

Alternate Reference*:	
Phone Number: _____	Fax Number:
E-mail:	
Alternate Reference Role on Reference Project:	
***Must be completed in addition to the Project Manager reference**	

Proposer's role on project and years of participation (mm/dd/yy to mm/dd/yy):

~~Project location, scope, cost, start / end dates:~~
~~Operational functionality (e.g., type of express lanes, pricing basis (per mile, per segment or other):~~
~~Identify ITS Systems used (identify which systems were provided by Proposer and maintained by Proposer):~~
~~Describe pricing functionality provided and maintained by Contractor:~~
~~Comparison to NCTA requirements:~~

~~Installed System and Operations and Maintenance documented performance, as applicable:~~
~~Key Personnel involved and role who are also proposed on NCTA project:~~

Form D-5
Reference Forms Part 2

(A Word version of the Reference Forms Part 2 is "paper clipped"
to this NCTA RTCS Exhibits file for ease of completion.)

Proposer shall use this form for Key Personnel Team member references. Each reference provided may be contacted. Copy this form as needed to comply with the requirements of the RFP and the number of references cited.

Key Team Member _____

Proposed Position _____

Reference Company Name:		
Address:		
City:	State:	Zip Code:
Phone Number:	Fax Number:	
Project Manager:		
E-mail:		
Number of total years' experience of Key Personnel team member in similar role to one proposed for NCTA:		
Reference Project:		
Key Personnel team member role on reference project, including dates of participation and job description:		
Description of reference project location, scope, cost, start / end dates, etc.:		
Operational functionality, number of lanes, plazas, revenue collected, ORT, AET or Express Lane, etc.:		
Relevant systems used (such as dynamic pricing, OCR, ITS elements):		
Key Personnel team member's major contributions and highlights:		

Form D-6

Requirements Conformance Matrix

(An Excel Version of the forms are "paper clipped" to this NCTA RTCS Exhibits file for ease of completion.)

Exhibit D-6: Instructions for Completing Requirements Conformance Matrix

1) The Proposer must complete and submit the Excel version of the Requirements Conformance Matrix which is provided in PDF form in Exhibit D-6: Requirements Conformance Matrix. The Excel version of the Workbook shall be downloaded from NCTA's Website at

2) The Matrix cover each of the requirements set forth in Section III, Scope of Work and Requirements.

3) Proposers shall not alter the requirements listed in the Requirements Conformance Matrix in any way and must use the workbooks provided. The Proposer shall submit a PDF version of the completed Matrix in Technical Proposal Section 6, in addition to submitting the Excel version of the Matrix on CD/DVD, as directed in Section 2.1 Submission of Technical Proposal.

4) The following are instructions for completion of the Section I and II of the Requirement Matrix worksheet.

a) There are seven columns in the - Section I and II of the Requirement Conformance Matrix worksheet as follows:

i. No. (Column A): A sequential number that matches the requirement number in the Requirements.

ii. Requirements (Column B): A description of each requirement.

iii. Status (Column C): Proposer must select one of the four (4) response codes for each Requirement and enter it in this column as further detailed in item "b)" below.

iv. Customer Name and Location, If Applicable (Column D): Proposer must indicate the Customer Name and Location where the functionality was deployed or implemented if the requirement is identified as base or modified. If the software was deployed at more than one customer, the Customer Name and Location is only required for a single customer.

applicable (NA).

vi. Subcontractor Name and/or 3rd Party Product/Vendor, If Applicable (Column F): If the functionality is provided by a Subcontractor or third party then please enter the name of the party/product.

vii. Comments (Column G): This field must be completed if the Status code is entered as "N = not provided" for the particular requirement in order to explain why the Proposer is not complying with this Requirement.

b) Proposers must complete the Status (Column C) in the following manner:

i. Base Product = B: Enter an "B" in this column if the requirement described is already incorporated into the Proposer's baseline system and is provided in the proposed Roadside Toll Collection System.

ii. Base Modified = M: Enter an "M" in this column if the functionality exists and is provided in the proposed Roadside Toll Collection System but needs to be modified to meet the requirement.

iii. New Development = D: Enter a "D" if the Proposer's baseline system does not currently have the required functionality but the functionality will be provided in the proposed Roadside Toll Collection System and will be developed to meet the

iv. Not Provided = N: Enter an "N" if the Proposer will not provide the functionality and will not meet the requirement as part of its Proposal. If any row in the Status column is completed as "N" then Proposer must provide an explanation in the Comments (column G) in the corresponding row. The comment field may reference information that is included elsewhere in the

5) The following are instructions for completion of the Section III, IV, V, VI, and VII of the Requirements Conformance Matrices

a) There are four columns in each matrix as follows:

i. No. (Column A): A sequential number that matches the requirement number in the Requirements.

ii. Requirements (Column B): A description of each requirement.

iii. Compliance (Column C): Proposer must select one of the two (2) response codes for each Requirement and enter it in this column as further detailed in item "b)" below.

iv. Comments (Column D): This field must be completed if the Compliance code is entered as "N = no" for the particular requirement in order to explain why the Proposer is not complying with the Requirements.

b) Proposers must complete the Compliance (Column C) in the following manner:

i. Yes = Y: Enter a "Y" in this column if the requirement described will be provided in the proposed Roadside Toll Collection

ii. No = N: Enter an "N" if the Proposer will not provide the functionality and will not meet the requirement as part of its proposal. If any row in the Compliance column is completed as "N" then Proposer must provide an explanation in the Comments (Column D) in the corresponding row. The comment field may reference information that is included elsewhere in the proposal.

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
1. ROADSIDE TOLL COLLECTION SYSTEM (RTCS) – FUNCTIONAL REQUIREMENTS						
1.1 Projects Overview						
	The Scope of Work involves implementing the Roadside Toll Collection System (RTCS) on two Projects which are located on two separate Toll Facilities, the Triangle Expressway (TriEx) and the Complete 540 (C540), as further discussed below. A map of the project area is show below in Figure 1. The Contractor will be responsible for the following for the Contract Term:					
	· Roadside Toll Collection System for Triangle Expressway, including the new Morrisville Parkway Interchange, and for Complete 540					
	· Roadside Toll Collection System Operations and Maintenance					
	· ITS Replacement for TriEx, ITS Installation for C540, and ITS Maintenance					
	· Toll Facilities Maintenance					
1.1.1 Triangle Expressway						
	The Triangle Expressway is an 18.8-mile toll road that extends the partially-complete "Outer Loop" around the greater Raleigh, North Carolina area from I-40 to NC-55 Bypass, and is comprised of two sections: Toll NC-147 and Toll NC-540. Toll NC-147 includes 3.4 miles of toll road between I-40 and Toll NC-540 and includes interchanges at Hopson Road, Davis Drive, and NC-540. Toll NC-540 includes 15.4 miles of toll road between NC-54 in western Cary and the NC-55 Bypass near the Town of Holly Springs. This section includes interchanges at NC-54, NC-55, Green Level West Road, US-64, S. Salem Street, US-1 and NC-55 Bypass. An illustration of the Triangle Expressway is depicted in Figure 2.					
	The TriEx is an existing All Electronic Tolling (AET) facility and includes the following:					
	· Automatic Vehicle Identification (AVI) and Image-based tolling;					
	· Four (4) mainline Tolling Locations (8 Toll Zones) with three (3) lanes and two (2) shoulders in each direction;					
	· Six (6) ramp Tolling Locations with twelve (12) ramp Toll Zones;					
	· Two (2) planned new ramp Toll Zones on the Triangle Expressway at the new interchange for the Morrisville Parkway Interchange extension;					
	· Dual gantry design – gantry spacing between columns of 50 feet with connecting center-lane truss members and details to be determined during Design; and					
	· An asphalt roadway surface through the Toll Zone for all ramp Tolling Locations except for one (2-1 T29). All other remaining Tolling Locations, including all mainline Tolling Locations, have a concrete roadway surface through the Toll Zone.					
1.1.2 Complete 540						
	The Complete 540 Project (C540), is a proposed highway facility on a new location, extending the Triangle Expressway approximately 28 miles from the NC 55 Bypass in Holly Springs to the US-64/US-264 Bypass in Knightdale, completing the 540 Outer Loop.					
	Currently, the C540 Project is expected to be constructed in two phases. Phase 1 will consist of 17.8 miles from NC 55 to I-40 with construction expected to start in August 2019 and opening to traffic in January 2022. Phase 2, which is not included in the Scope of this Contract, will consist of 10.2 miles from I-40 to US-64/US-264 with construction expected to start in 2027 and opening to traffic in 2031.					
	The Complete 540 Project will be an AET facility and includes the following:					
	· AVI and Image-based tolling;					
	· Phase 1 (Segments 1 & 2): Six (6) mainline Toll Zones with three (3) lanes and two (2) shoulders in each direction;					
	· Optional Future Scope: Phase 2 (Segment 3): Six (6) mainline Toll Zones with three (3) lanes and two (2) shoulders in each direction;					
	· Dual gantry design – gantry spacing between columns of 50 feet with connecting center-lane truss members and details to be determined during Design; and					
	· The roadway surface through the Toll Zones will be determined during Design.					

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
	Forecasted transactions for the Triangle Expressway and Complete 540 Project are provided in ***Attachment 1 – Future Project Transactions***. NCTA does not guarantee that these transaction levels will occur.					
1.1.3	General Description of Scope of Work					
	The Contractor shall procure, furnish, Design, test, install, operate and maintain the toll facilities, including all aspects required to create a complete NC Quick Pass (Transponder-based) or Bill by Mail (image-based) transaction and transmit the transaction from the roadside to the NCTA Customer Service Center (CSC) Back Office. The Scope of Work also includes review and verification, Digital Video Audit System (DVAS), and Toll Host System. Additionally, the Contractor is expected to provide a Complete Transaction, (including fully formed AVI transactions or fully formed, image reviewed, and verified image-based transactions) for processing, reporting, and reconciliation with the NCTA CSC Back Office. The RTCS components shall include all **Roadside Systems** and **Roadway Support System** to provide complete and properly formed transactions ready for processing by the NCTA CSC Back Office.					
	The Roadside Systems shall be located at the Tolling Locations and shall include, but not be limited to, the following:					
	· Toll Zone Controller;					
	· Automated Vehicle Identification (AVI) System provided by NCTA for integration by the Contractor;					
	· Image Capture & Processing Systems (ICPS);					
	· Automatic Vehicle Detection and Classification (AVDC);					
	· Interfaces to roadside Wrong-Way Vehicle electronic signs and alert/warning notification processing;					
	· Supporting electronics, devices, and associated communications Equipment; and					
	· Facility Servers (optional) to support transaction and image processing, storage, and forwarding from the roadside Tolling Locations.					
	The Roadway Support System (RSS) shall be located at the Statewide Transportation Operations Center (STOC) or at a Triangle Expressway equipment vault (location to be Approved by NCTA during System Design) and shall include the following:					
	· Toll Host System (including transaction processing, reporting, image review screens for image processing, and automated image processing);					
	· Integrated Digital Video Audit System (DVAS);					
	· Integrated Maintenance Online Management System (MOMS);					
	· All required local, metro, and wide area networks;					
	· Critical Environmental Monitoring System (CEMS); and					
	· Access Control and Security Monitoring System (ACSMS) for Tolling Locations and equipment vaults.					
	In addition, the Scope of Work and Requirements for the RTCS includes Project Management, Documentation, Design, Development, integration of a turn-key solution, testing, installation, Commissioning, Maintenance, and Operations - including license plate image verification to provide accurate, fully formed and verified transactions to the NCTA CSC Back Office for processing.					
	For Triangle Expressway, the Contractor shall plan and implement a transition to the RTCS that does not impact revenue collection and minimizes inconvenience to customers. The existing Triangle Expressway AET Lanes are shown in the as-built drawings contained in ***Attachment 2 – NCTA TriEx ORT Lanes "As-Built" Drawings, Attachment 2A – NCTA TriEx AVI System Retrofit "As-Built" Drawings*** and ***Attachment 3 – NCTA TriEx – Veridea Installation Drawings***. In addition, the NCTA is providing a list of existing equipment and quantities listed in ***Attachment 4A – NCTA TriEx Existing Inventory***. The Contractor shall reuse the existing equipment vault buildings and may reuse the existing computer racks, equipment cabinets, and security cameras. All other existing equipment shall be replaced as listed in ***Attachment 4A*** to meet the Requirements of this Scope of Work and Requirements and all Performance Requirements.					

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
	For the Complete 540 Project, the Contractor shall coordinate with the NCTA, the Civil Designer, and the Complete 540 Design Build Team (the "Constructor"), for all toll System construction-related activities anticipated for this RTCS Project. The Contractor shall provide toll System Design specifications to the Constructor and shall be required to review the engineering Design and provide feedback and potential impacts of the Toll System and ITS installation and performance early in the Design process.					
	The Contractor shall procure, furnish, and install ITS components to meet the Requirements of this Scope of Work and Requirements for TriEx (including Morrisville Parkway Interchange) and C540 as described in detail in ***Attachment 18 – NCTA ITS Technical Requirement***. The Contractor shall provide new Microwave Vehicle Detectors (MVD), closed circuit television (CCTV) cameras, and Roadway Weather Information System (RWIS) sensors to replace and upgrade existing ITS equipment on the TriEx and shall procure, furnish, and install ITS infrastructure for the C540 as defined in ***Attachment 4B – NCTA TriEx ITS Inventory & Equipment Refresh, Attachment 4C – NCTA New ITS Installations for C540 and Morrisville Parkway Interchange,*** and ***Attachment 5 – NCTA TriEx & C540 ITS Summary***. The Contractor shall be responsible for the Maintenance of all ITS elements and Toll Facilities on both Projects.					
	It is the intent of the Requirements to permit the Contractor the flexibility in the Design and Development of the RTCS to reflect innovation and state-of-the-art, proven technology that is fully capable of meeting the required operational, performance, and contractual Requirements. Further, it is the intent of NCTA to provide the Contractor with a set of Performance Requirements, as detailed in Section 6.6 and Section 8, that are not overly prescriptive and reflect the minimum tolerable performance expected of the Contractor to avoid unnecessary impact to the NCTA or performance measurement and verification, to the Contractor for performance compliance reporting, and to customers or the general public.					
	The Contractor shall be responsible for furnishing and mobilizing all required Equipment, facilities and resources to carry out this Scope of Work and to meet Contract Requirements. This includes but is not limited to mobilization; local office space; installation equipment storage; demobilization and site clean-up; all permits, licenses, fees, insurance and bonds; coordination and cooperation with NCTA, third parties, Constructor, NC Quick Pass and E-ZPass Group agencies; maintenance of traffic (MOT); development and production of Documentation, Design drawings, Plans and schedules; training; testing; safety; cooperation with NCTA rules regarding security and revenue control, and Quality Assurance and Quality Control.					
1.2	**Roadside Toll Collection System – General Requirements**					
1.2.1	Hardware and Software General Requirements					
1	All Hardware and Equipment supplied under this Contract shall be new and certified to have a ten (10) year minimum service life. Materials and products that have been previously used for development work or the Contractor's internal testing, or items that have been salvaged or rebuilt shall not be permitted to be used in connection with this Contract., unless specifically Approved in writing by NCTA prior to their use. Reuse of any existing equipment on the TriEx shall be submitted to NCTA for Approval.					
2	All components, supplies and materials furnished under this Contract for the Roadside Toll Collection System (RTCS) shall be new, Commercial Off-the-Shelf (COTS) and field proven in revenue Operations.					
3	All components procured, furnished, and installed by the Contractor shall be available through multiple sources identified by the Contractor and the names of such sources shall be included in the Bill of Materials (BOM) and readily available to NCTA, unless otherwise Approved by NCTA during Design.					
4	The NCTA shall have the right to purchase third-party Equipment directly from the Equipment vendor.					
5	All Hardware and Software provided under this Contract shall be supported by their manufacturers, and shall be Upgradeable, maintained, Updated, patched and secured throughout the Contract Term.					
6	Proof of purchase in the form of purchase orders, dated invoices and shipping bills shall be retained by the Contractor and furnished to NCTA in accordance with the Requirements of this Scope of Work and Requirements and the Contract.					

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1.2.1.1.	*Maintainability*					
7	The RTCS Hardware shall be Designed with the following specifications:					
	a) modular, replaceable and repairable components to allow for efficient Maintenance;					
	b) all replacements shall be plug compatible with no changes required;					
	c) all components that perform the same function shall be interchangeable;					
	d) all zone controllers shall be Designed such that they are identical and can be configured to operate through the addition of Hardware pluggable modules and setting of appropriate Software parameters at the specific number of lanes at each site as shown in ***Attachment 2 – NCTA TriEx ORT Lanes "As-Built" Drawings, Attachment 2A – NCTA TriEx AVI System Retrofit "As-Built" Drawings, and Attachment 3 – NCTA TriEx – Veridea Installation Drawings*** for TriEx and at each of the mainline Toll Zones for C540;					
	e) zone controllers shall be expandable for at least one additional travel lane to accommodate for future growth without major Hardware or Software modifications;					
	f) where possible, all in-lane Equipment shall use TCP/IP network protocol to communicate with the zone controller;					
	g) Contractor's electronic Design and installation shall prevent electrical disturbances and noise in the electronics;					
	h) All expansion bus (for example PCIe) shall have a minimum of two (2) spare slots to support the addition of components;					
	i) all field wiring shall be terminated on screw lugs or connectors and all connectors shall be keyed or polarized to prevent incorrect connections;					
	j) all wiring and connectors shall be labeled and strain relief shall be provided to protect the conductors;					
	k) surge suppression shall be provided for all field wiring susceptible to lightning or similar surges;					
	l) all lane Equipment shall be fused and protected against over current, over voltage, under voltage and lightning;					
	m) redundant power supplies shall be provided for all required internal DC voltages; and					
	n) all Equipment shall be properly grounded to ensure the safety of Maintenance personnel.					
8	If inductive loops are used for tolling, all splices between loop wire and lead-in cable must meet ***Attachment 6: NCDOT Roadway Standard Drawing 1725.01*** (Sheet 3 of 3); alternate splicing methods shall be approved by NCTA.					
1.2.1.2.	*Diagnostics*					
9	Maintenance personnel shall have easy access to components, and removal, testing, and replacement shall not require extensive effort or tools. All test points necessary to diagnose the Equipment while in operation shall be easily accessible and Light Emitting Diode (LED) indicators shall be provided to assist technicians to identify and diagnose problems.					
10	Equipment mounting and installation Design shall support the Maintenance of Equipment from below on toll gantries as applicable to each Toll Zone.					
11	Technicians shall have the ability to connect a laptop authorized by NCTA in accordance with NCTA policies to troubleshoot the components. Technicians shall have secured and remote access to the device to monitor its status and to perform diagnostics when the lane is in operation.					
12	For easy diagnostic and troubleshooting, all error and event logs shall be consolidated such that all events and errors associated to a transaction are in a single log. The consolidated error and event logs shall be retained online for a Configurable period of time and shall be easily accessible to the technicians.					
13	The consolidated error and event logs shall also be transmitted to the MOMS and available to Authorized User in viewable form. Search and filter capability shall be provided to display and review data in the consolidated log for up to 180 Days of backlog.					
14	All diagnostics performed on the Roadway System shall be recorded and automatically reported to the MOMS, including the technician ID, the time the Maintenance was performed, and all status and recovery messages.					

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15	All diagnostic Software and specialty tools required for support of Maintenance activities shall be supplied by the Contractor and NCTA shall have full rights and access as further defined in the Contract to such diagnostic Software and specialty tools.					
16	All diagnostic Software intended for laptop PCs shall function under the State approved version of Microsoft Windows operating system.					
17	All software and operating systems shall meet the NCTA's most current technology standards; all such Software and Equipment shall meet the security standards set forth in ***Attachment 7: State of North Carolina, Statewide Information Security Manual.***					
1.2.1.3.	*Customized Hardware*					
18	If customized components or controllers are used, the Contractor shall provide detailed Documentation on the Design, production and testing of these units and shall provide usage rights to NCTA. Documentation shall include electronic diagrams, component layouts and the detailed Bill of Material listing manufacturers/vendors. The Contractor shall identify all customized components and controllers and indicate their plan to make them available for the Contract Term, including the option for placing in escrow.					
1.2.1.4.	*Equipment Cabinets/Enclosures*					
19	All in-lane Equipment controllers and RTCS electronics, devices, servers and associated communications Equipment shall be installed inside environmentally controlled Equipment cabinets at the roadside or inside the vault at each Tolling Location depending on the type of Toll Facility and according to a layout Approved by the NCTA. The Contractor shall purchase and install the cabinets in accordance with the Requirements of this section.					
20	The cabinets shall have monitoring sensors (including humidity and temperature) and if environmental conditions inside the cabinets exceed the Configurable threshold, alarms shall be generated and reported to the MOMS. There shall be no loss of data in such conditions and the integrity of the System shall be maintained.					
21	It is the Contractor's responsibility to provide the cabinets of the correct size that meets the Requirements of this Scope of Work and Requirements and NCTA AET Standard Drawings. Cabinets shall have adequate space (25% extra) for added boards, servers and components for future expansion.					
22	The cabinets shall support the RTCS components for a minimum of ten (10) years.					
23	Access to all Equipment cabinets shall be recorded automatically and reported to the MOMS. The data reported shall include, but not be limited to cabinet status; date; time of door open; time of door close, and any applicable alarm conditions.					
1.2.1.5.	*Environmental*					
24	The RTCS Equipment to be supplied will be installed in areas exposed to the range of climatic conditions found in North Carolina. In addition to the climatic conditions, the Equipment will also be subjected to harsh environmental factors normally found in the operation of a toll lane, such as, but not limited to, car, truck, and bus emissions; industrial exhausts; industrial cleaners; gasoline and car lubricants; Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI), and vibrations. These conditions shall be taken into account in the Design and selection of Equipment used on this Project and the Contractor shall ensure that the System works accurately and reliably in such environment.					
25	Lane electronics, zone controllers, Image Capture & Processing System (ICPS) controllers/servers, AVDC systems and other components shall be able to operate in the enclosed environment of the roadside cabinets or Equipment racks installed within the vaults.					
26	All Hardware provided under this Contract shall be corrosion resistant and remain corrosion resistant for the Contract Term or ten (10) years, whichever is greater.					
27	All lane Equipment and devices shall be Designed to handle snow, heavy rain, fog and mist-like conditions and there shall be no degradation in the System performance under such environmental conditions.					

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28	The lane Equipment and devices not in environmentally controlled conditions shall operate with no degradation of performance in ambient air temperature of negative thirty (-30) to fifty-five (55) degrees Celsius, with and without direct sunlight, and relative humidity of five to one hundred percent (5% to 100%) for Equipment installed in an outside environment and five to ninety-five percent (5% to 95%) non-condensing for Equipment installed inside cabinets.					
29	During the Design phase, the Contractor shall provide specification sheets that prove the zone controller and supporting lane electronics, devices, and associated communications Equipment, meet the environmental specifications given above. Results of all environmental tests conducted shall be provided to NCTA for Approval.					
30	All exposed in-lane Equipment, when in its fully assembled configuration, shall not be damaged, nor shall operational performance or expected lifetime be degraded. During the Design phase, the Contractor shall provide specifications for the in-lane Equipment for NCTA Approval.					
1.2.1.6.	*Assembly*					
31	All customized Hardware shall be assembled and tested in the Contractor's fabrication/assembly facilities before being installed in the lane in accordance with NCTA Approved test Plan for customized Hardware. All chassis, attachments, and Hardware shall be fabricated with stainless steel, hot dipped galvanized or other materials resistant to salt exposure and corrosion.					
32	All customized Hardware shall be identified and shall undergo a seventy-two (72) hour burn-in test before they are installed in the lanes, in accordance with NCTA Approved test Plan.					
33	Customized Hardware assembly shall facilitate easy replacement of failed components in accordance with Requirements of this Scope of Work and Requirements.					
1.2.2	Bill of Materials					
34	The Contractor shall include the Bill of Materials (BOM) for all Equipment and Hardware supplied for the RTCS. The second manufacturer source for all Equipment and Hardware shall be included with any exceptions noted and explained. During the Design phase the BOM shall be finalized and all changes shall be subject to the Approval of NCTA.					
35	Prior to purchase of any Equipment and as part of its Design the Contractor shall submit the final BOM to NCTA for Approval. No Equipment shall be purchased by the Contractor prior to Approval of the BOM and the Design, unless otherwise authorized in writing by NCTA.					
36	All Hardware and Software procured under this Scope of Work and Requirements shall be confirmed to be the latest model/version at the time of purchase with the required warranty, security, Maintenance and support Services as specified in this Scope of Work and Requirements.					
37	Updates to the BOM shall be provided by the Contractor whenever Equipment and Hardware changes occur and at a minimum on a semi-annual basis over the Contract Term. All Equipment and Hardware changes shall be subject to the Approval of NCTA.					
1.2.3	Spare Parts and Support					
38	The RTCS procured, furnished, and installed under this Contract shall allow the Contractor to Maintain and replace tolling and ITS parts for the Contract Term. The Contractor shall maintain a sufficient level of spares required to meet Performance Requirements.					
39	This Contract includes the initial quantities of spare parts required for the operation of the Tolling Locations during the Contract Term. Costs for the replacement of spare parts during the Contract Term shall be the responsibility of the Contractor.					
40	At the end of the Maintenance term, all spare parts inventory shall be turned over to NCTA at one hundred percent (100%) inventory level. The Contractor shall identify (via the MOMS) the warranty status for each piece of Hardware and warranty period remaining, if applicable.					
1.2.4	RTCS Software					

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			If Applicable	Source	If Applicable	
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41	The operating systems, database, other third-party Software, and RTCS Software procured, furnished, and installed by the Contractor shall support real time Operations of the lane and shall be field proven.					
42	The operating systems shall have a clear and documented future Upgrade path and shall be supported for a minimum of (10) years. The Contractor shall ensure that the risk of obsolescence to the Hardware is minimized through the selection of the operating System Software and the peripheral Hardware.					
43	All RTCS Software developed, furnished, and installed under this Contract shall be warranted against Software defects, security vulnerabilities and deficiencies for the life of the Project.					
44	The Contractor shall provide at their cost an annual information security risk assessment and a vulnerability scan performed by a third-party Approved by NCTA and in consultation with NCDOT IT Security. The Contractor shall provide the assessment results to NCTA.					
1.2.5	RTCS Toll Facility and Lane Configurations					
45	The RTCS shall support AET Facilities as described in the Scope of Work and Requirements.					
46	The RTCS shall support the lane configurations in ***Attachment 2, Attachment 2A, Attachment 3, and Attachment 19*** and dimensions detailed below for each type of Toll Facility.					
47	Shoulder lane and travel lane widths will vary by facility, location, lane type and zone, and are detailed in ***Table 1: Triangle Expressway Toll Zone Lane Configurations, Table 2: Morrisville Parkway Interchange Toll Zone Lane Configurations, and Table 3: Complete 540 Phase I Toll Zone Lane Configurations.*** Travel lanes shall be equipped with the required toll collection subsystems to accommodate the variation in widths and road curvature. During the detailed Design period, the Contractor shall make the required adjustments to the System Design to accommodate for variations in the actual lane widths and curvature. Travel lane widths shall be assumed to be:					
	a) Triangle Expressway All-Electronic Tolling (AET) lanes include a total of four (4) mainline Tolling Locations, generally with three (3) lanes and two (2) shoulders for a total of eight (8) Toll Zones, and a total of six (6) ramp Tolling Locations with twelve (12) ramp Toll Zones. The Morrisville Parkway Interchange will add two (2) ramp Toll Zones.					
	b) Complete 540 All-Electronic Tolling (AET) lanes are planned for two phases. Phase I will include six (6) mainline Tolling Locations, including a total of twelve (12) Toll Zones, each with three (3) lanes and two (2) shoulders. Phase II of Complete 540 is not included in this project, unless the option is exercised by NCTA.					
48	Shoulder lanes with widths greater than four (4) feet shall be equipped with rear-only Image Capture & Processing Systems (ICPS), and sensors to trigger the cameras and detect and frame the vehicle traveling on the shoulder, as required to meet Performance Requirements. Sensor layout and Toll Zone Design shall ensure that narrow shoulders have full coverage to correctly detect and process vehicles straddling the shoulders.					
1.2.6	Roadside Access Requirements					
1.2.6.1.	*Vault / Enclosure Access*					
49	The Contractor is responsible for the security of all Hardware and shall control access to the vaults and enclosures via the Access Control and Security Monitoring System. Contractor personnel shall use only assigned, individual proximity cards/keys and shall not share cards/keys with any other individuals or make copies of any assigned cards/keys. Contractor personnel shall immediately return all assigned cards/keys to NCTA upon request.					
1.2.6.2.	*Toll System Software Security*					
50	Accounts for user access to the System shall require a strong password in accordance with password management standards in ***Attachment 7: North Carolina, Statewide Information Security Manual***. The access shall be role based and limited to the authorized Contractor staff and designated NCTA personnel.					
51	User access security, including sign-on facilities, permission control and access privileges for different levels shall be provided for the files, directories and application Software and shall be fully Configurable by a system administrator.					

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52	Remote access to all RTCS systems shall be VPN client-based and controlled through a central repository with each user having a unique log-in. The RTCS systems shall be able to operate in stand-alone/local mode when communications are disrupted.					
53	User sign-on, access and access failures, both local and remote, to any element of the RTCS shall be recorded and tracked for security audit proposes and reported to the MOMS. The System shall continuously and automatically monitor for unauthorized access; access violations shall be reported to the MOMS as Priority 1 alert. These reports shall be provided to NCTA within twelve (12) hours of discovery.					
54	The Contractor shall develop the access levels, user roles and privileges matrix during System Design with NCTA input and Approval. The System shall allow for additional changes to the access levels, user roles and the addition of personnel in a secure manner.					
55	A system level account shall be provided for NCTA security systems to perform "credentialed" scans. Additionally, NCDOT IT Security can request the Contractor to perform any scans and ensuing reports through the term of the Contract.					
56	The Contractor shall not circumvent NCTA Approved System security. All access to the System and Approved changes made shall be recorded, monitored, reviewed and audited. Specific requirements for this shall be developed by the Contractor during System Design.					
57	Authorized Users shall have access to the zone controller user access logs to audit the System access.					
1.2.7	Roadside System Subsystems					
1.2.7.1.	*Automatic Vehicle Identification (AVI) System Integration*					
58	The AVI System used on the Project will include Kapsch MPR II readers and antennas. NCTA will provide the AVI System through a selected AVI vendor based upon the quantities determined by the Contractor in consultation with and Approval by NCTA. NCTA will provide all AVI readers and antennas. The AVI Equipment provided will be compliant with the NCTA Interoperable Partner and National Interoperability requirements.					
59	For the TriEx integration, the Contractor shall reuse the existing Kapsch MPR II Readers and Antennas.					
60	The Contractor shall take delivery of the AVI System Equipment and the Contractor shall be responsible for the AVI System Equipment installation, integration and Maintenance upon delivery.					
61	The Contractor shall integrate the RTCS with the NCTA-provided AVI System at the Tolling Locations specified in this Scope of Work and Requirements. These integration Requirements shall include all the following anticipated protocols to be supported by the RTCS in no specific order of precedence:					
	a) PS111 (TDM/IAG E-ZPass Group)					
	b) ISOB_80K (SeGo)					
	c) ISOC (ISO 18000-63/6C)					
62	The RTCS shall support AVI readers that have redundancy.					
63	The Contractor shall maximize any inherent redundancy built into the AVI readers whereby the failure of the master or primary reader will result in the reporting of the Transponder reads via the slave or secondary reader.					
64	The Contractor shall furnish and install all other Hardware, cabling (including RF, communication, and power cables), connectors and associated mounting fixtures to form a fully functioning AVI System that meets the Requirements of this Scope of Work and Requirements.					
65	The Contractor shall be responsible for the physical tuning of the certified AVI Equipment, and for integrating the AVI System into the Contractor in-lane Design. In addition, the AVI vendor shall certify that the lanes are tuned to the AVI specifications. All AVI installation, configuration and tuning shall be in compliance with the AVI vendor Requirements.					
66	The Contractor is responsible for synchronizing all AVI readers that are at close proximity to the Tolling Locations as required by the AVI vendor.					
67	The AVI System shall provide full coverage at all areas of the Toll Zone/lane to read and report Transponders. Transponders on vehicles straddling the shoulders by a distance of up to four (4) feet shall be read and reported to the zone controller.					

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68	The Contractor shall support adjustments to the antenna quantity and placement based on the final lane configuration.					
69	The RTCS integrated with the AVI System shall have the ability to process Transponders mounted on vehicles traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds of up to 100 mph.					
70	The AVI System shall be able to read the Transponder and report all NCTA Interoperable Transponders and National Interoperable Transponders on vehicles traveling through any area of the Toll Zone, including but not limited to: center of lane, traversing lanes, straddling lanes, and straddling shoulder with no degradation of performance or interference.					
71	The integrated zone controller and AVI System shall be able to read the Transponder and report all NCTA Interoperable Transponders on vehicles traveling through any area of the Toll Zone, including but not limited to straddling the shoulder, center of lane, traversing lanes and straddling lanes with no interference or degradation of performance. The Priority of the processing Transponder protocols will be specified by NCTA during the Design process.					
72	The read zones in the lanes at a Toll Zone shall be tuned such that Transponders in vehicles traveling in the adjacent lanes, but opposite direction of travel, are not reported by the AVI System.					
73	The AVI System will buffer Transponder reads when it is unable to communicate to the zone controller. When communications are restored, the buffered reads shall be reported to and processed by the zone controller.					
74	If more than one Transponder is present in a vehicle, the zone controller integrated with the AVI System shall meet the AVI accuracy Requirements for each Transponder. The Transponders shall be reported separately and transaction association rules shall be in accordance with the Approved Business Rules and Design.					
75	The Contractor shall use the full capability of the selected AVI System to obtain AVI System status in accordance with the manufacturer specifications and report such status to the MOMS. Loss of communication to any element of the AVI System shall be immediately detected by the zone controller and reported to the MOMS. The Contractor-provided monitoring logic shall specifically detect the any AVI failures and generate alarms when failures are detected.					
76	To support remote access to the AVI System, a user interface shall be provided so that Software lane tuning, diagnostics, configuration changes, and other remote support shall be available to NCTA authorized personnel. Setup and configuration of the AVI System shall be achieved remotely and shall not require lane closure except for major lane tuning; when initially installed; or when a reader or antenna is replaced.					
1.2.7.2.	*Automatic Vehicle Detection and Classification (AVDC) System*					
77	The Contractor shall analyze the site conditions and Design, procure, furnish and install the required sensors and Hardware on all lanes at the specified Tolling Locations as part of the AVDC System that performs in accordance with Performance Requirements set forth in this Scope of Work and Requirements under all weather conditions.					
78	The AVDC System shall determine the vehicle axle count and classify vehicles in accordance with the NCTA Vehicle Classification Structure for all travel lanes and shall include the logic to handle the exceptions identified. Classification of vehicles traveling on the shoulder lanes is not required; however, the System shall detect vehicles that travel on the shoulder and trigger the Image Capture & Processing System (ICPS).					
79	The NCTA Vehicle Classification Structure is defined as 2-axle, 3-axle and 4+-axle vehicles with future optional vehicle profiling.					
80	The AVDC System shall accurately detect and classify vehicles traveling in stop and go and bumper-to-bumper traffic, vehicles traveling at speeds up to 100 mph and shall separate vehicles spaced as close as three (3) feet apart.					
81	The AVDC System shall have the ability to detect trailer hitches and ensure that vehicles with a towed trailer are reported correctly as one unit to the zone controller as part of the vehicle transaction data.					
82	The AVDC System shall detect the speed of the vehicle and report the speed to the zone controller as part of the vehicle transaction data.					
83	The Contractor shall ensure that there is full sensor coverage at all areas of the Toll Zone/lane and shoulder to accurately trigger the ICPS and detect and report vehicles traveling the shoulder and vehicles straddling lanes.					

No.			Required Inputs			
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84	The AVDC System shall provide vehicle event messages and signals, and vehicle classification data to the zone controller. Exception conditions processed by the AVDC System shall be included in the transaction data.					
85	The AVDC System shall have adequate redundancy whereby a failure of a single sensor does not completely degrade lane Operations or the System's capability to accurately associate Transponders or captured images with the correct vehicle. Under such degraded conditions, the Contractor shall still be required to meet the System accuracy Requirements.					
86	The Contractor shall Design, procure, furnish and install a secondary sensor and Equipment that are part of the AVDC System as a back-up to support image capture and vehicle framing in the event any element of the primary System fails or is degraded. The System shall determine the conditions (Configurable) that invoke the use of the secondary sensors and Equipment.					
87	The AVDC System shall report its health to the zone controller and shall provide status when polled. Loss of communication to any element of the AVDC System shall be immediately detected and reported. All health and failure status messages shall be transmitted and reported to the MOMS. In the event the primary AVDC System fails, then the secondary sensors shall be used to capture and process images in accordance with Business Rules determined during Design.					
88	In the event there is a Class Mismatch between the AVDC System and the Transponder class, the System shall default to the AVDC class and flag the transaction as an unusual occurrence as defined by the Business Rules during Design. The ability to enable or disable image capture for a Class Mismatch shall be Configurable.					
89	**Wrong-way Vehicle Detection.** The AVDC System shall be able to detect and report vehicles traveling in the wrong direction. In addition, the RTCS shall be able to illuminate Electronic Wrong-Way Vehicle signs that is installed and provided others. The interface to the Electronic Wrong-Way Vehicle sign will be defined during Design.					
1.2.7.3.	*Image Capture & Processing Systems (ICPS)*					
90	The Contractor shall provide an ICPS solution at the Tolling Locations that meets the Performance Requirements continuously 24x7 and under all light and climate conditions.					
91	The Contractor shall Design, procure, furnish, and install all necessary front and rear ICPS Hardware and Software required to support image-based tolling and image processing Requirements as set forth in this Scope of Work and Requirements.					
92	The Contractor shall Design, procure, furnish, and install cameras in sealed enclosures, lighting, necessary image triggers, back-up triggers and the necessary camera controls, and ancillary Hardware and Software required to support the image-based transaction processing Requirements as set forth in this Scope of Work and Requirements.					
93	Camera control Software shall be provided to automatically adjust the cameras to accommodate varying light and weather conditions to maintain adequate brightness and contrast settings, with or without traffic, to ensure optimum license plate information capture under all conditions and time of day.					
94	Contractor shall install high resolution front and rear color cameras to meet the accuracy Requirements. The RTCS System shall provide a region of interest (ROI) of the license plate and a general overview for the purpose of identifying the vehicle with the transaction/image package provided to the NCTA CSC Back Office for image-based transactions.					
95	The ICPS shall capture and process vehicles traveling in stop and go and "bumper-to-bumper" traffic, vehicles traveling at speeds up to one hundred (100) miles per hour, and vehicles with separation as close as three (3) feet apart.					
96	The Contractor shall ensure that there is shoulder coverage and vehicles traveling through any area of the Toll Zone/lane, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes, shall be accurately detected and their images captured and processed in accordance with NCTA Business Rules.					
97	The System shall associate all images captured for a single vehicle to the vehicle transaction including multiple images captured by the front, rear, and overview cameras, including all captured images for a vehicle straddling the lanes.					
98	Lights installed by the Contractor in support of the cameras shall not distract motorists traveling in either direction in the lanes. Contractor shall make no assumption of ambient light and the System shall function without any degradation regardless of the ambient light.					

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
99	The Contractor shall procure, furnish, and install the necessary redundant controllers/servers to support the in-lane ICPS Equipment. The Contractor shall provide robust, industrialized platforms and operating systems (PCs or workstation-type operating systems are not permitted) and the processor speed and memory shall be sufficient to process vehicles in real time to meet the speed and traffic volumes as specified in this Scope of Work and Requirements.					
100	The ICPS servers may be separate from the zone controller servers.					
101	The ICPS shall perform with no degradation under conditions where every vehicle is considered an image-based transaction (100 percent of all transactions, including AVI). Under these conditions the System shall store images at the roadside for a minimum of seven (7) consecutive Days per lane. The System shall provide a Configurable setting for the processing of one hundred (100) percent image-based transactions.					
102	The ICPS shall buffer images (retaining an image until its disposition is known) such that no image is lost in order to support multiple vehicles in the lane and in accordance with NCTA Business Rules. AVI transactions that successfully post to customer accounts will not require image review processing.					
103	The controllers/servers shall support standalone Operations and the roadside storage media shall be sized to hold a minimum of thirty (30) Days of images and data per lane at each of the Tolling Locations under normal operating conditions.					
104	When the storage capacity reaches a Configurable utilization percentage (for example 80%), a message shall be transmitted to the MOMS. Images shall be deleted only after it is confirmed/acknowledged that the images have been successfully transmitted to the RSS. Any deletion of images shall be automatic, without user intervention, and shall generate a message to be transmitted to the MOMS (Configurable).					
105	The ICPS controllers/servers architecture shall have sufficient reliability and/or redundancy such that failure of a processor, the communications, board, power supply, disk or other critical unit does not result in loss of images and data.					
106	In the event communications to the ICPS are lost or any ICPS Hardware becomes non-operational, the Contractor Design shall ensure that no images and/or data are lost and that all images and associated data are transmitted to the RSS.					
107	The Contractor's Design shall guarantee transmission of the images and data from the Roadside Tolling System to the RSS and on to the existing NCTA CSC Back Office and shall provide the capability to reconcile images to the transaction data.					
108	The Contractor provided RTCS and network architecture shall support the image throughput Requirements specified in the Scope of Work and Requirements.					
109	The ICPS shall be capable of transferring images and associated data to the RSS in real-time or in batch mode depending on the ICPS solution and the location of the optional OCR/ALPR Software. The System shall provide one hundred percent (100%) reconciliation of all images captured and transferred.					
110	The ICPS shall be capable of continuously performing diagnostics and reporting its health to the zone controller or the MOMS. Loss of communication to any element of the ICPS shall be immediately detected. All health, failure and recovery status messages shall be transmitted and reported to the MOMS.					
111	The Contractor shall provide Software tools for verifying the image quality in real-time and adjusting and tuning the images remotely.					
1.2.7.4.	*Optical Character Recognition (OCR)/Automatic License Plate Recognition (ALPR)*					
112	The Contractor may choose to provide OCR/ALPR Software for determining the license plate data (number, jurisdiction and plate type). The OCR/ALPR Software may reside at the RSS level, or the Roadside System level, as long as it meets the performance and functional Requirements specified in this Scope of Work and Requirements.					

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
113	The System shall correctly identify the jurisdiction (state/province), plate type, special characters and stacked characters, and accurately determine the license plate number and provide the result in the required DMV format so that the CSC may process without any additional manipulation as required in ***Attachment 8: NCTA CSC Back Office System RTCS File Exchanges – Interface Control Document (DRAFT).*** The Contractor shall take into consideration individual state license plate characteristics for the identification of stacked characters, specialty plates, etc. ***Attachment 9: NC License Plate Guidebook (Updated 03-24-14)*** is being provided as guide on the specialty plate types observed in North Carolina.					
114	The System shall meet the image processing Performance Requirements specified in this Scope of Work and Requirements. For informational purposes only, the license plates for the top twelve (12) states observed on NCTA roadways currently are North Carolina, Virginia, West Virginia, Florida, South Carolina, Georgia, Pennsylvania, New York, Texas, Tennessee, Maryland, and Ohio.					
115	There shall be no backlog in the processing of images for obtaining the license plate data (number, jurisdiction and plate type) and there shall be server redundancy whereby standby servers are available immediately and fully operational in the event of a failure.					
116	Any OCR/ALPR Software procured, furnished, and installed under this Contract shall include Software that enhances and improves the accuracy and efficiency of the OCR/ALPR process.					
117	Authorized Users shall have the ability to configure the Business Rules for auto processing images whereby images identified for auto processing may by-pass manual image review. Criteria for auto processing shall include but not be limited to:					
	a) jurisdiction;					
	b) license plate type;					
	c) confidence level of the license plate number and State;					
	d) vehicle class;					
	e) matching front and rear license plate data; and					
	f) license plate on the error plates list.					
118	For those images that are identified for manual review, the RTCS shall associate all images captured for a vehicle as it travels through each of the Tolling Locations on a Toll Facility, assign them a unique identifier and transmit the images to the RSS for image review.					
119	The images identified for the NCTA CSC Back Office billing and processing shall include, at a minimum, the best and most appropriate front or rear full compressed overview image and the associated ROI image. If a front LP is provided as the ROI image on a vehicle with greater than two axles, the front overview image shall be provided. Other images shall be made available upon request. If the vehicle has two rear license plates the ROI from the image that resulted in the highest OCR confidence shall also be included in accordance with the Approved ICD.					
120	The image data associated to each transaction shall be included in the transaction package transmitted to the RSS and then on to the NCTA CSC Back Office.					
121	The image data shall include, but not be limited to:					
	a) transaction data;					
	b) license plate data, including license plate number, jurisdiction and plate type;					
	c) accept or reject image status, and reject reason (if rejected);					
	d) confidence level of the OCR results for individual characters and overall license plate number; and					
	e) confidence level of the jurisdiction.					
122	The ICPS shall provide the capability of detecting image quality degradation in near real-time and generate alarms that are reported to MOMS when image quality impacts OCR/ALPR or manual image processing performance.					
123	For audit and Maintenance purposes, authorized personnel shall have the capability to view all the images in real time on any device connected to the RTCS network and verify the OCR/ALPR or manual image processing performance.					
1.2.7.5.	*Image Review System and Image Review Services*					

No.			Required Inputs			
		Status	If Applicable	Source	If Applicable	Comments
	Requirements	B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
124	The Contractor shall deliver a fully integrated Image Review System and perform Image Review Services in order to provide fully formed transactions, which are ready for processing by the NCTA CSC Back Office System.					
125	The image review process instituted by the Contractor shall allow the Contractor to meet the Performance Requirements set forth in the Contract Documents. If the approved image review process requires supervisory review or Quality Control review, then supervisor and Quality Control review shall be performed.					
126	Based on the Approved NCTA Business Rules, those images that require manual review shall be available in the Image Capture and Processing System (ICPS).					
127	The Image Review System shall provide the capability to utilize OCR results to filter license plates/images that match specified states and license plate types that cannot be processed.					
128	The image review process shall be designed to meet the license plate accuracy Requirements specified in the Scope of Work.					
129	The Image Review System shall provide image review enhancement tools to permit the Contractor to meet the image review accuracy and Performance Requirements.					
130	The screens, enhancement tools and navigation methods shall be optimized for speed, reliability, and accuracy.					
131	Any enhanced image that results from the manual review process, upon which the license plate determination is based, shall be saved for use in the subsequent processes, in addition to the saving of the original unaltered image.					
132	Image disposition reasons shall be Configurable and shall cover all possible conditions upon which a disposition could be based. These dispositions shall be Approved by NCTA during System Design.					
133	The Image Review System shall automatically queue and present images for manual image review based on Configurable Approved NCTA Business Rules established whereby images that are identifying as requiring manual review and queued for review first-in-first-out (FIFO) based on the transaction time.					
134	The Image Review System shall provide the capability to make available/group all image-based transactions for the vehicle image being reviewed if the vehicle is identified to have driven through other toll plazas on the toll road within a Configurable period of time before and after the time of the current image under review. This will permit image reviewers to review all images associated with a vehicle and enter the license plate information more efficiently and accurately.					
135	The Image Review System shall provide Authorized Users the capability to search for the images and review them.					
136	The Image Review System shall provide consistency in the image review user interface and presentation of images and data at all stages of the image review process, for example, all images associated to license plate transaction shall be made available at all image review stages.					
137	The Image Review System shall require that rejected images have a reject reason and the reject reason can be entered either during the first review or supervisory review. These reject reasons shall be Approved by NCTA during System Design.					
138	The Image Review System shall provide the Configurable capability to queue all rejected images for supervisory review.					
139	The Image Review System shall provide the capability to track the rejected images and generate Maintenance alerts if rejected images are above a Configurable threshold for each lane for a Configurable period of time.					
140	The Image Review System shall provide the capability to track the rejected images and generate operational alerts if rejected images are above a Configurable threshold for an image reviewer for a Configurable period.					
141	The Image Review System shall provide the capability to disposition and track temporary plates as part of the manual review process.					
142	The Image Review System shall provide the capability to track and alert operations if the image reviewer is entering the same value repeatedly over a Configurable period of time, or if the image reviewer is inputting data too quick for quality or too slow for performance.					
143	The Image Review System shall provide the capability for an Authorized User to manage a Quality Control process for image review, per the Approved NCTA Business Rules, including but not limited to: review, correct and approve image processing results using interactive screens and reports.					

No.	Requirements	Status	Required Inputs			Comments
			If Applicable	Source	If Applicable	
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
144	The Image Review System shall provide reports that track the transmission of image-based transactions and their associated images.					
145	The Image Review System shall provide reports that track the errors in the transmission of the image-based transactions and their associated images and their re-transmission.					
146	The Image Review System shall provide a report that allows NCTA to review and audit Contractor-rejected images (up to 50 per page) that shall be sent daily to NCTA in PDF format. The report shall include relevant information about each rejected image-based transaction, including location, date/time, image reviewer, reject reason, and any available OCR/ALPR information.					
147	The Image Review System shall provide reports that allows NCTA to access the results of the review, including but not limited to:					
	a) Contractor/vendor;					
	b) number of transactions transmitted;					
	c) number of images accepted;					
	d) images rejected,					
	e) quantity by reject reasons;					
	f) accuracy; and					
	g) image reviewer.					
148	The Image Review System shall provide image review performance reports that show how many images were reviewed for the selected criteria and the number of images reviewed by each image reviewer by review status/sub-status. Images that by-passed manual review and those flagged as rejects shall be reported, including but not limited to:					
	a) for what reasons;					
	b) at what stage;					
	c) the errors; and					
	d) the stage the error was identified.					
149	The Image Review System shall provide via Dashboard for NCTA use, an image review management tool that displays relevant information, including but not limited to:					
	a) individual image reviewer performance;					
	b) OCR/ALPR performance (if OCR/ALPR is provided);					
	c) image review performance by entity providing the service, for example, third-party image review service provider #1, third-party image review service provider #2, internal image review;					
	d) overall image review performance;					
	e) image review performance broken down by the entity providing image review service; and					
	f) as compared against key performance indicators for each entity providing the service.					
150	The Image Review System shall provide reports that allow NCTA to monitor the image review vendor performance against agreed to KPI, including but not limited to:					
	a) number of images that did not meet review KPI;					
	b) established accuracy KPI;					
	c) variance from accuracy KPI;					
	d) image reject rates; and					
	e) exceptions to the KPI by license plate state.					
151	The Image Review System shall provide reports that display image review trends.					
152	The Image Review System shall have the capability to re-process images that were previously sent to the existing NCTA CSC Back Office, then rejected and returned for correction. These reprocessed images shall be identified on performance reports and accounted for as reprocessed in the monthly performance review.					

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153	For QA and audit purposes authorized personnel shall have the ability to perform image review, utilize image enhancement tools, and enter license plate data independent of the normal image processing workflow. A flexible user interface shall be provided that allows users to select the image review criteria. Data entered through this process shall be available on the RSS.					
154	All data entered through the independent image review QA and audit process described above shall be saved separately from the normal process and shall be available to Authorized Users through reports. Such an audit process shall not impact normal operations.					
1.2.8	Digital Video Audit System (DVAS)					
155	The Contractor shall provide an integrated Digital Video Audit System (DVAS) that provides NCTA the capability to investigate lane performance issues and support NCTA in customer dispute resolution.					
156	The Contractor shall develop, procure, furnish, and install two or more IP addressable, color video cameras as part of the DVAS at each Toll Zone sufficient to meet the Requirements of this section. The cameras installed shall be the same at all Toll Zones.					
157	The DVAS cameras shall have pan-tilt-zoom (PTZ) functionality that allows Authorized Users to remotely control the camera. The DVAS cameras shall revert to the default settings that can be overridden by Authorized Users when no PTZ commands are received within a Configurable time. Alarm messages shall be reported to MOMS when remote controls or setting other than default are detected.					
158	Clear, high quality video of each toll lane shall be provided in accordance with the ambient lighting and/or weather conditions at each Tolling Location.					
159	Authorized Users shall have the ability to individually setup and configure the cameras, and Configurable settings shall be available on a per-camera basis.					
160	The DVAS shall encompass all Equipment and Software necessary to provide the audit capability described herein, including but not be limited to:					
	a) digital cameras and any associated lenses, lighting and sensors;					
	b) interface to the zone controllers to capture event data;					
	c) storage media; and					
	d) application to view real-time video and events and playback the information.					
161	The DVAS and audit data shall be independent of the transaction data stream provided to the RTCS; however, the DVAS shall be integrated into the Contractor's System and linked to the transaction to meet the requirement specified in this section.					
162	The Contractor shall provide Authorized Users the ability to access the DVAS through the RTCS application or through a secure application using any NCTA authorized workstation connected to NCTA System network.					
163	The DVAS video and event data shall be available from the Roadway Operations monitoring application and Operations Dashboards to Maintenance staff when investigating anomalies, and to any Authorized User including auditors and Customer Service Representatives (CSRs) when reviewing class mismatch transactions and toll disputes.					
164	The DVAS shall provide the capability to monitor an overall image of the Toll Zone with the ability to see each lane and the vehicle traveling in that lane, and shall display detailed events for each lane as they occur in real-time. The events displayed shall be Configurable by Toll Facility.					
165	At a minimum, the DVAS shall display the facility ID, Tolling Location, lane number, transaction number, transaction date and time, Transponder ID, Transponder class, operational mode and the AVDC class. The DVAS video and data shall be accessible in read-only mode; no changes or alterations to the video or data shall be allowed.					
	The DVAS screens shall allow the Authorized User to obtain and sort the video/data events through various query criteria or Configurable report templates finalized during the Design phase, including but not limited to:					
	a) lane ID;					
	b) vehicle class;					
	c) transaction time;					

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166	d) payment type;					
	e) transaction time range;					
	f) alarm condition;					
	g) class mismatch condition;					
	h) unusual event conditions;					
	i) operational mode;					
	j) Transponder ID; and					
	k) Transponder status.					
167	All detailed data obtained from various subsystems shall be displayed to assist auditors and Maintenance staff with the investigation of discrepancies and problems. The DVAS shall perform and display video and data in real-time and shall have the ability to playback events and data.					
168	The DVAS shall also have the capacity to record and store up to one hundred and twenty (120) Days (Configurable) of video and data to an electronic media for each installed DVAS camera. DVAS video and the corresponding data (event information and the transaction information) shall be saved together as a unit such that when it is moved to a different environment, the video can be replayed with the events being displayed (Configurable) outside the production environment as long as the DVAS replay Software is available.					
169	As part of the Design phase, the Contractor and NCTA shall determine the optimum location for the installation of the DVAS Equipment to allow for the complete monitoring of each toll lane.					
170	The location and number of cameras shall permit the capture of video that allows Authorized Users to identify the vehicle class.					
171	The Contractor is responsible for the installation of the DVAS Equipment, including mounting Hardware to the designated structure (either toll gantry or separate mounting pole) as well as power and signal cabling between the DVAS Equipment and the storage media as described in ***Attachment 10: Responsibility Matrix .***					
172	The health of the DVAS shall be monitored and displayed and any problems or failures shall be reported to MOMS.					
173	The DVAS shall be time synchronized to the same source as the zone controllers and interface to the zone controller to obtain event data.					
174	Identification on the screens shall allow the reviewers to clearly differentiate the lane under review and its associated event data.					
175	The DVAS shall provide the capability to save the displayed contents of a screen (images and data) and electronically distribute such information as needed.					
176	Controls shall be provided to step forward and backward by frame and display of events shall be synchronized. All digitized video and corresponding event data shall be tightly synchronized and stored.					
177	The DVAS System shall record a five (5) second looping DVAS video file upon detection of a Wrong-Way Vehicle by the RTCS AVDC System and the RTCS shall Alert TMC personnel within ten (10) seconds (Configurable) of the vehicle passing through the Toll Zone. The DVAS video file of the vehicle and the message will be prominently displayed on operators' video wall or monitors.					
1.2.9	Enforcement Notification					
178	The RTCS shall support the Maintenance and update of a Violation Enforcement List (VEL) that contains Transponder and/or license plate numbers that NCTA requires notification on.					
179	The VEL will be provided to the RTCS at frequent Configurable increments and when changes to the list take place.					
180	The RTCS or Roadside Support System shall provide the capability to Alert authorized personnel if the System detects a Transponder passing through the Tolling Location that is identified for enforcement notification. The criteria for notification shall include the status of the Transponder and presence of the Transponder on the VEL.					
181	The System shall Alert personnel within ten (10) seconds (Configurable) of the vehicle passing through the Tolling Location if a vehicle on the VEL is identified. The Transponder ID and status (if any), and a picture shall be included in the Alert.					

No.	Requirements	Status	Required Inputs			Comments
			If Applicable	Source	If Applicable	
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
182	Notification methods shall include but not be limited to text message, email or system to system interface.					
183	If an enforcement notification was successfully transmitted to applicable personnel, the transaction shall have a flag denoting the transmission of the enforcement notification. This enforcement transmission status shall be transmitted to the existing NCTA CSC Back Office System.					
184	The System shall support the transmission of images (Configurable) to the applicable personnel and shall include the image of the vehicle and/or the ROI.					
1.2.10	Wrong-way Vehicle Notification					
185	The RTCS shall Alert TMC personnel via email and SMS text message within ten (10) seconds (Configurable) of the vehicle passing through the Toll Zone if the AVDC System detects a vehicle traveling in the wrong direction. The RTCS shall transmit to the STOC a five (5) second looping DVAS video file of the vehicle and the message will be prominently displayed on operators' video wall or monitors.					
186	The RTCS shall be capable of interfacing to an electronic wrong-way vehicle sign (provided by others) located in close proximity of the tolling zone to alert a motorist driving the wrong way.					
187	Any wrong-way vehicle transaction shall be transmitted to the existing NCTA CSC Back Office with a flag indicating wrong-way vehicle transaction.					
188	The System shall support the transmission of images (Configurable) and shall include the image of the wrong-way vehicle and the vehicle Region of Interest (ROI).					
1.2.11	Zone Controller					
1.2.11.1.	*Zone Controller Hardware*					
189	A fully redundant zone controller shall be Designed, procured, furnished, and installed at each of the Toll Zone as identified in ***Attachment 2, Attachment 2A*** and ***Attachment 3.*** The zone controller shall be Designed in a redundant configuration where there is a single primary zone controller with a "hot standby" secondary zone controller operating in parallel and capable of assuming processing control in the event the primary unit should fail (automatic failover), without requiring human intervention.					
190	When any Hardware and/or process on the primary zone controller fails preventing it from processing vehicles and creating transactions, the secondary zone controller shall assume the functions of the primary zone controller. The failover from the primary zone controller to the secondary zone controller shall be transparent to the rest of the System and shall not require the restart of any subsystems. Only one zone controller at a time shall generate revenue transactions.					
191	Alarm messages shall be generated and reported to the MOMS when such a failover event occurs. The Contractor's failover Design shall ensure that there is no loss of revenue or transactions when one of the zone controllers fails.					
192	The System shall provide Authorized Users the capability to manually and remotely switch the active zone controller to and from the primary zone controller to the secondary zone controller. All such events shall be recorded and transmitted to the MOMS.					
193	The Contractor shall Design, procure, furnish and install a zone controller that is capable of supporting the Requirements in this Scope of Work and Requirements.					
194	The zone controllers shall be hardened, industrial grade servers and the processor speed and memory shall be sufficient to process vehicles in real time to meet the traffic speed and volumes as specified in this Scope of Work and Requirements.					
195	Storage shall be sized to hold a minimum of thirty (30) Days of one hundred percent (100%) of transactions, images (under the "Save Image Mode") and event data for each lane at the Tolling Location supported by the zone controller.					
1.2.11.2.	*Zone Controller Software*					
196	The zone controller Software shall interface to the various devices and subsystems for each of the lane configurations specified and perform all the functions as described in this Scope of Work and Requirements for the AET Facilities.					

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
197	The zone controller located at each of the Tolling Locations shall process all of the data obtained from the other subsystems and devices as described in this Scope of Work and Requirements to generate a transaction record for each vehicle passage through the tolling zone/lane. The zone controller shall:					
	a) manage the Transponder status list for NCTA, all NCTA Interoperable agencies, and all National Interoperable Agencies used to validate the status of a Transponder received from the AVI System;					
	b) use the data obtained from the AVI and AVDC systems to assign the Transponder read to the correct vehicle and frame the vehicle transaction accurately;					
	c) notify the ICPS to capture and process vehicle images in accordance with NCTA Business Rules;					
	d) transmit the transaction record to the RSS, including but not limited to the following data: vehicle detection and classification data, Transponder data, Equipment status data, and all other pertinent information regarding the transaction;					
	e) transmit to the MOMS all alarm messages relating to the health of each subsystem, including the health of the primary and secondary (redundant) zone controller. Recovery messages shall also be transmitted and reported;					
	f) vehicle event data and transaction data shall be accessible to the DVAS; and					
	g) transmit to the RSS for further processing all other messages/events in accordance with Approved Interface Control Documents (ICDs).					
198	The zone controller Software shall be Configurable and shall be able to support NCTA Roadside operational needs without requiring changes to Software. The Configurable parameters shall be defined and documented during the Design process. All parameters shall have default values that shall be established during the Design process.					
199	The Contractor shall propose appropriate protocols and data structures to accomplish the communications required between various peripherals. These protocols and data structures shall be fully detailed and documented by the Contractor during the Design process and Approved by NCTA.					
200	Guaranteed transmission protocols shall be used for all messages exchanged between systems, including but not limited to:					
	a) zone controller;					
	b) ICPS;					
	c) AVI System;					
	d) AVDC System;					
	e) RSS (including Facility Server and Toll Host System);					
	f) MOMS;					
	g) DVAS;					
	h) microwave vehicle detectors; and					
	i) the NCTA CSC Back Office.					
1.2.11.3.	*Zone Controller Start-Up*					
201	Upon start-up or initialization, the zone controller shall perform a self-diagnostic test to ensure full System Operations. Alarm messages shall be reported for all failure conditions and a notification of the diagnostic check completion shall be displayed on the MOMS monitoring screen. The failure of a critical system shall result in the Tolling Location operating under degraded Operations in accordance with Approved NCTA Business Rules.					
202	Upon start-up, the zone controller shall verify with the RSS that it has the latest configuration files; Transponder status file; and any other files required to support the lane Operations. If the latest files are not present on the zone controller, it shall request the latest data from the RSS. If a zone controller is unable to get the latest files, an alert shall be generated and sent to MOMS.					
1.2.11.4.	*Zone Operations*					
203	The RTCS shall support each Roadway operation as specified in Section 1.3.					
204	In the event of a power interruption the zone controller shall open in the operational mode it was in before it was powered down.					

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
205	Authorized Users shall have the ability (local and remote) to configure the next operating mode and to gracefully shutdown the zone controller. Each time a mode change is requested an Alert message shall be sent to the MOMS.					
206	When a lane is operating in a mode other than normal open mode (to be finalized during Design), an Alert shall be generated and sent to MOMS at regular (Configurable) intervals.					
207	The RTCS shall support various modes of operation that are managed and initiated by Authorized Users through the Toll Host.					
208	Transactions shall be processed according to different Business Rules either at the Roadside Systems level or the RSS level based on the mode of operation and the facility type. The Contractor shall be responsible for ensuring that the AVI and image-based transactions are processed according to NCTA Business Rules and transmitted correctly to the RSS and then to the existing NCTA CSC Back Office System.					
209	The RTCS shall support the following modes of Operations:					
	a) **Open Mode:** All transactions shall be processed normally in an open mode;					
	b) **Closed Mode:** Invoked when the lane is closed for toll collection. The System shall use a virtual user ID (a special user ID specifically designed for tracking transactions in certain modes) or an alternative method for tracking vehicles and activity in the closed lanes. The lane shall process transactions similar to an open lane and support the creation of automatic shifts (for transaction reconciliation purposes) if applicable.					
	c) **Maintenance Mode:** Transactions created in Maintenance mode are processed as normal transaction but are identified as Maintenance mode transactions and transmitted to the RSS. Transactions that occur during Maintenance mode are not reported as traffic or revenue transactions.					
	d) **Emergency Mode:** Transactions created during emergency mode shall be identified as emergency mode transactions and processed in accordance with NCTA Business Rules to be determined during the Design phase.					
	e) **Save Image Mode:** Capability shall be provided whereby Authorized Users can enable and disable a zone controller to save one hundred (100) percent of vehicle images processed through the ICPS based on various selection criteria. Transactions under such condition shall be processed normally; however, these transactions and images shall be flagged with the save image mode and processed according to the NCTA Business Rules (for example audit purposes).					
1.2.11.5.	*Transaction Processing*					
210	The zone controller shall detect, classify, and frame vehicles, assign the Transponder accurately to the correct vehicle and capture and process the image of the correct vehicle in accordance with NCTA Business Rules and in accordance with the Performance Requirements specified in this Scope of Work and Requirements.					
211	The zone controller shall incorporate logic that will prevent the incorrect assignment of Transponder reads from vehicle driving in the adjacent general traffic lanes and in the opposite direction of travel.					
212	The detailed transaction processing rules shall be defined and finalized during the Design phase; however, the following basic rules shall apply:					
	a) The zone controller shall properly associate multiple Transponder reads reported by the AVI System to the vehicle and report the transaction to the RSS.					
	b) any **compatible**, but non-interoperable Transponder reads shall be reported to the RSS;					
	c) a minimum of one revenue bearing transaction shall be created for each vehicle that travels through the Toll Zone and the zone controller shall ensure that the transaction is complete prior to transmitting it;					
	d) the zone controller shall be able to accurately identify, process, and track multiple vehicles in the Toll Zone;					
	e) the zone controller shall ensure that duplicate Transponder transactions (same Transponder ID) are not reported from the same lane or Tolling Location within a Configurable period of time or consecutively;					
	f) buffered Transponder reads that are transmitted to the zone controller shall not be assigned to a vehicle by the zone controller but shall be Flagged and reported to the RSS for further processing and vehicle assignment;					
	g) the zone controller shall automatically synchronize with the various subsystems to ensure the events in the lane correspond to the transaction generated, and					

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		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
	h) the System shall incorporate self-correcting logic to adjust for lane anomalies and event synchronization issues.					
213	The transaction message details shall be defined and finalized during the Design phase; however, the following basic rules shall apply:					
	a) The RSS shall transmit to the NCTA CSC Back Office the fully formed, image reviewed, and verified image and AVI transactions for processing, reporting, and reconciliation.					
	b) the transaction message shall contain the data required by the NCTA CSC Back Office to process the Transponder and Image-Based Transaction;					
	c) the transaction message shall contain all data contained in the NCTA, NCTA Interoperable, and the National Interoperable file specifications if applicable to the specific Tolling Location;					
	d) each transaction shall contain, and be reported with, various classification data, including AVDC class; Transponder class, default class, and fare class (if applicable);					
	e) each transaction shall contain, and be reported with, various event times, including 'vehicle entry' time; 'ICPS trigger' time; 'Transponder read' time; and 'vehicle exit' time that shall allow Transponder reads, images and transaction to be associated correctly with the vehicle;					
	f) each transaction shall contain the toll amount due (based on when the vehicle passed under the AET Toll Zone) and the toll amount collected (based on the NCTA CSC Back Office posting disposition); and					
	g) the System shall assign a lane number to each transaction and report the lane in which the vehicle was detected.					
1.2.11.6.	*Transponder Mapped Class*					
214	The System shall capture the raw Transponder class obtained from the Transponder data and map that to the NCTA mapped class for each of the toll facilities.					
215	The System shall retain the raw Transponder class and include that in the transaction data along with the mapped class for each Toll Facility.					
216	If a Transponder has a raw Transponder class that is not mapped to the NCTA class then the System shall apply the class as defined by the Business Rules.					
1.2.11.7.	*Revenue Vehicle Class (NCTA Class)*					
217	The assignment of the revenue vehicle class in normal Operations and in degraded mode of Operations shall be in accordance with the NCTA Business Rules. If no classification data is obtained, a Configurable default revenue class shall be assigned to the transaction and the transaction shall be flagged.					
218	The revenue vehicle class shall be used to determine the fare amount for a transaction as defined by the NCTA Business Rules. Flags in the transaction shall identify which class was used as the revenue vehicle class.					
219	The System shall have the capability to cap the maximum and minimum (Configurable) axles and class and to charge a set toll rate per additional axle count.					
220	Transactions shall include the AVDC class, raw NCTA Interoperable Partner Transponder class (if applicable), mapped Interoperable Partner Transponder class (if applicable) and revenue vehicle class. The revenue vehicle class assigned in accordance with NCTA Business Rules shall be used to determine the toll amount transmitted to the existing NCTA CSC Back Office.					
1.2.11.8.	*Fare Determination*					
221	The System shall support the determination of the fare class at the tolling zone and the RSSs.					
222	The fare class shall be determined in accordance with NCTA Business Rules and will vary by lane type and payment method.					
223	The System shall have a Configurable default fare class for each Toll Facility and lane type to be used in the event classification data is not available.					

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		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
224	Tolls shall be assessed using the toll rates and schedules established for each tolling point. The System shall support the toll rate and the NCTA Vehicle Classification Structure based on the toll location and facility. The initial toll rates shall be defined during System Design and shall be Configurable to support periodic rate adjustments as Approved by NCTA.					
225	The System shall support the assessment of toll by payment type for example, AVI, image-based, and non-revenue; vehicle class, lane health, Agency code, and location based on NCTA Business Rules.					
226	It is currently envisioned that the existing NCTA CSC Back Office will process the Contractor provided image-based transaction and convert them to I-Tolls, if applicable. The Contractor shall process the transaction dispositions from the NCTA CSC Back Office, including any adjustment of fare for converted I-Toll transactions. Vehicle classification adjustments shall also be processed.					
227	Home (NCTA-issued) non-revenue Transponders shall be charged $0.00 (Configurable) fare but Away non-revenue Transponders shall be charged the normal fare based on vehicle class and location.					
228	Transactions shall be flagged if the AVDC System is operating in a degraded mode.					
1.2.11.9.	*Saving of Images*					
229	Images shall be saved for all vehicles under all conditions in accordance with NCTA Business Rules.					
230	Images shall be captured and saved for the following conditions and as further defined during the Design process, including but not limited to:					
	a) in all cases where there is no Transponder read (including when the AVI System is down or degraded), the Transponder is not "valid", or a non-interoperable Transponder read is detected;					
	b) in all cases where there is a vehicle classification condition as determined by the NCTA Business Rules, for example in conditions where the AVDC is degraded;					
	c) in all cases where there is a "wrong-way" vehicle detected;					
	d) if the ICPS loses communications with the zone controller in accordance with the NCTA Business Rules;					
	e) in all cases where there is a Class Mismatch between the Transponder class and the AVDC, as determined by the NCTA Business Rules; and					
	f) in conditions where the "save image mode" is enabled.					
231	Images saved during ICPS loss of communication event shall be flagged and subsequently matched with the correct transaction data when communications with the zone controller resumes. This matching can occur at the RSS but shall take place in a manner that does not interfere with or degrade real time zone controller Operations.					
232	If the AVDC System is not operational but the ICPS trigger is functioning, images shall be saved such that all non-valid Transponder transactions that occur during the AVDC malfunction can be subsequently pursued for collection. Sufficient data shall be provided in the transactions to allow the RSSs to process such transactions so that customers are not charged in error when lane operation is degraded.					
1.2.11.10.	*Configuration Files*					
233	All parameters and settings required to run the zone controller application shall be maintained in configuration files. Access to configuration files required to support the zone controller Operations shall be controlled and access to these files shall be limited to authorized personnel.					
234	The configuration files shall be maintained at the RSS for configuration and version control. All zone controllers shall have default configuration files that shall allow the lane to start-up automatically.					
235	Authorized personnel shall be able to make changes to parameters and settings that are defined as Configurable in this Scope of Work and Requirements and in the Approved Design documents. Authorized personnel shall be able to make changes to the configuration files in the field. Changes to configuration files shall be recorded in the MOMS. All changes made to the configuration files in the field shall be synchronized to the master configuration file that is maintained at the RSS.					
236	Each zone controller shall automatically back up its critical configuration files to a back-up server to be used to rebuild the master drive in the event of hard disk failures.					

No.	Requirements	Status	Required Inputs			Comments
			If Applicable	Source	If Applicable	
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
1.2.11.11.	*Zone Controller Interfaces – General Requirements*					
237	The zone controller shall interface to various devices and subsystems to transmit and obtain data and synchronize the time.					
238	The zone controller shall provide checks on all data it receives from each of the devices and subsystems it interfaces to and generate alarm messages that are reported to the MOMS.					
1.2.11.12.	*Interface to AVI System*					
239	The zone controller shall interface with the designated AVI System in accordance with the Approved ICD and transmit all data received from the AVI System to the RSS.					
240	The zone controller shall have the capability to interface to multiple AVI System vendors and vendor products. At a minimum, these AVI interfaces include Kapsch, 3M, and TransCore reader protocols.					
1.2.11.13.	*Interface to AVDC System*					
241	The zone controller shall interface with the AVDC System to obtain vehicle events that shall permit accurate detection, classification, tracking and processing of vehicles. Vehicle dimensions, vehicle characteristics and speed information shall also be obtained from the AVDC System and reported as part of the vehicle transaction data reported to the RSS for potential use.					
1.2.11.14.	*Interface to ICPS*					
242	The zone controller shall interface with the ICPS to capture and process images of vehicles in accordance with NCTA Business Rules to be developed during the Design phase. The vehicle data, OCR/ALPR results (if applicable) and images obtained from the ICPS shall be transmitted to the RSS to support NCTA Bill by Mail processing Requirements and the NCTA CSC Back Office operations Requirements.					
1.2.11.15.	*Interface to DVAS*					
243	The zone controller shall interface with the DVAS to transmit event data for display on the DVAS. The event data shall be based on the facility type and shall include Transponder reads, ICPS data, and AVDC messages received as the vehicle travels through the lane.					
1.2.11.16.	*Interface to UPS*					
244	The zone controller shall interface with the UPS to monitor the UPS performance. The MOMS shall detect the status of the UPS and Alert technicians when the System is on UPS.					
1.2.11.17.	*Interface to Roadway Support System (RSS)*					
245	The zone controller shall interface with the RSS to transmit lane data and receive files, commands, messages and data required for lane Operations. Error detections and data validation checks shall be instituted at both systems to ensure incorrect or corrupt data is detected and is not inserted into the System.					
246	The RTCS shall institute automated methods to determine loss of communications between the zone controller and the RSS and any failure detected shall be reported to MOMS.					
247	Receipt of all files and data shall be acknowledged and any failures in the transmission or detection of data errors shall be reported to the MOMS.					
248	The Contractor shall provide an automated means of synchronizing the zone controller and RSS messages in the event the zone controllers are replaced, if communications are down, or if data on the zone controller is not retrievable due to a catastrophic failure.					
1.2.11.18.	*Transmitting Data*					
249	All messages generated at the zone controllers shall be transmitted to the RSS (e.g., Facility Server (if provided) or Toll Host System) in real-time using a transport mechanism that performs error detection and correction to guarantee data transmission. All messages shall be uniquely identified and validated at the RSS to ensure there are no missing or duplicate messages.					

No.	Requirements	Status	Required Inputs			Comments
			If Applicable	Source	If Applicable	
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
250	The System shall support exception handling in accordance with the NCTA Business Rules Approved during the Design phase. Alarms shall be generated and reported to the MOMS for all exceptions/errors.					
251	All failed transactions and exceptions shall be identified and reported.					
252	Failure of transmission of data to the RSS shall result in the generation and transmission of alarm message to the MOMS.					
253	All messages shall be confirmed as received by the RSS before they are Flagged for write-over. In the event of communication failures the messages shall be stored on the zone controller until successful transmission is complete and verified.					
254	The zone controller shall transmit to the RSS all data, including but not limited to those identified below:					
	a) all transaction messages generated in the lanes;					
	b) all alarm and status messages generated in the lanes;					
	c) all lane operational, communication status and self-health messages;					
	d) all events generated in the lanes that are displayed on the Roadway Operations monitoring screen or are required at the RSS; and					
	e) all events required by the DVAS for real-time review or playback.					
1.2.11.19.	*Receiving Data*					
255	The zone controller shall support the Transponder Status List (TSL) and any other Interoperable Agency lists and shall have the capability to support every Interoperable Agency and its assigned Transponder number range as described in the National Interoperability specifications.					
256	The zone controller shall accept comprehensive (complete list once a day) and incremental (changes updated on a Configurable interval, but not more frequently than every ten minutes) TSL in accordance with the established Business Rules and shall activate the lists upon receipt after validation of the files.					
257	The Contractor shall use an effective Design to transmit the files (compress, encode, etc.), store the files and use the files such that the new list is available at the zone controllers within ten (10) minutes of the RSS receiving the new list. The format of the file shall be finalized during the Design phase.					
258	For AET facilities, the toll rates, toll schedules and the effective date/time shall be downloaded to the zone controller and new toll rates initiated when the toll rate changes.					
259	All configuration files and tables needed to support the lane Operations shall be downloaded to the zone controllers from the RSS upon confirmed change or at scheduled intervals and activated as required. Versions of the Configurable files on each zone controller shall be maintained, tracked, and recorded.					
260	All zone controller Software shall be downloaded to the zone controllers from the RSS and versions on each zone controller shall be maintained, tracked, and recorded.					
261	The Roadside System shall institute checks whereby it detects issues with the data it receives from the RSS, including but not limited to:					
	a) incorrect versions of the data received;					
	b) corrupted data received; and					
	c) missing files when a file was expected.					
262	The System shall support exception handling in accordance with the NCTA Business Rules Approved during the Design phase. Alarms shall be generated and reported to the MOMS for all exceptions/errors.					
1.2.11.20.	*Monitor All Lane Equipment for Device Status*					
263	Each zone controller shall self-monitor the System health of internal components and all associated in-lane Equipment devices for status. All RTCS components, including AVI System, AVDC System and ICPS shall be continuously polled for status. The health of some digital devices shall be inferred from events.					

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		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
264	The System shall generate a recovery message and restore its operational status if a device recovers after reporting a failure. Recovery messages shall be recorded against the original failure work order, shall be reported through the MOMS, and shall be available to authorized staff. Recovery messages shall not close the associated failure/work order but shall serve as supporting evidence of an Equipment recovery.					
265	All alarm, health, and recovery messages shall be transmitted and reported to the MOMS.					
266	If communications from the zone controller to any RSS is unavailable, an alarm message shall be generated and reported to the MOMS.					
267	If the lane is operating in any mode other than normal open mode an Alert message shall be generated at Configurable intervals and reported to the MOMS.					
1.2.11.21.	*Diagnostics and Equipment Malfunction*					
268	The zone controller Software shall execute periodic diagnostic checks on internal processes, the in-lane Equipment and interfaces. Intelligent peripheral devices shall be interrogated for device status on a regular basis. A device's failure to respond to a status inquiry after a Configurable number of retries shall be regarded by the zone controller Software as an Equipment failure. All failures shall be detected and alarms generated and shall be reported to the MOMS.					
269	Diagnostic and self-checks shall take place in all modes of lane operation and the results shall be placed in the associated zone controller's consolidated log and easily accessible to the technicians. Sanity checks for fault conditions and validations shall be incorporated into the System. Detection of such conditions shall be reported to the MOMS.					
270	Degraded modes of operation shall be supported based on NCTA Business Rules developed during the Design process, and Approved by NCTA. The Contractor shall ensure the RTCS continues to operate without loss of revenue or visible impact to the patron in the event that some components of the RTCS fail and degraded mode Operations occur.					
1.2.11.22.	*Stand-alone Mode of Operation*					
271	The zone controller shall operate in a stand-alone mode for a minimum of thirty (30) Days if communications to the RSS is down. When operating in stand-alone mode, the last files downloaded from the RSS shall be used for processing vehicles.					
272	The zone controller shall have an available data port to permit onsite manual uploading of Software, TSL, or other pertinent data required for continued operation until communications with the RSS is re-established. Devices utilized to download the TSL to the lanes shall have the capability of synchronizing the current versions whereby a new TSL is updated on the device within an hour.					
273	The System shall provide the capability for Authorized Users to download transactions from the zone controller and transfer such transactions to the RSS, and from the RSS to the existing NCTA CSC Back Office.					
274	The System shall provide the capability for Authorized Users to download event/transaction data for manual and stand-alone playback of the DVAS.					
275	Upon re-establishing communications with the RSS all back-logged messages, including manually transferred messages shall be transmitted and synchronized to the RSS without affecting the real time Operations or degrading the lane Operations.					
276	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be transmitted to the MOMS.					
1.2.12	Access Control and Security Monitoring System (ACSMS)					
277	The Contractor shall furnish and install an Access Control and Security Monitoring System (ACSMS) for access and monitoring all Tolling Locations and equipment enclosures/vaults and roadside cabinets.					
278	The ACSMS shall interface with MOMS to generate and transmit alarms, Alerts, recovery messages and operational status.					
279	The ACSMS shall maintain access information and video logs of access events, and shall also provide escalated Alerts for unusual monitored events, including forced door openings and parking lot movements after hours via motion detection in areas of interest.					

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		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
280	The ACSMS shall include proximity cards, readers, and access management software for all equipment vaults and roadside cabinets.					
281	All vaults; roadside cabinets/enclosures; Toll Zones; WAN cabinets, and cabinets / enclosures containing Contractor hardware, including the STOC, secure locations shall be monitored by security access color cameras. "Secure locations" are defined as any location not listed that contains (or could contain) Contractor hardware/equipment.					
282	The security access cameras shall interface to the existing NCTA security access control System located at the NCTA Statewide Traffic Operations Center (STOC). A separate Virtual Local Area Network (VLAN) shall be used for this interface.					
283	The local security access controllers shall be synchronized to the designated time source.					
284	The ACSMS shall have the ability to query and report the quantity and assignment of active cards in the System.					
285	The Contractor shall provide sufficient quantities of proximity cards for the Contract Term.					
286	The proximity cards shall contain the name and picture of the assigned card holder, as well as an address indicating where to return the card if found.					
287	The Contractor shall update the ACSMS to disable access within 2 hours of becoming aware of an employee's change in employment status.					
1.2.13	Critical Environmental Monitoring System (CEMS)					
288	The Contractor shall provide a Critical Environmental Monitoring System (CEMS), which shall consist of an environmental monitoring unit for the HVAC and other environmental conditions. The environments monitored shall vary as appropriate depending on the enclosure type (vault, roadside cabinet, or equipment enclosure) and shall include:					
	a) HVAC status (On/Off);					
	b) Temperature;					
	c) Humidity;					
	d) Utility power;					
	e) Generator status (On/Off);					
	f) Generator propane fuel level;					
	g) Automatic Transfer Switch (ATS) transfer monitor;					
	h) UPS power;					
	i) Smoke detector; and					
	j) Carbon monoxide detector.					
289	The CEMS shall provide a useful variety of historical reports and trends for the monitored conditions.					
290	The CEMS shall interface with MOMS to generate and transmit alarms, Alerts, recovery messages and operational status.					
291	The CEMS shall be accessible from the Statewide Traffic Operations Center (STOC).					
1.2.14	Uninterruptible Power Supply (UPS)					
292	All RTCS Hardware and Equipment shall be on UPS. The UPS shall be supplied by the Contractor.					
293	For new AET facilities, the Constructor shall furnish and install an automatic transfer switch (ATS) at each vault. The Contractor shall interface with the ATS and the Contractor-provided smart Power Distribution Units (PDUs) to manage the Roadside power distribution Maintenance technicians shall have remote access to manage power to critical devices.					
294	For AET facilities, failure of the UPS shall cause the ATS to switch to raw utility power and provide power to the roadside tolling Equipment, allowing toll collection to continue.					
295	The Contractor shall furnish and install an electronic interface to the UPS to monitor its UPS performance for all toll facilities. The MOMS shall detect the status of the UPS and Alert technicians when the System is on UPS.					
296	Software drivers shall be developed, furnished, and installed to acquire, display, store and report all parameters provided as outputs from the UPS.					

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297	The UPS shall support the RTCS at each Tolling Location for a minimum of one (1) hour for AET facilities. When there is loss of power to the Tolling Location, the power will switch to the generator.					
298	When utility power is restored and Hardware/Equipment is no longer on the UPS a notification shall be reported to the MOMS.					
1.2.15	RTCS Business Continuity Solution					
299	The Contractor shall provide a RTCS Business Continuity Solution as part of the Design.					
300	The RTCS Business Continuity Solution shall consist of a portable equipment mounting device and necessary hardware to provide for the temporary use of cameras, AVI equipment, and other associated equipment near a tolling point in the case of catastrophic damage to the gantry at that site.					
301	The RTCS Business Continuity Solution shall be able to collect sufficient level of transaction information to maintain the revenue stream from the impacted Toll Zone.					
302	The RTCS Business Continuity Solution shall support the following assumptions:					
	a) no equipment shall be placed over the active traffic lanes;					
	b) the solution shall consist of a stable, temporary structure which is placed outside of the MOT, where the MOT is assumed to be concrete barrier wall between shoulder and travel lanes;					
	c) the solution shall be implemented with only minor, reversible modifications to the lane equipment;					
	d) the solution shall consist of all cabling, cabinetry, fasteners, etc. to readily accept existing Toll Zone equipment from spare stock					
	e) the zone controller, roadside cabinetry and loops are unaffected by the gantry damage and in good working order;					
	f) the current zone controller is to be used for implementation of the temporary tolling solution;					
	g) (REQUIREMENT DELETED)					
	h) spare conduit in the under-pavement duct bus at each tolling location may be used to cross the road for both power and communications;					
	i) the Business Continuity Solution shall be deployed by the Contractor within 48 hours of Notification from NCTA and within 24 hours of securing proper MOT for the affected Toll Zone area;					
	j) only rear images will be captured by the Business Continuity Solution;					
	k) existing in-pavement loops or detection equipment shall be used for triggering the temporarily mounted equipment;					
	l) the equipment for the Business Continuity Solution shall be taken from spares as applicable;					
	m) the current Key Performance Indicators related to Lane and Plaza performance will be waived for the impacted site until the site is returned to the original Design configuration;					
	n) the solution and surrounding equipment will be subject to same preventative maintenance schedule that the fixed gantry receives; and					
	o) the goal of the Business Continuity Solution is to be capable of capturing sufficient data for revenue collection on 75% of all traffic that passes through the tolling point.					
1.3	**RTCS – Triangle Expressway and Complete 540 AET Facilities**					
	The Contractor shall provide a Roadside System for AET Facilities that meets the general Requirements specified above in Section 1.2 and the Requirements described in this section.					
1.3.1	AET Facility Type and Concept					
303	Contractor shall provide an AET facility type where all customers pay the tolls electronically. Customers travel through toll gantries on the roadway at highway speeds.					
304	The AET tolling concept shall be barrier-based where vehicles pass through one or more toll facilities on the mainline and/or ramp and customers pay a flat toll based on the mode of payment and vehicle classification at each Toll Facility they use.					
1.3.2	Modes of Payment					
	The System shall support the following modes of payment:					
305	Electronic payment using AVI Transponder in all lanes.					

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306	Electronic payment using image-based "Bill by Mail" tolling in all lanes.					
1.3.3	Lane Modes					
	The System shall support configuring an individual lane, Toll Zone, or Tolling Location in the operating modes specified above in Section 1.2.					
307	(REQUIREMENT DELETED)					
308	(REQUIREMENT DELETED)					
309	(REQUIREMENT DELETED)					
1.3.4	Classification Structure					
	The System shall support the following classification structures based on the Roadway.					
310	The System shall support axle-based classification where the vehicle class is based on the number of axles on the ground when the vehicle drives through the Toll Zone and the toll assessed is based on the number of axles.					
311	The System shall support profile-based classification where the vehicle class is based on vehicle height and length classification.					
312	The System shall support tiered class categories where the vehicles may be categorized by a range of axles (2X; 3X, and 4X or greater) and/or combined with vehicle profile based on height and length; the toll is assessed based on this categorization.					
1.3.5	Fare Determination					
	Based on the type of Toll Facility the fare determination can be performed by the RTCS or the RSS. For NCTA AET facilities, the default setting for fare determination shall performed by the RTCS. The fare assessed for a vehicle which travels through the Tolling Location shall be based on one or multiple factors including but not limited to:					
313	Vehicle Classification: Based on NCTA Business Rules and the various classification data the System shall determine the fare class which is then used to determine the toll amount.					
314	Method of Payment: Different toll amounts shall be assessed for the transaction based on the method of payment (differential pricing).					
315	The System shall support the assessment of toll by payment type for example, AVI, image-based, and non-revenue; vehicle class, lane health, Agency code, and location based on NCTA Business Rules.					
316	Based on the Toll Facility the System shall support the assessment of fares based on the fare schedule and toll rate in effect at the time of the vehicle passage through the Tolling Location.					
317	The System shall support day of the week; weekend/weekday and Holiday toll schedules.					
1.4	**Roadside Tolling Facility Server**					
	The provision of a facility server is optional but if the Contractor's solution includes a facility server, then the Requirements in this section shall be met. The Contractor has the option to use the facility server as an image server as long as the Design complies with the Requirements of the Scope of Work and Requirements.					
318	The Contractor shall provide one or more facility servers located at a tolling point if it is deemed necessary to meet the Requirements specified in this Scope of Work and Requirements. A facility server or set of servers can support multiple Toll Zones.					
	The Contractor shall furnish and install a complete Hardware configuration for each facility server to support the availability, redundancy and Performance Requirements of this Contract, including but not limited to:					
319	p) multiple processors;					

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
	q) dual, redundant, hot-swappable power supplies;					
	r) fault tolerant (RAID) storage devices; and					
	s) backup library.					
320	The Hardware solution shall provide high-speed connectivity between all storage, database, application, and reporting servers, and backup systems.					
321	The facility server shall interface to the zone controller and shall serve as a store and forward server for transactions and messages.					
322	Each facility server shall communicate with the primary and secondary RSS.					
323	Each facility server shall be capable of storing transactions and images (if used as a local image server) from the in-lane subsystems for a period of minimum sixty (60) Days, in the event of a communications failure.					
324	The facility server shall be capable of operating in a stand-alone mode for a minimum of sixty (60) Days if communications to the RSS are down. When operating in stand-alone mode, the last files downloaded from the RSS shall be used for processing vehicles.					
325	The facility server shall have an available data port to permit onsite manual uploading of Software, TSL, or other pertinent data required for continued lane operation until communications with the RSS are re-established. Devices utilized to download the TSL and rate tables (if applicable) to the facility server shall have the capability of synchronizing the current versions whereby a new TSL is updated on the device within an hour of receipt.					
326	The System shall provide the capability for Authorized Users to download transactions from the facility server and transfer such transactions to the RSS.					
327	Upon re-establishing communications with the RSS all back-logged messages, including manually transferred messages, shall be flagged and transmitted to the RSS without affecting the real time Operations or degrading the lane Operations.					
328	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be transmitted to the MOMS.					
329	Failure of any component of the facility server shall be detected and reported to the MOMS.					
1.5	**Roadway Pavement, Toll Gantry, and Equipment Vault Design Support**					
1.5.1	General Design Requirements					
330	At the tolling points the Contractor shall install the toll collection Equipment on the infrastructure provided by the Constructor as identified further in ***Attachment 10: Responsibility Matrix .***					
331	The Contractor shall work with NCTA and provide input into the civil Design and/or construction schedule, and Requirements for all civil construction work to be performed by others on the Project, including toll gantry; vaults; roadway/pavement, and conduit relative to the aspects that integrate with the Design and installation of the RTCS.					
332	The Contractor shall cooperate and provide support as needed to the civil design and construction efforts. During civil design, Contractor support is anticipated to include responses to information requests for clarification on proposed Designs as well as actively reviewing the civil plans and drawings.					
333	During construction, Contractor shall provide review and approval of Constructor shop drawings or similar within the context of the toll System functional and Performance Requirements.					
334	During installation, the Contractor shall provide verification and approval of toll System related elements that the Constructor is responsible for installing.					
335	Upon approval of shop drawings or similar Design elements by the Contractor within the context of System function and performance, Contractor shall assume responsibility for those elements to the extent that if the civil work is installed as Designed and does not meet the Performance Requirements of this Scope of Work and Requirements, the Contractor shall be responsible for the costs of redesign, civil rework and additional Equipment costs as further set forth in the Contract.					

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
336	The Contractor shall also coordinate and be available onsite as needed during the installation of the civil elements related to the RTCS and shall be responsible for the sign off that the civil work and installation is performed in accordance with the Contractor's Requirements.					
1.5.2	Toll Gantry					
337	The Contractor's Equipment mounting and installation Design for the toll collection Equipment shall take into consideration its Maintenance and lane closure constraints.					
338	The Contractor shall coordinate in-lane Equipment Design, installation specifications, structural Requirements and drawings for mounting the Equipment to the overhead toll gantry at each Tolling Location as it relates to the Contractor's Equipment Requirements to the Constructor, including but not limited to Equipment mounting locations and installation instructions for mounting structure and mounting brackets; conduit; junction box; and electrical Requirements; wind load, Equipment load and power calculations, deflection and vibration limits for the various tolling Equipment, as well as Contractor Requirements related to special electrical grounding, isolated circuit integrity by Equipment.					
339	The Contractor shall also review and provide comments on all aspects of toll gantry design drawings submitted by the Constructor that are related to the toll System Equipment required to meet the Requirements of this Scope of Work and Requirements.					
340	The Contractor shall be responsible for all necessary mounting Hardware required to install the toll Equipment on each gantry at each lane as specified in this Scope of Work and Requirements and shall ensure installation is in compliance with NCTA specifications.					
341	The Contractor shall be responsible for all Equipment installations, terminations, and connections of Equipment located on the overhead gantry and for connecting such Equipment to the electronics in the Roadside Equipment cabinets and vault enclosures.					
1.5.3	Equipment Vault					
	On AET Facilities, an Equipment vault with external generator, and Heating, Ventilation and Air Conditioning (HVAC) will be provided by NCTA or the Constructor at each Tolling Location.					
342	The Equipment vault shall house the RTCS Equipment racks, enclosures and UPS provided by the Contractor. All RTCS electronics, devices, servers and associated communications Equipment shall be installed in the Equipment racks and enclosures. General guidelines for an existing equipment vault are provided in ***Attachment 11 – AET Standard Drawings*** .					
343	The Contractor shall provide detailed drawings of Equipment rack space layout for NCTA review/approval (verification) for consistency of vault Design.					
344	The Contractor shall install racks, enclosures and UPS within the vaults in accordance with applicable North Carolina State building codes and NCTA AET Standard Drawings.					
345	The Contractor shall install temperature and humidity sensors in the vaults and roadside Equipment cabinets that monitor the temperature and humidity in those environments. In addition, HVAC status, UPS status, and utility power status shall be monitored. Alarm messages shall be generated and reported to MOMS when the condition exceeds a Configurable threshold. The alarm shall be generated at every Configurable interval until the condition falls below the Configurable threshold.					
346	The Contractor shall adhere to the latest version of the NCDOT Standard Specifications, NCDOT Roadway Standard Drawings, and ***Attachment 11: AET Standard Drawings*** . In case of conflict, the AET Standard Drawings shall take precedence.					
347	The Contractor shall review and comment on all aspects of Equipment vault Design drawings, power specifications, electrical and cabling Design, circuit breaker and switches, and grounding Design submitted by the Constructor that are related to the RTCS Equipment.					

No.	Requirements	Status	Required Inputs: If Applicable	Required Inputs: Source	Required Inputs: If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
348	The Constructor shall procure, furnish, and install the conduits between the vault and the demarcation point on the toll gantry. The Contractor shall procure, furnish and install any conduit required from the demarcation point to the Equipment and between the various components on the toll gantry.					
349	The Contractor shall procure, furnish, and install the cables necessary for terminating and connecting the RTCS Equipment on the toll gantry to the electronics in the Equipment cabinets and/or vault. Cable lengths shall include sufficient service loops to facilitate maintenance.					
350	The toll Equipment vault shall house the RTCS Equipment racks provided by the Contractor.					
351	The Contractor is responsible for the RTCS Wide Area Network (WAN) communications. RTCS WAN Design must be Approved by NCTA and shall conform to NCDOT IT Communication & Security Policies. All networking Equipment at the toll Equipment vault and other locations to be provided by Contractor. The schematic of the RTCS and ITS network is shown in ***Attachment 12: Communications Schematic*** **.**					
352	The Contractor shall allocate a range of IP v4 Class C addresses and all networking addressing will be coordinated with the NCTA. The Contractor provided LAN Equipment shall be capable of supporting IPv6 addresses.					
1.5.4	Roadway Pavement					
353	During the Design phase the Contractor shall provide the in-pavement sensor Requirements to the Constructor, if such sensors are to be used.					
354	The Contractor is responsible for the Design and installation of all elements of the RTCS that is applied on or embedded into the pavement to achieve the required System Performance.					
355	The Contractor shall coordinate with the Constructor for the installation of the sensors in the lanes. The location and Design of the pull boxes shall minimize the impact of Maintenance activities on the effected lane.					
356	The Contractor is responsible for any roadway pavement failure directly caused by the installation of in-pavement sensors for the Contract Term.					
1.5.5	Communications					
357	On new facilities the Constructor will provide, terminate, and test the fiber connections from vault to vault (the Metro Area Network or MAN). The Contractor is responsible for all network Equipment/switching for the MAN. The Contractor is responsible for all elements of the Local Area Network (LAN). The Contractor is responsible for WAN connections to the NCTA CSC Back Office.					
358	Network monitoring Software shall be procured, furnished, and installed on the RSS servers to monitor the System network status and communications, including the connection to the existing NCTA CSC Back Office. All network alarms shall be reported to the MOMS. The software tool shall utilize the Simple Network Management Protocol (SNMP) to poll devices real time for status where possible.					
359	If communications to any element of the RTCS is down an alarm shall be generated and reported to MOMS.					
360	The Contractor shall provide network security at the RSS locations and shall comply with the NCTA Security Policy.					
361	The LAN within a toll Equipment building shall be connected by CAT6 (or higher) cabling. The LAN connections from the vault to the roadside Equipment may either be CAT6 or multi-mode fiber-optic (MMFO) cable according to the Contractor's design. The MAN physical connectivity between the toll Equipment vaults within the Triangle Expressway and Complete 540 corridors shall be provided by NCTA or by the Constructor, respectively. The Contractor shall be responsible for providing and obtaining the WAN connectivity from any primary or secondary Toll Host locations to the NCTA CSC Back Office.					
362	The Roadside System at the Toll Zones shall be connected and communicate to the primary and secondary RSS.					
363	The Contractor shall procure, furnish and install all required communication Equipment at the toll Equipment vault to support the RTCS LAN. All LAN communications Equipment procured, furnished, and installed under this Contract shall be able to communicate with the NCTA communications Equipment.					

No.	Requirements	Status	Required Inputs			Comments
			If Applicable	Source	If Applicable	
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
364	The Contractor shall coordinate with NCTA, NCDOT IT and the Constructor regarding demarcation points between the onsite fiber network and Internet Service Providers (ISPs). The Contractor shall coordinate with NCTA and the Constructor regarding overall network Design and splicing for the MAN physical network between the toll locations. Once network Design is finalized, Contractor shall certify in writing that network Design meets all RTCS needs.					
365	The Contractor may install the secondary RSS at a Contractor location within the contiguous United States as Approved by NCTA. The Contractor is responsible for securing the connectivity from such secondary location to the NCTA CSC Back Office.					
366	The Contractor shall work with NCTA in Designing the network communication interfaces between the Roadside Systems, RSS, (including optional Facility Servers and Toll Host Systems), MOMS, DVAS, CCTV and Access Control System, and the existing NCTA Back Office systems.					
1.5.6	Utility Power					
	Utility power will be made available to the Contractor at the vault, the Equipment enclosures and the Tolling Location based on the Toll Facility type.					
1.5.7	Generators					
367	Constructor-provided generators shall be used and the Contractor shall install the electronics that allow the Roadway Systems to communicate to the generator.					
368	Software drivers shall be developed, furnished, and installed by the Contractor to acquire, display, store and report all parameters provided as outputs from the generator.					
369	The System shall detect the switch to generator power and report the Alert to the MOMS.					

No.	Requirements	Status B-Base Product M-Base Modified D-New Development N-Not Provided*	If Applicable Customer Name and Location	Required Inputs Source P-Proposer S-Sub T-Third Party NA-Not Applicable	If Applicable Subcontractor Name and/or 3rd Party Product/Vendor	Comments Comment required if "Not Provided*", optional otherwise.
2. ROADWAY SUPPORT SYSTEM (RSS) – FUNCTIONAL REQUIREMENTS						
	The Contractor's RSS architecture shall have a fully redundant high availability primary and secondary RSS that meets the functional and Performance Requirements of the Scope of Work and Requirements.					
2.1	**Roadway Support System (RSS) – General Requirements**					
370	The Contractor's central processing system architecture shall include a fully redundant highly available primary and secondary RSS that meets the functional and Performance Requirements of the Scope of Work and is accessible to Authorized Users of the NCTA System network.					
371	The functions of the Roadside Tolling Facility Server, Toll Host System, Central Image Servers (if provided), DVAS and the MOMS shall be part of the RSS.					
372	The RSS shall support AET facilities.					
373	The toll collection process shall be administered and controlled by RSS provided by the Contractor.					
374	The Contractor shall procure, furnish, and install all servers, storage and communications Hardware needed to support the Software that meets NCTA RTCS Requirements.					
375	The primary RSS shall be installed at the existing STOC building or at a Triangle Expressway Equipment vault location. The location shall be determined during System Design and Approved by NCTA.					
376	The secondary RSS shall be hosted within the contiguous United States. All infrastructure required to support the secondary servers, including but not limited to UPS, air conditioning, security and backup generators shall be the responsibility of the Contractor.					
377	The primary and secondary RSS configuration shall meet the Performance and Disaster Recovery Requirements of the Contract guaranteeing availability as identified in Section 8.					
378	The secondary RSS shall be configured as a "hot stand-by" in an active-active state to allow continuous Operations in the event of a failure of the primary RSS.					
379	The secondary RSS environment shall mirror the primary System in all Hardware and Software configurations, be kept up to date and be capable of performing all functions of the primary RSS as described in this Scope of Work.					
380	Unless otherwise noted, all Hardware and Software procured under this Scope of Work and Requirements shall be confirmed to be the latest model and version at the time of purchase.					
381	All computers, servers and Hardware procured, furnished, and installed under this Contract shall have the most current and up-to-date current virus, firewall, spam protection and other security Software that protects from virus attacks, unauthorized intrusions and unauthorized access. Virus protection and other Software shall automatically obtain Updates according to a recommended (Configurable) Maintenance schedule.					
382	Per ***Attachment 7: North Carolina, Statewide Information Security Manual*** and as applicable, all computers, servers and Hardware shall automatically detect virus protection and security Updates according to a recommended (Configurable) Maintenance schedule and generate an Alert that is reported to MOMS. Virus protection and security Updates to workstations shall be automatic but Updates to servers shall be scheduled upon NCTA Approval. The System shall detect all unauthorized access and intrusions at all levels and report such events to the MOMS.					
383	The System shall detect intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to NCDOT IT Security immediately once detected.					
384	A high level of redundancy shall be built into the RSS to support high availability Requirements.					
	The RSS shall support the following general functions:					
	a) communicate with all the zone controllers in receiving transactions, alarms and other messages and transmitting TSLs, toll rate schedules, user identification lists (UIL), and configuration files as defined during System Detail Design phase;					
	b) provide real-time Roadway Operations monitoring screens and Dashboards to assist Maintenance and supervisory staff in observing transaction and event data in real-time, including reviewing DVAS image/video and data through these screens;					
	c) provide the ability to remotely operate and control the lanes through real time screens;					
	d) perform transaction processing and fare determination based on the facility type and transaction type.					

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		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
385	e) interface with existing NCTA CSC Back Office per ***Attachment 8: NCTA CSC Back Office System RTCS File Exchanges – Interface Control Document*** to transmit images, transaction messages for further processing and fare schedules and toll rate data and receive TSL, and transaction processing disposition results;					
	f) process I-Toll dispositions for image-based transactions which were converted to I-Tolls at the existing NCTA CSC Back Office for Accounts in good standing, including the adjustment of toll rate posted per the Approved Business Rules;					
	g) perform Maintenance management functions of the System, including alarm notification and tracking, Equipment inventory, Maintenance history and other Maintenance related functions, incorporated into the MOMS;					
	h) provide an independent audit of successful receipt of all transactions from the zone controllers to the RSS;					
	i) provide various management reports that assess the operational performance of the System and transaction reconciliation reports as determined by NCTA during Design.					
	j) communicate with facility servers (if provided) in receiving transaction, alarm and other messages and transmitting TSLs, UIL and Violation Enforcement List (VEL) (if exercised);					
	k) communicate with the applicable image server(s) for tracking and reconciliation image transmission and transfer status;					
	l) provide the capability to manage toll rate/toll schedule and transmit the toll rates/toll schedules to the zone controllers and the existing NCTA CSC Back Office System;					
	m) (REQUIREMENT DELETED)					
	n) provide the capability to enter or obtain employee information defined in the Design phase such as employee ID, role and access privileges from Active Directory and, if required, to transmit the UIL to the zone controllers.					
2.1.1	Roadway Support System (RSS) Hardware and Third-party Products					
	The Work under this section shall include all labor, materi-als, and support Services to complete the Design; fabrication; integra-tion; packaging; delivery; testing, and Acceptance of the primary and redundant RSS Hardware and third-party Software in accordance with the Requirements of this Scope of Work and Requirements.					
386	NCTA shall have ownership of all Hardware, third-party Software and firmware procured, developed, furnished, and installed as part of the RSS.					
387	The Contractor is responsible for obtaining all required licenses in the name of NCTA. All licenses and media shall be provided to NCTA for all Hardware, third-party Software and firmware. The Contractor shall retain authorized copies (backups) for all Software media to use for periodic System Maintenance, Upgrades, or restore, as required.					
388	The Contractor shall furnish and install a complete, fully redundant, RSS Hardware configuration needed to support the redundancy and Performance Requirements of this Contract, including but not limited to:					
	a) multi-processors					
	b) dual, redundant, hot-swappable power supplies;					
	c) storage devices; and					
	d) storage devices, backup library.					
389	The RSS Hardware solution shall provide high-speed connectivity between all storage, databases, servers, and backup systems. The Hardware solution shall provide for storage expansion and Upgrades. A storage area network (SAN) is a preferred solution over a minimum-cost just a bunch of disks (JBOD) server solution.					
390	The System Design and implementation shall ensure the RTCS continues to operate without data loss even if any unit of the server configuration fails.					
391	The Contractor shall provide a test environment that is independent and separate of the production environment to support testing, including new releases.					
392	All components, supplies, Software and materials furnished under this Contract shall be new, COTS and field proven, and in revenue Operations for two (2) years.					
393	The RSS server configuration, including all major Hardware elements, shall be of the latest Design and incorporate standard commercial products currently in production.					
394	All components procured, furnished, and installed by the Contractor should be multi-sourced and readily available to NCTA.					

No.	Requirements	Status	If Applicable	Required Inputs Source	If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
395	All components procured, furnished, and installed by the Contractor should have the capability of sourcing from the same manufacturer or multiple suppliers. The intent is to increase compatibility and reduce maintainability problems.					
396	Proof of purchase in the form of dated invoice and shipping bills shall be retained and furnished to NCTA in accordance with the Requirements of this Scope of Work and Requirements and Contract for all Hardware purchased by the Contractor.					
397	The RSS Hardware shall have a minimum manufacturer warranty for five (5) years.					
398	The RSS Hardware shall be supported for the duration of the Contact after the date of Operational Test Acceptance. During the life of the Contract the Contractor is responsible for ensuring the System is operational in accordance with the Performance Requirements.					
399	The Contractor shall use proven server configurations that support future Upgrades to processors, memory, storage, operating System, database, and other System components. All third-party Hardware and Software and Contractor Software shall be Hardware neutral and shall perform without intervention on any Hardware platform.					
400	The System architecture shall have expansion capability to support a ten (10) year growth in traffic volumes in its installed Hardware which includes support of Bill by Mail tolling at the Tolling Locations. For the purposes of calculation, please refer to ***Attachment 1: Future Project Transactions*** , for projected traffic data.					
401	The operating System for the RSS servers shall be a proven system used widely throughout the United States for intensive database Operations and shall be compatible with the Relational Database Management System (RDBMS) and other tools employed.					
402	The operating System for the RSS servers shall consist of a multi-user, multi-tasking operating System.					
403	The operating System shall fully utilize the redundant RSS server architecture and shall support all peripherals defined in these specifications.					
404	The operating System shall also support the proposed communications topology, redundant RSS configuration, and Contractor's application Software.					
405	The Contractor shall provide and maintain supported versions of the operating System for the Contract Term and all Upgrades of the RSS shall be the Contractor responsibility.					
406	The operating System shall have a future Upgrade path and be supported for the Contract Term.					
407	The Contractor shall provide a highly reliable and secure RDBMS for the storage of images, video, transaction data, image-based transaction data, audit data, and all other data, as applicable, for the retention period specified in the Scope of Work and Requirements.					
408	Contractor shall provide the latest version of the RDBMS that is field-proven to operate in a transaction intensive environment.					
409	The RDBMS architecture shall support the RSS functions for each of the Roadways and allow Authorized Users seamless access to all data.					
410	The RDBMS shall be compatible with the operating System and application Software, and shall support the redundant RSS server architecture.					
411	The RDBMS shall have an Upgrade path and shall support Upgrades to operating system, application, memory, processors, etc.					
412	The RDBMS shall have Maintenance and Upgrade Services from the 3rd party software provider for the Contract Term. For example Microsoft Software Assurance or Oracle Software Update and License Support or typical shall be required.					
413	The Contractor shall provide and maintain supported versions of the RDBMS for the Contract Term and all Upgrades of the RSS RDBMS to the latest supported version shall be the Contractor responsibility.					
414	The RDBMS shall be supported by the Contractor for the term of Contract.					
415	The secondary RSS shall perform all functions of the primary RSS as described in this Scope of Work and Requirements.					
416	The Contractor shall keep all Software instances throughout all environments at the same software version, configuration and patch level.					
2.1.2	Roadway Support System (RSS) Printers					

No.	Requirements	Status	If Applicable	Required Inputs Source	If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
417	The Contractor will not be required to procure, furnish, and install any printers for NCTA use as part of the RSS.					
418	NCTA shall have the ability to print from the RSS interface to any printer connected to the NCTA System network.					
2.1.3	**Roadway Support System (RSS) Uninterruptable Power Supply (UPS)**					
419	All Roadways Support System Hardware and Equipment shall be on UPS supplied by the Contractor and the Contractor shall furnish and install an electronic interface between the RSS and the UPS to monitor the UPS performance. The MOMS shall detect the status of the UPS and Alert technicians when the System is on UPS.					
420	Software drivers or interfaces shall be developed, furnished, and installed where required to acquire, display, store and report all parameters provided as outputs from the UPS. The interface shall be designed to provide support for TCP/IP, SNMP, and/or a web interface that can be used to configure and administer the UPS, as well as support email-based alerting.					
2.1.4	**Image Server**					
	The Contractor's image processing solution shall meet the functional and Performance Requirements of the Scope of Work. The Design shall support latency in the transfer of images to the existing NCTA CSC Back Office System and prevent loss of images and image-based transactions if there are communications or server issues. If the Contractor's solution includes the provision for a central image server as part of the RSS, then the central image server shall be located at a NCTA Approved location.					
421	The image processing solution shall support, but not be limited to the following general functions:					
	a) communicate with all of the roadside ICPS for the transmission, tracking, reconciliation and processing of all vehicle images and image-based transactions;					
	b) interface with existing NCTA CSC Back Office System for the processing and reconciliation of all vehicles images and image-based transactions;					
	c) support the transfer of images and image-based transactions to the existing NCTA CSC Back Office System without loss of any image or image-based transaction; and					
	d) provide reconciliation reports as determined by the NCTA during Design.					
2.1.5	**Data Backup**					
422	The RSS shall include data backup Software and Hardware that allows remote incremental and full back-up of data without manual intervention. Notification on the status of the backup process shall be transmitted to MOMS.					
423	The Contractor shall maintain local and remote backups and if there is a catastrophic failure that results in the loss of data, means shall be provided to restore the data and reconfigure the servers without disruption to the toll collection Operations.					
424	During the installation of the RSS servers, the Contractor shall create an image of the completed server configurations, as well as maintain regular local and remote backups. If there is a catastrophic failure that results in the loss of data, means shall be provided to reconfigure the servers without disruption to RSS Operations.					
425	The backup software shall be capable of displaying the backup data in a user-friendly and readable form as defined during the Design phase.					
426	The Contractor shall provide a solution for data backup storage locally and off-site.					
2.1.6	**Archive and Purge Control Mechanisms**					
427	Provide the capability for fully automated and Configurable archival and purging of data, images, video and files in accordance with NCTA's data retention Requirements.					
428	Archival and purge routines shall be Configurable for each impacted data elements, including but not limited to:					
	a) data;					
	b) images;					
	c) video;					
	d) MOMS data;					
	e) System logs; and					
	f) interface files.					
	Servers shall retain transaction and summarized data, images, MOMS data and System logs, in accordance with the retention procedures, including but not limited to:					

No.	Requirements	Status	If Applicable	Required Inputs Source	If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
429	a) Transaction data shall be retained online for ninety (90) Days and then archived and purged;					
	b) compressed images associated with Transponder-Based transactions shall be retained online thirty (30) Days and then archived and purged;					
	c) Image-Based Transactions and images (compressed image and region of interest) online for ninety (90) Days and then archived and purged;					
	d) compressed images associated with class mismatch transactions shall be retained online for a minimum of ninety (90) Days and then archived and purged;					
	e) DVAS video, security video, CCTV video and other video shall be retained online in accordance with the Requirements of the Scope of Work and Requirements.					
	f) summarized data shall be retained online for at least ten (10) years and then archived and purged;					
	g) System logs shall be retained online on the System for ninety (90) Days and then archived and purged;					
	h) MOMS data shall be retained online for the Contract Term; and					
	i) all other data shall be retained on the System for ninety (90) Days and then archived and purged.					
430	The status of the archival process shall generate a message to be transmitted to MOMS. No transactions shall be deleted unless confirmed to be successfully archived.					
431	The Servers shall be sized to accommodate for the restoration of selected archived data (two months minimum).					
432	Authorized Users shall be able to generate queries from the restored data.					
2.1.7	Maintenance Access and Application Access					
433	Technicians and NCTA staff shall have ability to access the System and application as applicable.					
2.1.7.1.	*Maintenance Access*					
434	The Contractor shall procure, furnish, and install the required keyboards, video monitors, mouse(s), and KVM switches over IP to allow technicians to access all servers, controllers, computers, and devices in order to perform diagnostics.					
435	Authorized technicians shall be able to access the System through a secure virtual private network (VPN) connection provided by the Contractor and through any NCTA authorized workstation connected to the NCTA System network.					
436	All Maintenance Hardware and Software installed on the Roadside System and RSS shall comply with NCTA security Requirements.					
2.1.7.2.	*NCTA Access*					
437	Authorized NCTA staff shall be able to access the RTCS through a secure virtual private network (VPN) connection provided by the Contractor and through any NCTA authorized workstation connected to the NCTA System network.					
438	The RSS shall be a Graphical User Interface (GUI) application which shall be accessible by any NCTA authorized workstation connected to the NCTA System network.					
439	Access to the application Software shall not require the installation of any Contractor supplied application Software on NCTA authorized workstations and shall be accessible via External networks with via Secure VPN access. Based on the user's access privileges the appropriate menus shall be made available.					
440	The Contractor shall procure, install, and configure two (2) workstations (each with two (2) 50-inch portable monitors) in the NCTA/NCDOT Transportation Building for use by Authorized NCTA staff to access the Traffic Management System.					
441	The Contractor shall procure, install, and configure four (4) workstations in the STOC (each with two (2) 24-inch monitors) for use by Authorized NCTA staff to access the Traffic Management System.					
442	The Contractor shall procure, install, and configure one (1) workstation in the CSC (with two (2) 24-inch monitors) for use by Authorized NCTA staff to access the Traffic Management System.					
2.1.8	Roadway Support System (RSS) Software					
443	The RSS Software shall support the functionality detailed in this section and shall meet the NCTA operational Requirements set forth in this Scope of Work and Requirements and Contract for the Contract Term.					
2.1.8.1.	*Data Communications and Interface Requirements*					
444	The RSS shall communicate with various other systems for the transmission and receipt of toll collection data based upon the Toll Facility in accordance with Approved ICD.					

No.	Requirements	Status B-Base Product M-Base Modified D-New Development N-Not Provided*	If Applicable Customer Name and Location	Required Inputs Source P-Proposer S-Sub T-Third Party NA-Not Applicable	If Applicable Subcontractor Name and/or 3rd Party Product/Vendor	Comments Comment required if "Not Provided*", optional otherwise.
445	All data; transactions; images; files, and messages transferred between all subsystems shall be guaranteed and have the required data validation protocols to confirm the accuracy and validity of data transfer.					
446	The System shall support error detection and recovery process in accordance with the NCTA Business Rules Approved during the Design phase. Alarms shall be generated and reported to the MOMS for all exceptions/errors.					
447	Authorized Users shall have the capability to correct the errors and re-process the data without compromising System security.					
448	The RSS shall support the interfaces specified in this Scope of Work including, but not limited to:					
	a) Interface to the zone controllers: If the Contractor's solution does not include a facility server, the RSS shall receive and store all the messages from the zone controllers in real-time. It shall transmit all data required by the zone controllers to support its operation, including the UIL and TSL. All data sent to and received from each zone controller and the RSS shall be acknowledged and confirmed.					
	b) The VEL shall be transmitted from the RSS to the Roadside System to support onsite enforcement (if exercised).					
	c) Interface to the facility servers (if provided): If the Contractor's solution includes a facility server, the RSS shall have the capability to transmit all data to and receive data from the facility servers as required in this Scope of Work to support lane Operations. All data sent to and received from each facility server at the RSS shall be acknowledged and confirmed.					
	d) Interface to the existing NCTA CSC Back Office System: The RSS shall have the capability to transmit AVI transactions to the existing NCTA CSC Back Office System in real time and in batch mode (at Configurable intervals/transactions) in accordance with the Approved ICD.					
	e) Interface to the image server(s): The RSS shall track and reconcile image transmission and transfer status.					
	f) Interface to the MOMS: The RSS shall interface with the MOMS to transmit alarms and RSS operational status including recovery messages.					
	g) Interface to the traffic detector servers for the receipt of traffic data.					
449	The RSS shall receive a comprehensive TSL from the existing NCTA CSC Back Office System once a day and incremental TSL Updates not more frequently than every ten (10) minutes (Configurable).					
450	Toll rate tables shall be transmitted to the NCTA CSC Back Office when rate changes are initiated on the RSS.					
2.1.8.2.	*Interface to the zone controllers*					
451	The RSS shall support the interface to the zone controllers to transmit and receive toll collection data including, but not limited to:					
	a) transaction data;					
	b) ICPS images;					
	c) alarm messages;					
	d) remote Authorized User Operations;					
	e) TSL;					
	f) UIL;					
	g) toll rate schedules; and					
	h) configuration files.					
452	All data sent to and received from each zone controller and the RSS shall be acknowledged and confirmed.					
2.1.8.3.	*Interface to the existing NCTA CSC Back Office*					
453	The RSS shall communicate with the existing NCTA CSC Back Office per ***Attachment 8: NCTA CSC Back Office System RTCS File Exchanges – Interface Control Document*** in real time and in batch mode for the transmission and receipt of toll collection data including, but not limited to:					
	a) Transaction data upon creation of the fully-formed, pursuable transaction;					
	b) Fully-formed image-based transactions, including image review results that include license plate number; jurisdiction and plate type (if applicable);					
	c) Processing of Image Toll (I-Toll) transaction dispositions and related fare adjustments for I-Tolls which are determined and processed in the NCTA CSC Back Office using the fully-formed image-based transactions;					

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		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
	d) comprehensive TSL once a day and incremental TSL Updates not less often than every ten (10) minutes (Configurable);					
	e) transaction reconciliation status;					
	f) Violation Enforcement List (VEL) (if exercised); and					
	g) Other data files needed for NCTA CSC Back Office transaction processing.					
2.1.8.4.	*Interface to the Maintenance Online Management System (MOMS)*					
454	The RSS shall interface with MOMS to transmit alarms and RSS operational status including recovery messages and operational Alerts.					
2.1.8.5.	*Interface to the Traffic Management System*					
455	Toll rate and other traffic information obtained by the toll collection System shall be made available to other Traffic Management Systems (as applicable) in accordance with Approved ICDs.					
2.1.9	Version Tracking Requirements					
456	The RSS shall maintain records of all versions of the TSL; UIL; toll rate schedules; lane configuration files; and lane executable programs that it received and/or created and that were successfully downloaded to the lanes. Receipt of files from the existing NCTA CSC Back Office, their version, time of receipt and processing status shall also be tracked.					
457	The RSS shall maintain records of the last twenty (20) versions of the TSL, toll rate tables, VEL (if exercised), UIL, and lane configuration files that it received and/or created and that were successfully downloaded to the lanes. Receipt of files from the existing NCTA CSC Back Office System, their version, time of receipt and processing status shall also be tracked.					
458	Reports and screens shall be made available to verify the versions and the file download status. Failure in the transmission of any data to a lane shall result in a failure message being logged and reported to the MOMS.					
459	The System shall provide the capability to track the versions of lane executable programs installed at each Toll Zone location.					
2.1.10	Diagnostics					
460	The RSS shall provide self-diagnosis functions to detect and report on the status and functioning of the RSS Hardware devices, third-party Software, communications, processes, tasks, and Software applications, as defined in the NCTA Approved Design Document.					
461	All Hardware and Software failures detected shall be reported to the MOMS.					
2.1.11	Data Security					
462	The Contractor shall ensure that any data records, once entered into the System, cannot be deleted or changed.					
463	Data records and files shall only be appended to and not edited or deleted. If manual intervention is required to complete the audit and verification process, only Authorized Users shall be permitted to Flag a file to ensure the integrity and provide a complete audit trail.					
464	All System access/entry, logins, and modifications (for example, flagging actions) shall be recorded and unauthorized access shall be prevented, logged and reported to NCDOT IT Security within twelve (12) hours of detection.					
2.1.12	Transaction Audit and Verification					
	It is critical that all messages from the zone controllers are transmitted to the RSS and a verification of this data transmission shall be performed by the System.					
465	The Contractor shall perform automatic audit and verification process that confirms all data transmissions between the zone controller and RSS are successful.					
466	The Audit process shall be an independent validation of the end of day summary counts from the lane/zone controller to the detailed transaction data at the RSS.					
467	If the validation process fails for any reason, failure messages shall be created and reported to MOMS. If the audit process determines that transactions are missing, the missing sequence number shall be identified and reported to MOMS.					

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468	The RTCS shall perform an independent automatic audit and verification process that confirms all vehicles traveling through the toll lane are detected and reported as transactions; all transaction transmissions between the zone controller and RSS are successful and the System has the screens and reports to validate the audit trail.					
469	If the validation process fails for any reason, failure messages shall be created and reported to the MOMS. If the audit process determines that vehicles or transactions are missing, the missing information shall be identified and reported to the MOMS.					
470	If the audit process is successful then the audit for the location for the Revenue Day shall be deemed "complete" and System shall track this status of the audit on reports.					
471	Once the Revenue Day is "complete" the data reported for that day should not change. Any condition for example toll waiving that result in changes to the data shall be identified and Authorized Users alerted.					
2.1.13	Data Summarization					
472	In order to support the NCTA reporting Requirements, transaction data shall be summarized. The summarization details, including but not limited to summarization date, and status shall be recorded to provide an audit trail.					
473	In the event additional data is received that changes the summary counts previously generated, then an alarm message shall be generated and the System shall automatically re-summarize the data until a Configurable period has lapsed after which the re-summarization shall be performed manually.					
2.1.14	Data Warehouse					
474	The Contractor shall provide a replicated database environment independent and separate of the RSS production environment for reporting and analytics to which NCTA shall have full access.					
475	The Contractor shall provide validation that any and all data replicated between the production database(s) and the replicated database is complete and accurate.					
476	The replicated database environment shall be updated with all non-sensitive data (production data excluding any PII related data) at a minimum once per day.					
477	Provide a schema architecture that is simple to understand so that Authorized Users familiar with query commands can effectively query data for export/input into common business intelligence tools for data reporting and analysis.					
2.1.15	Fare Calculation					
478	The RSS shall support fare calculation Business Rules by Toll Facility. Fares shall be determined in U.S. currency for the specified Toll Facility.					
479	The RSS shall calculate the fare to be charged to the Customer Account based upon the toll locations; the payment method; the rate that was applicable for that transaction and any minimum/maximum criteria established by NCTA.					
480	The fare due from a vehicle without a Transponder that is determined to be an image-based transaction shall be in accordance with the Business Rules established be NCTA during the Design phase.					
481	The System shall assess a default toll amount if the cost cannot be determined.					
2.1.16	Transaction Pre-processing					
482	The RSS shall ensure all transactions transmitted to the existing NCTA CSC Back Office are transactions that are pursuable and comply with the ICD specifications.					
483	The RSS shall pre-process all transactions in accordance with the Approved Business Rules in order to filter incorrect transactions that may result from Equipment failures and lane logic issues.					
484	Transactions that should not be processed further at the existing NCTA CSC Back Office shall be identified and Flagged and filtered at the RSS and not transmitted to the NCTA CSC Back Office.					
485	The RSS shall identify exceptions, anomalies and other conditions determined during the Design phase in the event they have not been filtered at the zone controller, for example, same Transponder read within Configurable conditions.					
486	In scenarios where multiple Transponders with valid status are reported, the System shall select one Transponder with valid status to be included the transaction (per the Approved Business Rules) and transmitted to the existing NCTA CSC Back Office System and the existing NCTA CSC Back Office will post the transaction in accordance with NCTA Business Rules. NCTA CSC Back Office.					

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487	In cases where a Transponder read and an Image-Based Transaction are created for a vehicle (in case of buffered reads or lane logic issues) then the RSS shall perform the filtering based upon Configurable parameters Approved during the Design phase. In case of buffered read transactions, the Transponder read time shall be used as the transaction time.					
488	Alarm messages shall be created and reported to the MOMS in the event such exceptions identified in this section exceed a Configurable threshold.					
2.1.17	Roadway Support System (RSS) Application Software					
489	The Contractor shall develop, furnish, and install a single GUI application Software for the RTCS that supports all user functions for the RSS, including the MOMS, image review and DVAS. The System shall provide Single Sign On capability. All rules for password security such as characters and rotation are enforced and passed between network and application. Any SSO exclusions shall be identified by the Contractor in System Detail Design phase.					
490	A single GUI application shall be provided to access all RSS functions and reports. The System architecture shall provide the necessary databases to support the synchronization and transfer of the necessary data to support the single GUI requirement.					
491	Any NCTA authorized workstation connected to the NCTA System network shall be granted permission to access and run the GUI application.					
492	The GUI application shall be compatible with the State Approved current version, or immediate prior State Approved version of Microsoft Office and releases of the following browsers, including but not limited to, Microsoft Internet Explorer.					
493	Based on the user's access privileges obtained from Active Directory the appropriate menus, screens, tabs, reports and other System functionality shall be made available.					
494	Changes to the System data and System parameters shall be through screens and only Authorized Users shall have access to these screens.					
495	All access to the application and changes to the data shall be recorded and tracked, and the System shall provide an audit trail for all data modifications and parameter changes.					
496	Authorized Users shall have access to the data modifications and parameter changes initiated by users.					
2.1.17.1.	*Graphical User Interface (GUI) Requirements*					
	The GUI Design must include accepted industry design standards for ease of readability, understanding and appropriate use of menu-driven Operations, user customization and intuitive operation.					
497	The GUI Design and development shall incorporate human factors and usability engineering and be optimized for speed, as well as provide the following controls, including but not limited to:					
	a) menus (such as pull down, popup, cascading, leveling, etc.);					
	b) windows (allowing for multiple windows within the application, such as to navigate back without having to re-enter information)					
	c) informational messages;					
	d) positive feedback;					
	e) provide warning and/or confirmation messages when appropriate as defined during the Detailed Design phase					
	f) exception handling and error dialogs, including logging the error;					
	g) control icons, links and action buttons;					
	h) data entry fields, combo boxes, check boxes;					
	i) provide the capability for the user to print screens					
	j) display (read-only) fields; and					
	k) general and context-specific help menus.					
498	Data entry screens shall have Configurable mandatory fields that require data entry prior to continuing through the process.					
	Provide field-level validation (server-side enforced) and format verification upon exiting data fields applicable to pre-defined formats or standards, including but not limited to:					
	a) alpha-numeric;					
	b) date;					

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499	c) time;					
	d) special characters;					
	e) length;					
	f) lane and location ID; and					
	g) Transponder numbers.					
500	Provide other formatting masks (server-side enforced) as configured by the System administrator (visible to certain users but masked for other users), which can be applied to any other field in the GUI.					
501	Provide field-level "tooltips" or other interactive help, Configurable by the System administrator, that provide specific guidance on any field presented, including but not limited to:					
	a) alpha-numeric fields;					
	b) date fields;					
	c) time fields;					
	d) special characters;					
	e) username and password;					
	f) length restrictions;					
	g) lane and location ID; and					
	h) Transponder fields.					
502	Online help shall be provided for each screen, each editable field and each selectable option within each screen.					
2.1.17.2.	*Screens and Report Access*					
503	Capability shall be provided to assign Roadside System Application screens and reports access privileges to users based on user level/role, as determined by NCTA.					
504	Based on the access levels/role a user is assigned to the appropriate menus, screens, tabs, reports and all other required user information shall be displayed.					
505	For some screens, certain access levels/roles may only be allowed to view the contents and not allowed to enter any data.					
506	Access privileges shall be set up to allow NCTA authorized personnel to make changes to the access privileges at any time, and shall be based upon access level/role and not at an individual user basis.					
2.1.17.3.	*Roadside System Screens and Reports*					
507	All data entered or generated in the System shall be retrievable through reports and screens.					
508	Reports menu shall be organized by category of reports and shall be intuitive to users and easily accessible based on user access.					
509	Data shall be summarized to improve report generation performance and to track changes in data for as-of-date reporting.					
510	Reports and screens shall be made available through the System on demand and on an ad-hoc basis; shall have various selection and sort criteria, and shall be intuitively Configurable with user selected criteria from drop down data elements as defined during Detailed Design Phase.					
511	The location selection criteria shall include Roadway; Tolling Location; lane, and direction of travel.					
512	The date selection criteria shall include but are not limited to the ability to generate the same report by hour; day; date range; weekly; monthly; yearly, and year-to-date.					
513	Data shall be presented as an accumulation or individually for the selected criteria. This capability shall be Configurable and applicable to individual Tolling Location and different transaction types whereby the user can choose the data to be presented as an accumulation of Tolling Locations and/or payment types or as individual Tolling Locations and/or payment types.					
514	Reports developed shall allow NCTA to audit and reconcile the transaction data from RTCS to the transaction data at the RSS and the existing NCTA CSC Back Office in accordance with this Scope of Work and Requirements.					
515	Capability shall be provided to manipulate the report data to perform comparative analysis and statistical calculations.					
516	The Contractor shall provide ad-hoc reporting tools supporting natural language and use of the tools to generate ad-hoc reports shall be documented.					

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517	Provide ad-hoc reporting tool capabilities to Authorized Users to allow the creation and execution of custom reports, including but not limited to:					
	a) drag-and-drop field functionality;					
	b) drill down functionality;					
	c) filtering;					
	d) parameter prompting;					
	e) formula support;					
	f) grouping;					
	g) sorting; and					
	h) stored procedure and function support.					
518	The ad-hoc reporting tool shall be COTS software and be the latest version at the time of Acceptance testing and field-proven to operate in a transaction intensive environment.					
519	The ad-hoc software shall be compatible with operating System standards and shall be patched and Upgradeable to new versions of the software and operating System.					
520	Ad-hoc report templates created by Authorized Users shall be made available to all Authorized Users.					
521	All reports shall show the status of the validation/audit process, as defined by NCTA and other relevant statuses that indicate items, including but not limited to whether:					
	a) all data has been obtained from the lanes;					
	b) the data has been re-summarized;					
	c) the transactions have been transmitted to the existing NCTA CSC Back Office System; and					
	d) the report is complete.					
522	The date and time of the last transaction processed shall be included in all applicable reports.					
523	Once the audit process is completed and Revenue Day is closed, the data on reports for the day shall not change unless data is re-summarized.					
524	All reports shall include individual totals, sub-totals, and grand-totals as appropriate and such totals shall be maintained when data is exported to other formats.					
525	Reports shall have the capability to select the date type, including but not limited to:					
	a) revenue date;					
	b) transmission date;					
	c) as-of date;					
	d) process date;					
	e) transaction date; or					
	f) a combination thereof, as designated by NCTA.					
526	Reports shall use conditional formatting to identify exceptions and data that are outside the normal trend.					
527	All reports and screens shall have the capability to be printed or saved in various formats (both compressed and uncompressed), formats to be Approved during the Design phase including but not limited to:					
	a) Portable Document Format (PDF);					
	b) plain text format (TXT);					
	c) rich text format (RTF);					
	d) Microsoft Excel (2010 version and later);					
	e) delimiter-separated values;					
	f) hypertext markup language (HTML), and					
	g) extensible markup language (XML).					
528	A report generation feature shall be available for configuration and shall permit an individual with permission to request selected reports for auto delivery by email or to a designated server according to a routine or custom-specific interval.					
529	Selected reports shall be automatically generated and made available to authorized personnel at the start of the Business Day or at other appropriate time as designated or requested by NCTA.					

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530	Data from summary reports scheduled to run daily shall be automatically exported daily to a specified file format and made available on the NCTA designated server.					
531	The System shall have the ability to drill down all high-level reports/screens to the next level of detail and to details as required.					
532	Authorized Users shall have the ability to display and review the ICPS images and DVAS video and event details associated with the selected transaction from the drilled down details.					
533	Authorized Users shall also have the ability to view the contents of files that are received by the RSS and transmitted by the RSS in a readable format. If files are compressed or encrypted, the necessary Software tools shall be provided to view their contents. If the user selects a specific file, the contents of the file shall be displayed and the user shall have the ability to save the contents as a .csv file and in a useable Excel format.					
534	Where applicable, data shall also be presented in graph forms and chart types and the user shall be able to select presentation form from a variety of graphic styles. Report Designs shall be presented and finalized during the Design phase.					
535	Data shall be organized and summarized in a manner to allow for report generations within thirty-five (35) seconds for daily reports when less than or equal to 30,000 rows (750 pages) in the report, and within seventy (70) seconds for weekly, monthly, and annual reports when less than or equal to 200,000 rows (8,000 pages) in the report, of a report generation request. The report execution time shall be based on the reporting server execution time statistics calculated during the execution of the report.					
536	Additionally, after the deployment and implementation of the System, the need may arise to create additional reports and modify implemented reports and the Contractor shall support such additions and/or modifications. It is anticipated that no more than five (5) additional reports will be required for each Toll Facility type.					
2.1.17.4.	*Roadway Support System (RSS) Reports*					
	The RSS shall provide reports to audit and reconcile the System and validate System performance.					
537	Report Designs and templates shall be presented by the Contractor and reviewed by NCTA during the Design phase and Approved.					
538	Additionally, after the deployment and implementation of the System, the need may arise to create additional reports and modify implemented reports and the Contractor shall support such additions and/or modifications. It is anticipated that no more than five (5) additional Roadside Support System reports will be required for each Toll Facility.					
539	Traffic Reports: Peak hour (user-selectable); fifteen (15) minute increments, hourly; daily; weekly; monthly and comparative reports shall be provided that help NCTA gauge congestion, mobility, travel times and throughput. Average travel time, average toll rate, and minimum and maximum toll rate shall be included in the traffic reports. Provide the capability for user-selectable criteria for reporting as defined during Detail Design phase.					
540	Average Lane Throughput Report: This report shall display hourly traffic volumes for each lane grouped for each tolling point within the selected Toll Facility. Hourly traffic volumes shall be totaled by lane for the day for each tolling point to calculate the average lane throughput at each tolling point.					
541	Counts and Percentages Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example AVI and Image-based for each tolling point. This is a daily report and is grouped by tolling point for the selected Toll Facility. This report shall drill down to the Counts and Percentages by Direction Report.					
542	Counts and Percentages by Direction Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example AVI and Image-based counts and percentages for each tolling point. This is a daily report and is grouped by tolling point and direction for the selected Toll Facility.					
543	Lane Traffic Counts and Statistics Reports: This report shall provide AM and PM traffic counts and statistics by hour for each Highway and tolling point by revenue category for example AVI and Image-based. The report shall also include AM and PM peak hour statistics and provide a grand total by revenue category for all peak hour. The total percentage of AVI transactions with the AM/PM breakdown and identification on the AVI high hour and lane shall be included.					

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544	Finance Traffic Details Report: This report shall display traffic counts grouped by tolling point and vehicle class category and include grand totals for each vehicle class category.					
545	Tolling Location by Lane Report: This report shows traffic counts by lane for each tolling point by vehicle class categories and vehicle classes. This report includes the summary by tolling point for the selected Toll Facility. This report is used by Operations staff in analyzing traffic volumes by lane and vehicle class.					
546	Market Penetration Report: This report shows traffic counts by revenue category, for example AVI and Image-based for AM/PM peak hours and includes the AVI penetration percentage, and comparisons shown for EL, GP lanes and any other lane AVI penetration percentages available.					
547	Speed Bin Reports: This report shows the traffic count information per lane by user-definable speed bins. This report is used by Operations staff to monitor traffic flows at various speeds.					
548	Traffic Counts Report: This report shows traffic count information grouped by revenue category for example AVI and Image-based with breakdown by transaction types and sub-totaled by tolling point and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions. This report shall drill down to the Traffic Counts by Direction Report.					
549	Traffic Counts by Direction Report: This report shows traffic count information grouped by c revenue category for example AVI and Image-based with breakdown by transaction types and sub-totaled by tolling point, direction and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions.					
550	Vehicle Count by Lane Mode Report: This report shall display tolling point, lane and detailed transaction information for vehicles that travel through a lane based on the date range, tolling point, lane and user-selectable lane mode.					
551	Vehicles and Mileage Report: This report shows traffic counts for all vehicle classes in addition to vehicle class category for each revenue category between tolling points, average travel time between tolling points and total distance traveled for the selected criteria. The report includes a summary page with traffic between tolling points and total miles traveled. Each summary shall be grouped by vehicle class category and revenue category, for example AVI and Image-based.					
552	Transaction Audit Report: This report shows the status of the transaction transmission from the zone controllers to the RSS, the audit status, the failed transactions, all exceptions, and missing transaction sequence numbers at each of the Tolling Locations. The communication status between the zone controllers to all of the subsystems shall be displayed. The report shall also include the date the transactions were received at the RSS and the Days lagging. It also shows the transmission status of the transactions to the existing NCTA CSC Back Office.					
553	System Audit Trail Reports: Weekly and monthly reports shall be made available that show the modifications made by the users to system parameters and ability shall be provided to obtain the details of the modifications.					
554	System Exceptions Report: The System Exceptions report shall display transactions that are considered exceptions, including but not limited to duplicate transactions; dual Transponders; RSS filtered transactions and non-interoperable Transponder reads. Exception handling errors and the disposition of these exceptions shall also be displayed along with the transaction.					
555	Image Reconciliation Report: The Image Reconciliation report shall provide the ability to match transactions by type to images and to help identify missing images. These reports shall not only reconcile the actual images saved to what was expected but also verify that the images were successfully transmitted to the RSS for image review and image review results were obtained back.					
556	Image Reconciliation Detail Report: This operational report list the information on the image-based transaction for a user defined transaction date/time range. Capability shall be provided to show only records where an image is expected and if the image is expected if the image has arrived yet.					
557	Transactions Reconciliation Reports: Yearly, quarterly, monthly, weekly, and daily reports that show AVI and image-based transaction transmission reconciliation for all of the tolling points. These reports shall validate that all of the AVI and image-based transactions received from the lanes were posted to the RSS and transmitted to the existing NCTA CSC Back Office System. Reports shall be available by transaction day and transmit day, and transmit day reports shall show the files transmitted and acknowledged by the receiving system.					

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		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
558	Fare Schedule Report: This report shall provide user-selectable criteria to include at a minimum, fare schedule and types of fares. The fare amount for each vehicle class will be displayed by tolling point for the effective date selected. The report shall be used by Operations and management staff to verify future, current and past versions of released and unreleased fare schedules based on the effective date selected. Historical fare information shall be used in determining future changes in fares.					
559	Hardware Status Report: This report shows the Hardware status codes and descriptions based on the selected date range, Toll Facility, Lane and type of Hardware failure. This report allows Maintenance staff to audit the state of all Hardware components in the lanes.					
560	Transaction Number Gap Report: This report shall provide information on gaps in transaction numbers based on tolling point and lane for the specified date range.					
561	Unusual Occurrence Report: This report shall be used to provide Operations and Maintenance staff with information regarding unusual occurrences with lane data to identify potential Hardware issues, software issues or other System anomalies. The report shall include the Toll Facility and tolling point and may be filtered by unusual occurrence (UO) code. This report includes lane number, transactions date and time, lane status transaction number and a description of the UO.					
562	Lane Operations Report: This operational report lists and summarizes vehicle transactions and Equipment messages that are generated in the lanes. This report is an audit tool that presents all lane activity for a specified location and desired transaction date and time period. Numerous selection and filter criteria shall be provided to help identify problems. Detailed information regarding the transaction and event shall be included.					
563	Transponder Audit Report: This report verifies that Transponders are properly read at each roadside Tolling Location					
564	Transaction Reports: Daily, weekly, monthly, quarterly, and yearly transactions and reports showing traffic and vehicle class by payment type. Class mismatch transactions shall also be identified. Transaction reports shall be summarized and detailed.					
565	Transaction Summary Reports: These reports show daily, weekly, monthly, quarterly, yearly, and comparative transaction and revenue, by vehicle class and payment type. Transaction and revenue reports shall be summarized and detailed. The summary data shall drill down to the Transaction Detail Report.					
566	Transaction Detail Report: The transaction details shall be provided in this report including lane status, Equipment status, transaction status and various lane flags. Users shall be able to access the bit descriptions in all cases where information is coded. The report shall be used to investigate discrepancies and issues.					
567	Accounting Revenue and Associate Traffic Report: This report shows accounting revenue and traffic counts by Revenue Dates for the vehicle class categories.					
568	Class Report: This report shows information related to traffic and revenue by vehicle class by transaction types, for example AVI, Image-based and Non-Revenue This report is used by management and Operations to report on traffic and revenue by vehicle class.					
569	Executive Summary Traffic and Revenue Report: This report shows daily traffic counts and revenue amounts by revenue category, for example AVI and Image-based by vehicle class category, grouped by shift, selected day totals, previous day totals, percentage of increase/decrease and month to selected day totals. This report is used to show the increase and/or decrease in traffic counts and revenue compared to the previous Days' totals using the breakdown by revenue types. Data in this report shall also be represented graphically to include selected day traffic and revenue statistics; daily revenue and traffic comparisons by vehicle class and revenue type including selected day; previous day; month to selected day average and prior week day. Backup of the summary data by facility and tolling point shall be included.					
570	Finance Traffic and Revenue Details Report: This report shows traffic and revenue counts by tolling point and is grouped by vehicle class categories for the specified highway(s) selected. This report provides Operations and management with traffic and revenue totals for each tolling point by vehicle class categories for a specified date range.					
571	Traffic and Revenue Report: This report shows transaction by revenue category, for example AVI, Image-based and Non-Revenue for tolling points in each Toll Facility. The data is grouped by vehicle class categories and tolling point. A summary is provided at the end of the report by vehicle class category and transaction type.					

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572	Traffic and Revenue Comparison Report: This report shall provide a comparison of current year monthly traffic and revenue data with the previous year with percentage increase/decrease and includes selected Toll Facility and tolling point. Similar to the traffic and revenue report above, the report includes a breakdown by vehicle class category. The report is further divided into sub-groups by revenue category, for example AVI and Image-based.					
573	Transponder Status List Transmission Report: The TSL Transmission report shows the status of the TSL transmissions to the RSS and to all of the zone controllers. Summary information related to the number of Transponders, time acknowledged by the zone controller and other data shall be provided to verify results and Performance Requirements. Time of receipt from the existing NCTA CSC Back Office System, time of transmission to the zone controllers and the status of the transmission shall be displayed. Lanes not compliant to the Requirements shall be identified.					
574	Image Transmission Summary Report: This operational report counts the number of images created in the lanes for a user defined image created date range and other criteria. Data displayed include the number of triggered, non-triggered and total images from the lanes and the date the images were received at the image server(s). For each received date, the total images, number of lag Days, the percentage of transactions received each day and a cumulative percentage shall be included.					
575	Image Transmission Detail Report: This operational report lists information on images from the lanes for a user defined lane created date. Capability shall be included to show image records where it took longer than a user defined number of hours for the image to arrive at the image server(s).					
576	Image Processing Performance Report: The Image Processing Performance Report shall display OCR/ALPR and manual review performance statistics by jurisdiction. Problematic lanes, toll locations and jurisdictions shall be identified. The report shall also include a breakdown of the OCR/ALPR performance by confidence levels, if OCR/ALPR is used. The report selection criteria shall include at a minimum jurisdiction, toll locations, lane and sortable by each selected criteria. The selected criteria shall be defined during the Detail Design phase.					
577	System Exceptions Report: The System Exceptions report shall display transactions that are considered exceptions, including but not limited to duplicate transactions, RSS filtered transactions and non-Interoperable Transponder reads. Exception handling errors and the disposition of these exceptions shall also be displayed along with the transaction. Additional information may include but not limited to operational mode schedule, configuration parameters, incident/override.					
578	System Audit Reports: Weekly and monthly reports shall be made available that show the user access data and modifications made and ability shall be provided to obtain the details of the modifications.					
579	File Transfer Performance: This operational report lists files that have been created and sent from the RSS by component for either the created date range or sent date range selected by the user. Information displayed include, file information, created date and time, sent date and time and process time. This report verifies System compliance to Performance Requirements. File/data transmissions to the lanes shall include confirmation of successful delivery at each lane.					
2.1.17.5.	*Monthly Performance Reports*					
	The RSS shall provide reports to measure compliance to the stated Performance Requirements.					
580	Availability – AET Lanes: This report will show each travel lane by location along with uptime, downtime, exception time, availability percentage calculated to 0.001 percent for the reporting period, and points assessed per travel lane. The report shall contain a summary, the information from which the Contractor's Monthly Performance Scorecard is generated.					
581	Availability – RSS: This report shall display a list of functional areas (to be determined during System Design) within the RSS along with a drill down to each of the components therein that contribute to the availability of the RSS along with uptime, downtime, exception time, and availability percentage calculated to 0.001 percent for the reporting period, and points assessed per line item. The report shall contain a summary, the information from which the Contractor's Monthly Performance Scorecard is generated.					

No.				Required Inputs		
		Status	If Applicable	Source	If Applicable	Comments
	Requirements	B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
582	Completeness – Toll Facility Maintenance: (This report requires Maintenance schedules to be setup in MOMS for System tracking purposes) The report shall list each Toll Facility Maintenance activity scheduled within the reporting period, along with a value indicating if the task was completed or not and the points assessment for each (determined elsewhere). The report shall contain a summary, the information from which the Contractor's Monthly Performance Scorecard is generated.					
583	Operations – ITS Complete and Timely Data transmission: Report shall provide for each day during the reporting period; data statistics such as but not limited to: number of data intervals in period, number of data sets received, percentage of data sets received, max number of consecutive data sets lost, overall percentage of expected data received calculated to 0.01% for each day in the reporting period. The report shall contain a summary containing the monthly calculations which will be used on the Contractor's Monthly Performance Scorecard.					
584	Operations – AVI Transaction Transmission Timeliness: This report shall show for each day in the reporting period total AVI transactions sent to the CSC, total number of transactions not sent to the CSC within 120 minutes, and the percentage of transactions sent to the CSC later than 120 minutes. This report will also contain a summary showing the monthly totals for the counted items and the average for the calculated percentages. The summary information will be used on the Contractor's Monthly Performance Scorecard.					
585	Operations – Image Transaction Transmission Timeliness: This report shall show for each day in the reporting period total image transactions sent to CSC, total number of image transactions not sent to the CSC within 72 hours, and the percentage of transactions sent to the CSC later than 72 hours. This report will also contain a summary showing the monthly totals for the counted items and the average for the calculated percentages. The summary information will be used on the Contractor's Monthly Performance Scorecard.					
586	Operations – AVI Transaction Accuracy: This report will display the number of AVI transactions reviewed by the QA person(s), the number of AVI transactions that failed the QA accuracy check, and the System calculated accuracy calculated to 0.001 percent, as well as the amount of assessed points for the month. The data for the report will be provided by the NCTA (or designee) reviewer, and a screen for this information to be entered into the System will be required. This information, once collected and calculated by the System will be used on the Contractor's Monthly Performance Scorecard.					
587	Operations – Image Transaction Accuracy: This report will display the number of image based transactions reviewed by the QA person(s), the number of image based transactions that failed the QA accuracy check, and the System calculated accuracy calculated to 0.001 percent, as well as the amount of assessed points for the month. The data for the report will be provided by the NCTA (or designee) reviewer, and a screen for this information to be entered into the System will be required. This information, once collected and calculated by the System will be used on the Contractor's Monthly Performance Scorecard.					
588	Operations – Image Rejection Accuracy: This report will display the number of image based transactions reviewed by the QA person(s), the number of image based transactions that failed the QA Image Rejection accuracy check, and the System calculated accuracy calculated to 0.001 percent, as well as the amount of assessed points for the month. The data for the report will be provided by the NCTA (or designee) reviewer, and a screen for this information to be entered into the System will be required. This information, once collected and calculated by the System will be used on the Contractor's Monthly Performance Scorecard.					
589	Operations – Image Quality: This report will display for each day in the reporting period, the total number of images rejected, total number of images rejected for reasons under control of contractor (to be determined during System Design phase), and the percentage calculated to 0.001 percent. The report shall also have a summary showing the monthly totals of each plus the assessed points for the month. The summary information will be used on the Contractor's Monthly Performance Scorecard.					
590	Operations – CSC File Communications: This report will show for each day in the reporting period any endpoints (zone controllers, etc.) that require the TSL file along with a total number of times within the reporting period that the TSL was not received and applied within ten minutes. Each of these lines will also show the number of Updates not received and applied within ten minutes along with the value equal to the number of Updates received from the CSC minus the number of Updates received and applied. Last column in the body of the report is the number of points assessed for each day, the formula to be finalized during System Design.					

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591	Performance Reporting – Monthly Contractor's Performance Scorecard: This report is intended to be a single page quick look at the performance of the contractor and System for the reporting period. The aforementioned reports will provide the data that will be used to populate this report, as sample of which is shown in Table 6.					
592	Performance Reporting – Historical Performance: This report will show the Contractor's performance on each of the Performance Standards for the last twelve (12) months.					
2.1.17.6.	*Dashboards/Real-Time Monitoring*					
593	The Contractor shall provide real-time Dashboards applications developed during the Design phase to monitor the RTCS in a pictorial and Dashboard view. The Dashboards shall include but not be limited to real-time monitoring of tolling point traffic, Maintenance data, operational modes for Tolling Locations, incident modes/status and System performance monitoring. There should be at least one (1) screen that includes monitoring data/Dashboard for all Tolling Locations.					
594	Authorized Users shall have the capability to configure and customize their Dashboard to display the relevant data/graphs and video. The capability for Dashboard displays that are layer Configurable by the user is highly encouraged.					
595	The Dashboard view shall be Configurable and based on the Toll Facility type the appropriate Dashboard shall be displayed.					
596	The Contractor shall provide Authorized Users the capability to view real time DVAS video and also playback recorded video via the Dashboard. The event data pertaining to the vehicle in the video shall be displayed on the video.					
597	Authorized Users shall have the capability to drill down to each lane to review and monitor detailed events as they occur for each transaction.					
598	The Dashboard shall provide full Tolling Location/lane monitoring which has continuous, current monitoring information for each lane including Equipment status.					
599	Users shall have access to the detailed data and trending graphs directly from the pictorial and Dashboard view.					
600	Users shall be able to easily maneuver through screens and view data, and different colors and pictures shall be used to bring critical events to the user's attention. The use of tooltips is encouraged.					
601	Summary data by payment type for all NCTA toll facilities and by Tolling Location shall be displayed and users shall have the ability to drill down to the details. If a specific Tolling Location is selected, transaction and event level data by lane shall be made available and users shall have the ability to view the DVAS real-time video and transaction images through this screen. Real-time video and images should have a Configurable refresh rate.					
602	Display various comparative transaction, pricing and revenue trends, and forecasts.					
603	All Priority 1 alarms shall be displayed in color and shall be audible to direct attention to the failure. Operational alerts shall also be displayed on the Dashboard.					
604	Users shall be able to easily identify problems (traffic or Equipment) on the lanes and initiate MOMS work order from this interface.					
605	In addition, the real-time monitoring shall provide detailed real-time information about the AVI System performance, the AVDC System performance, and the ICPS performance to assist in diagnosing and investigating problems. Data pertinent to traffic monitoring and Maintenance shall be displayed in real-time.					
2.1.17.7.	*Maintenance Remote Operations*					
606	The System shall provide the ability to allow Authorized Users to remotely operate the lanes to support the NCTA Operations, including but not limited to:					
	a) remote Update of security patches and Software Updates;					
	b) download TSL, UIL and toll rate schedules to selected zone controllers when there are issues;					
	c) manage power distribution systems; and					
	d) reboot the zone controller.					
2.1.17.8.	*User Management*					
	User setup and management is a critical task since the user access levels/roles created through the System determines what privileges and access rights each user is granted.					

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607	Access to the zone controllers, RSS, the MOMS, and the DVAS shall be controlled through the user access privileges set up through the user management module.					
608	The user list shall be obtained from the NCTA Active Directory maintained by NCDOT IT or from an Approved source at regular intervals as defined during the Design phase.					
609	Authorized Users shall have the capability to add new users into the System, to update/modify existing users, and to disable users.					
610	The user identification data shall include the user name, job designation and identification number. Each user record shall also include a Configurable user expiration date in the System that is defaulted to three (3) years for permanent employees. The default expiration date is one (1) year for seasonal employees. The System shall monitor for user expiration dates and shall send Alerts to a supervisory role a Configurable number of Days in advance of the expiration date.					
611	All users shall be assigned a user ID and a default password which they are required to change when first accessing the application. All RSS applications shall provide a single sign on capability. All rules for password security as defined in ***Attachment 7: State of North Carolina, Statewide Information Security Manual*** are enforced and passed between network and application. Any SSO exclusions shall be identified by the Contractor in System Detail Design phase.					
612	Users shall have the ability to reset/change their password and all security controls shall be instituted to be compliant with standard security Requirements including but not limited to, strength of the password, the reuse of old password, and changing password at Configurable intervals.					
613	All users who require access to the lanes, including Maintenance staff, shall be assigned a default PIN which they shall be required to change at first sign in.					
614	Access to all information on the NCTA toll collection network shall be limited to designated NCTA and Contractor personnel and shall be password/PIN controlled. User access security including sign-on facilities, access privileges, user role and different levels of access shall be provided for the application, database, files and directories and shall be fully user Configurable. Specific Requirements shall be developed during the System Design.					
615	Authorized Users shall have the ability to configure the access privileges based on user role for all menus, screens, tabs, functions and actions provided in the RSS and the Roadside Systems. All user lane and application privileges shall be maintained at the RSS and transmitted to other systems for user validation.					
616	The Contractor shall develop the matrix of access levels/user roles and allowed privileges during System Design with the NCTA input and Approval. The System shall allow for addition and changes to the access levels/user roles and addition of personnel in a secure manner. Authorized Users shall have the ability to activate, deactivate, and terminate user's access to the System in accordance to Approved Business Rules.					
617	The Contractor shall not circumvent the NCTA Approved System security. Specific Requirements shall be developed by the Contractor during System Design.					
618	The System shall generate a user identification list (UIL) that is transmitted to the zone controllers each time there is a change that impact toll collection Operations. It shall at a minimum contain the user ID, password/PIN and access level. All access to the lane System shall be validated against this list. The UIL shall become active upon receipt by the lane/zone controller.					
2.1.17.9.	*Toll Rates and Schedule*					
619	The System shall provide Authorized Users the capability to create and manage toll rates and schedules. GUI capabilities shall incorporate human factors, exception handling, error dialog, general and context-specific help and be optimized for speed.					
620	At a minimum, capability shall be provided to establish toll rates based on facility, tolling point, vehicle class, or payment type and shall support time of day and Holiday toll rates as defined during the Design phase.					
621	Authorized Users shall have the capability to pre-establish the effective date/time the toll rates will be enabled. The System shall permit NCTA to schedule toll rates and changes in toll schedules in advance of the new rates becoming effective.					

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622	Authorized Users shall have the capability to establish a default toll rate to be used in the event of data unavailability or other conditions as determined by NCTA that would warrant the use of the default toll rate.					
623	The System shall record and track the toll rate ID and toll schedule ID and their transmission status for audit purposes.					
2.1.17.10.	*Configurable Parameters*					
624	The System shall provide the ability for Authorized Users to modify the Configurable System parameters.					
625	Any configuration change shall result in the creation of an audit trail and each change shall be identified by a unique identifier.					
626	Changes to Configurable parameters can be scheduled to take effect immediately or at a scheduled time as determined by the user.					
627	The System shall record and track all changes to Configurable parameters for audit purposes.					
628	When a new parameter takes effect, a notification shall be generated and reported to the MOMS.					
2.1.17.11.	*Zone Controller Executable Download*					
629	The System shall have the capability to download zone controller executable files and all other files required by the lane for its Operations. All Software Updates shall be coordinated with NCTA.					
630	Successful download of the files shall be verified and alarm messages generated if any file was not received by any zone controllers.					
631	Where possible, once NCTA has Approved a Software release, all System application Updates shall be semi-automated requiring no action by Maintenance personnel.					
2.1.17.12.	*Maintenance Online Management System (MOMS)*					
	There shall be a single Maintenance Online Management System (MOMS) that supports the Roadway System Maintenance activities and Maintenance Operations.					
2.1.17.13.	*Maintenance Online Management System (MOMS) – General Requirements*					
632	Provide the MOMS that supports Maintenance Operations for all Software and Hardware provided under this Contract.					
633	Provide a MOMS that monitors, Alerts and generates work orders in real-time for all processes, including but not limited to:					
	a) communications issues;					
	b) file transmission issues;					
	c) data exceptions;					
	d) Hardware issues;					
	e) Software issues or failures;					
	f) database issues;					
	g) issues with jobs, processes or data flows;					
	h) low storage space for each subsystem (Configurable thresholds);					
	i) CPU utilization (Configurable thresholds);					
	j) CPU load (Configurable thresholds);					
	k) mounts (if applicable); and					
	l) disk IOs.					
634	Provide the MOMS that monitors, Alerts and tracks in real-time unusual activity triggered by users and systems, including but not limited to:					
	a) Image-Based Transactions above threshold;					
	b) class mismatch and flushed transactions above threshold; and					
	c) other activities that are not normal in daily toll Operations.					
	Provide the MOMS that includes but is not limited to the following:					
	a) receiving and monitoring status messages of all System Hardware and Software;					
	b) is capable of local work order manual entry or email entry by Authorized Users;					

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	c) storing data in a relational database to allow for data recovery and flexibility in reporting the raw data (including via Ad-hoc reporting);					
	d) tracking device failures and service requests;					
	e) assigning priorities and actions to events;					
	f) notifying (automatically) Maintenance personnel via reports, text and email;					
	g) assigning work orders to Maintenance personnel;					
	h) reassigning (manually) work orders to other Maintenance personnel;					
	i) escalating (automatically) work orders to other Maintenance personnel;					
	j) recording time of acknowledgement by Maintenance personnel;					
	k) recording time of acknowledgement by all subsequently assigned Maintenance personnel;					
	l) recording time of repair;					
	m) recording time of Equipment and process recovery;					
635	n) recording completion of service calls;					
	o) providing automatic Alerts for work orders not closed out in specified time;					
	p) maintaining and tracking Repair Maintenance Activity;					
	q) is capable of accepting and updating work orders via PDA/smart phones entries via secure communications;					
	r) tracking all System application Software components and Hardware via an asset management module;					
	s) is user configurable to allow new equipment / devices to be added so that they may be selected from the application menus;					
	t) is capable of role-based security;					
	u) containing an automatic System exception reporting for all processes that are not running;					
	v) containing an automatic System workflow exception reporting for all items that are not processing correctly or are hung in the System;					
	w) providing a time stamp of every activity performed to a ticket throughout its life-cycle; and					
	x) providing hard copy reports on device failures and trouble resolution status detail which shall include all entries generated by technician or System since the ticket's initial creation, including but not limited to notifications, time recordings and attached documents. The time recordings shall not be changeable by the Contractor without NCTA Approval and any changed information shall be tracked and auditable within MOMS.					
	Provide the MOMS that supports Maintenance functions, including but not limited to:					
	a) automatic System job/workflow/queue exception reporting and Alerting for all elements that are not processing correctly or are hung in the System;					
	b) issuing electronic notifications via email or text to Maintenance staff when problems are detected;					
636	c) prioritization of failures and Alerts that is Configurable and Alert Authorized Users when configurations are changed;					
	d) for the calculation of response times, repair times, and down time from the data entered by the Maintenance staff and automatically generated by the System; and					
	e) scheduling of preventive Maintenance through the MOMS that generates automatic work orders at the scheduled times.					
	Provide a MOMS that supports asset management, including but not limited to:					
	a) tracking of all System Hardware and Software items;					
	b) tracking of all System Hardware and Software locations;					
	c) tracking of all System Hardware and Software versions;					
	d) tracking of all Maintenance and service agreements;					
637	e) maintains a list of vendors from where products were procured;					
	f) associates the original purchase order number to the individual item;					
	g) associates the original vendor number to the individual item;					
	h) associates all warranty information to the individual item;					
	i) provides an Alert prior to warranty expiration; and					
	j) provides automatic Alert for spare parts levels.					

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638	The System will record all configuration data, and will be versioned after each System component change, including application of System patches.					
639	Make all MOMS screens available to all Authorized Users from NCTA.					
640	NCTA shall have the ability to configure the Priority level of each alarm and assign and change the escalation attributes.					
641	Addition of alarms shall not require any changes to the MOMS and NCTA shall have the ability to indicate if an alarm should result in the generation of a work order and if an alarm should be considered in performance reporting.					
642	Generating (automatically) daily, weekly and monthly Performance Reports as determined by NCTA during Design.					
643	Provide the capability for Authorized Users to select MOMS operational, management and performance report configurations based on drop down entries based on the following but not limited to closed tickets, open tickets, tickets worked on by specific technicians, device type or other fields as defined during Detail Design Phase.					
644	Provide Authorized Users with operational, management and Performance Reports from the MOMS that include but are not limited to:					
	a) summarized and detailed alarm history;					
	b) Maintenance paging and response history;					
	c) work order status and tracking;					
	d) Equipment inventory and tracking;					
	e) Equipment availability;					
	f) preventive Maintenance;					
	g) pervasive Maintenance;					
	h) corrective Maintenance;					
	i) response and repair times for each of the priorities;					
	j) Equipment use history;					
	k) Equipment repair history;					
	l) total System availability;					
	m) sub-system availability for the Roadside Systems and RSS;					
	n) Equipment versions, Software versions, firmware versions and serial numbers for all Equipment installed under this Scope of Work and Requirements;					
	o) incident logs and lost revenue estimates;					
	p) MTBF for the preceding and current Maintenance periods and cumulative;					
	q) Performance Reports detailing compliance to the Performance Requirements;					
	r) detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;					
	s) status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);					
	t) Performance Reports;					
	u) an exceptions report summarizing all unusual or significant occurrences during the period;					
	v) trend analysis for repetitive failure;					
	w) status of spare parts inventory; and					
	x) staffing report detailing positions, staff hours worked and performance.					
645	When spare parts inventory is reduced to a Configurable threshold quantity, automatic Alerts shall be generated.					
646	Provide a MOMS that has the ability to receive information (success or failure), including but not limited to:					
	a) backup;					
	b) time synchronization;					
	c) synchronization of primary and secondary systems;					
	d) Software Updates; and					
	e) file downloads.					

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647	In order to ensure that all Tolling Locations are functional, all systems are operational, all the processes are working and file transfers are successful, Authorized Users shall have access to the MOMS screens that can verify the status of Tolling Locations, the System and various file transfers, including the files transmitted and received from the existing NCTA CSC Back Office.					
648	Tolling Locations and System status shall be shown in a pictorial view with the capability to drill down to the device causing the Alert and its associated error logs.					
649	The MOMS screen shall show if required files were transmitted to all the lanes and what version is in use.					
650	Users shall have the ability to re-initiate download in the event transmissions were not successful.					
651	Screens shall be available that show all the alarms generated by the various systems and subsystems, including the operating System and the database.					
652	Failure of all devices, processes, programs, and scheduled tasks shall be forwarded to a MOMS screen that is accessible to authorized staff.					
653	Various events and error logs shall be provided for each program that shall assist the system administrator to investigate problems.					
2.1.17.14.	*System Health Monitoring Software*					
654	Provide a System health monitoring Software that includes but is not limited to:					
	a) tight integration with the MOMS;					
	b) network health monitoring;					
	c) Hardware health monitoring;					
	d) a Dashboard that graphically displays component's health;					
	e) comprehensive log reporting and review capabilities; and					
	f) integration with existing NCTA monitoring software.					
2.1.18	Time Synchronization					
655	The RSS server shall be synchronized to a certified source Approved by NCTA using standard network time protocol (NTP) at Configurable intervals but at a minimum every five (5) minutes.					
656	The zone controllers; AVI systems; AVDC systems; ICPS; image server; OCR server; DVAS, and other servers needed to support the Requirements of this Scope of Work and Requirements shall be synchronized to a Contractor-provided primary Network Time Protocol (NTP) appliance within the RSS. Such appliance shall synchronize with the Authority's NTP source and a Stratum 0 or 1 time source. The Contractor shall also supply a secondary time source. Both the primary and secondary time synchronization sources shall be Approved by the Authority.					
657	If needed, synchronization messages shall be sent to devices that do not support off-the-shelf time synchronization Software.					
658	The time synchronization technique shall ensure that under no circumstance shall the possibility arise for duplicate or incorrect transaction time. The time synchronization precision format shall be hh:mm:ss:msms.					
659	Alarm messages shall be generated when there are time synchronization failures and when time drifts are more than a Configurable threshold.					
660	The RTCS shall have the capability to handle Daylight Saving Time changes.					
2.1.19	General Requirements for Interfaces					
	The Contractor is responsible for working with NCTA and the existing Contractors in Designing, developing, documenting, testing and implementing all required interfaces. Electronic interfaces are required to provide connectivity between the existing NCTA Systems (NCTA CSC Back Office), the RSS and Roadside Systems. The Contractor shall be responsible for developing the ICDs, and where changes to existing ICDs are required, these documents shall be modified by the Contractor as part of this Scope of Work based on the Contractor solution during the Design phase. The ICDs shall include requirements for data format and transmission, criteria for acknowledgement and validation of transmitted data and procedures for recording and reconciliation, as appropriate for each interface. It is expected that the latest version of the ICDs will be implemented at Go-Live and that the Contractor shall continue to update the ICDs as appropriate for the life of the Contract.					
661	Provide electronic automated interfaces to the existing systems in accordance with these Requirements.					

No.	Requirements	Status B-Base Product M-Base Modified D-New Development N-Not Provided*	If Applicable Customer Name and Location	Required Inputs Source P-Proposer S-Sub T-Third Party NA-Not Applicable	If Applicable Subcontractor Name and/or 3rd Party Product/Vendor	Comments Comment required if "Not Provided*", optional otherwise.
662	Provide for guaranteed transmission of data for all interfaces.					
663	Provide for one hundred (100) percent reconciliation of the transmitted data and files.					
664	Provide the capability for Authorized Users to access and view the contents of files, including compressed or encrypted files, which are received and transmitted by the RSS in a readable format. Authorized Users shall have the capability to save the contents of such files.					
665	Provide the capability for real-time alerting to the MOMS of interface and data transmission failures, including but not limited to:					
	a) MOMS Dashboard for managing and monitoring interfaces;					
	b) workflow user interface for managing and monitoring steps within each interface;					
	c) status and history of executions;					
	d) comprehensive scheduling of file transmissions;					
	e) comprehensive reporting for inbound and outbound transmissions;					
	f) tight integration with the MOMS and notification of failed transmissions;					
	g) notification of file transmission and receipt status; and					
	h) capability to manually execute a failed transmission.					
666	The Contractor shall utilize secure network protocols Approved by NCTA for the transfer of data and/or files via interfaces defined during the Design phase.					
667	Provide the capability to transmit and receive multiple files during each scheduled batch.					
668	Provide the capability to transmit and receive multiple files in a day.					
669	Utilize file naming conventions that prevent the overwrite of data and/or files. For example, include the date and time of transmission and provide for unique identifiers.					
670	Utilize file handling and processing methods that provide a complete log of the data and/or file transfer process. For example, files that are successfully processed are moved to a processed folder.					
671	Validate records and identify errors in the received data and/or files, including but not limited to:					
	a) mandatory fields;					
	b) data formats;					
	c) data validity (such as tolling points and lane numbers);					
	d) duplicate records;					
	e) unexpected response;					
	f) checksum/record count verification; and					
	g) incorrect status.					
672	Provide the capability to correct and re-transmit data and/or files.					
673	Provide the capability to process re-transmitted data and/or files automatically or manually by Authorized Users as determined during the Design phase.					
674	Provide the capability to transmit the error details to the transmitting entity, as well as record it in the MOMS.					
675	Provide the ability to identify missing records/transactions/images and request the transmission of such missing records/transactions/images.					
676	Reconcile the transmitted records to the records received and accepted by the receiving entity.					
677	Provide the means to identify interface issues by validating the file transmission process, including but not limited to:					
	a) creation and transmission of data and/or a file at the scheduled time, even if there are no records to transmit;					
	b) determination if the data and/or a file was transmitted or received at the scheduled time;					
	c) creation of alerts to the MOMS if data and/or a file was not created or received at the scheduled time;					
	d) creation of alerts to the MOMS if received data and/or a file was not acknowledged;					
	e) creation of alerts to the MOMS if records in the received data and/or file had errors when processed;					
	f) provide details in real-time to the MOMS of each failed record; and					
	g) creation of alerts to the MOMS when a response has not been received for individual records within the expected duration.					
678	Provide data and/or file transmission and reconciliation reports as described in these Requirements.					

No.	Requirements	Status	If Applicable	Required Inputs Source	If Applicable	Comments
		B-Base Product M-Base Modified D-New Development N-Not Provided*	Customer Name and Location	P-Proposer S-Sub T-Third Party NA-Not Applicable	Subcontractor Name and/or 3rd Party Product/Vendor	Comment required if "Not Provided*", optional otherwise.
679	Provide a Dashboard that tracks the progress of data and/or file transmissions through each stage and their acknowledgements by the receiving entity, including but not limited to:					
	a) transactions eligible for transmission;					
	b) file and/or data created with file name;					
	c) file and/or data transmitted;					
	d) file and/or data received;					
	e) file and/or data accepted;					
	f) file and /or data rejected;					
	g) file and/or data re-transmitted;					
	h) number of records in the file and/or data set; and					
	i) number of failed records.					
680	Provide the capability for Authorized Users to configure the relevant parameters related to file and/or data transmission for each interface.					
681	Monitor the disk capacity where files and/or data are deposited and send an alert to the MOMS and interfaces entities (if applicable) if folders are near capacity (Configurable) or full.					
682	Provide the capability to automatically archive successfully processed data and/or files after a Configurable number of Days.					
683	Provide the data to reconcile file transmissions.					
684	Conform to any existing ICDs, including any Updates required at the time of Design and develop all new ICDs that have been identified as "to be developed". It is the Contractor's responsibility to ensure all ICDs (including existing) are accurate, updated and meet the Requirements of the Scope of Work and Requirements before developing the interfaces.					
2.1.19.1.	*Roadway Support System (RSS) Interface to the Existing NCTA CSC Back Office System*					
685	The Contractor shall Design and develop an interface from the RSS to the existing NCTA CSC Back Office System to transmit receive and acknowledge one hundred (100) percent of all transactional and tag data in accordance with the ***Attachment 8: NCTA CSC Back Office System RTCS File Exchanges ICD (DRAFT)*** to be Approved during the Design phase.					
686	The interface shall be capable of transmitting AVI transactions, Exception List and toll rates to the existing NCTA CSC Back Office System.					
687	The interface shall be capable of receiving TSL and VEL (if option is exercised) files from the existing NCTA CSC Back Office System.					
688	The Contractor shall provide the capability to positively acknowledge (ACK) message receipt, negatively acknowledge or reject a message (NACK) and reconcile data transmissions to/from the RSS.					
2.1.19.2.	*Roadway Support System (RSS) to Facility Server Interface*					
	The provision of a facility server is optional but if the Contractor's solution includes a facility server, then the Requirements in this section shall be met.					
689	The Contractor shall Design and develop an interface from the RSS to the facility Servers (if applicable) to transmit, receive and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.					
690	The interface shall be capable of sending TSL, VEL (if option is exercised), configuration files, software Updates and toll rates (if applicable) to the facility servers.					
691	The interface shall be capable of receiving all transactions, alarms and event messages from the facility servers.					
692	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the RSS.					
2.1.19.3.	*Roadway Support System (RSS) to Zone Controller Interface*					
693	The Contractor shall Design and develop an interface from the RSS to the zone controllers to transmit and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.					
694	The interface shall be capable of sending TSL, VEL (if option is exercised), configurations files, software Updates and toll rates (if applicable) to the zone controller.					
695	The interface shall be capable of receiving all transactions, alarms and event messages from the zone controller.					

No.	Requirements	Status B-Base Product M-Base Modified D-New Development N-Not Provided*	If Applicable Customer Name and Location	Required Inputs Source P-Proposer S-Sub T-Third Party NA-Not Applicable	If Applicable Subcontractor Name and/or 3rd Party Product/Vendor	Comments Comment required if "Not Provided*", optional otherwise.
696	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the RSS.					
2.1.19.4.	*Image Server to Roadway Support System (RSS) Interface*					
	Reconciliation of images to the image-based transactions and the status of the transfer of images and image-based transactions shall be maintained and reported at the RSS.					
697	The Contractor shall Design and develop an interface from the image server(s) to the RSS to transmit and track the status of the capture of images by the Roadside Systems for each image-based transaction and the subsequent transfer of images and image-based transactions to the existing NCTA CSC Back Office System.					
698	The interface shall be capable of sending image reconciliation and transfer status data to the RSS.					
699	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all images and image-based transactions at the existing NCTA CSC Back Office System.					
2.2	**Interoperability**					
700	The Contractor shall support expected growth of NCTA's interoperable footprint such that it supports the inclusion of multiprotocol readers and Transponders. The Contractor solution shall allow for modifying and adapting the System Design to incorporate new readers and support the transition to the new Interoperable solution with limited interruptions to the revenue collection.					
701	(REQUIREMENT DELETED)					
702	The Contractor shall support the following Interoperable partners:					
	a) SunPass					
	b) PeachPass					
	c) E-ZPass					

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
3. ROADWAY SYSTEM TRANSITION			
	The new RTCS will be installed on the new Triangle Expressway and Complete 540 AET Facilities. Based on the options exercised throughout the Contract, other facilities may transition to the new RTCS.		
3.1	**Roadway System Transition – General Requirements**		
703	The Contractor shall accommodate the transition of the Triangle Expressway in accordance with the Approved schedule.		
704	The installation of the new toll collection System and its transition to revenue collection shall not impact the Operations of the existing System. It is the Contractor's responsibility to make sure there is sufficient infrastructure (space, power, etc.) to support both the existing and replacement systems.		
705	The Contractor shall provision for additional conduits and mounting structures needed for the installation of the toll collection Equipment.		
706	Any temporary re-location of existing Equipment shall be identified and documented by the Contractor and all such relocations shall be Approved by NCTA. The Contractor shall relocate the existing Equipment if Approved.		
707	The Contractor's implementation process shall accommodate all onsite testing at the locations identified by NCTA.		
708	The NCTA CSC Back Office supports all NCTA existing and future Toll Facilities. The NCTA CSC Back Office will interface to only one RSS (including the Primary and Secondary RSS). As such, the RSS shall be first Commissioned and it shall interface with the NCTA CSC Back Office System to process transactions as soon as the first toll lane is opened to revenue collection.		
709	The Contractor shall transition the RTCS to interface with any NCTA CSC Back Office System implemented during the Contract Term.		
710	The Contractor schedule shall be sufficiently flexible to accommodate modifications or changes such as early completions or delays in start or completion of phases that would normally be expected in a multi-phase, multi-contractor construction schedule.		
711	The Contractor shall accommodate the various phases of the RTCS implementation in accordance with the NCTA Approved schedule.		
712	All changes to the System to accommodate technology Upgrades and meet the Contract Requirements shall be the responsibility of the Contractor.		
3.2	**RTCS System Implementation**		
713	Upon the successful completion of the FAT, the Contractor will be authorized to install the new RTCS at select Tolling Locations. The primary and secondary RSS shall be installed at the Approved locations.		
714	The Onsite Installation Test (OIT) shall be conducted at the selected Tolling Locations and the functions of the RTCS and the RSS including its interface to the existing NCTA CSC Back Office shall be verified.		
715	Upon the Approval of the OIT, the Contractor will be given the authorization to Commission the RSS in revenue collection.		
716	The Contractor will be given the authorization to Commission the OIT lanes in revenue collection and to start installation on the remaining lanes in accordance with the Approved installation schedule.		
717	The installation, Commissioning and subsequent transition of each toll lane to revenue collection shall be in accordance with the Approved Transition Plan.		
718	After the Roadway is opened to revenue collection on the new toll collection System, the Contractor shall monitor the System Operations. All toll Equipment shall be configured and tuned to their optimal performance prior to the start of the Operational Test. The Operational Test shall commence when the Contractor meets the Operational Test entry criteria.		

No.	Requirements	Required Inputs: Compliance (Y - Yes, N - No)	Required Inputs: Comments (If "Compliance = N" then Proposer must provide an explanation in this column)
719	For an existing Toll Facility, and as Approved by NCTA, the Contractor shall de-commission the existing Equipment. The Contractor is responsible for the removal of all existing Equipment, mounting arms, cabinets and enclosures and their disposal.		
720	The Contractor shall procure, furnish, Design, test, install, operate and maintain the Roadside Systems, including the redundant Roadside System Hardware, Software, Equipment, Interfaces and communications provided in the toll Equipment building at each tolling point.		
721	The installation and Commissioning of all Tolling Location implementations shall be in accordance with the Approved Transition Plan.		
3.3	**Transition to Revenue Collection**		
3.3.1	RTCS System Transition Plan		
722	The Contractor shall provide a Transition Plan for NCTA Approval for each Roadway Implementation that addresses the transition of the Roadside and RSS into revenue collection.		
723	The Transition Plan shall address all critical transition elements and activities associated with the installation and implementation of the Roadway System, including the Roadside Systems; RSS, and interfaces to the existing NCTA CSC Back Office.		
724	The Transition Plan shall address the integration and interface of the RSS to existing interfaces/Equipment (if applicable).		
725	The Transition Plan shall address, by location, the transition from the current toll collection Equipment at ramps and/or mainline locations to the new toll collection Operations. All temporary changes and modifications to the infrastructure to accommodate the transition shall be described.		
726	On existing Roadways where data migration is required, the Transition Plan shall describe the Contractor's data migration concept.		
727	The Contractor's plan for decommissioning of the existing Equipment (where applicable) and their disposal shall be included.		
728	The Transition Plan shall, at a minimum, include the installation, OIT, Commissioning, revenue collection and Acceptance of the new Roadside Equipment, the transition from current collection to Operations under the new System and Acceptance of each Project.		
729	The use of the existing infrastructure at the Tolling Locations shall be described including Contractor's approach to installation that will have minimal impact on current Operations.		
730	Any temporary processes implemented to support the transition shall be documented in the Transition Plan including eventual replacement process if applicable.		
731	All points of coordination or reliance on third-party Deliverable, for example the WAN communications network, shall be clearly identified in the Transition Plan.		
732	The RTCS Transition activities shall be coordinated with the Constructor (if applicable), NCTA and existing system integrators, and Approved by NCTA in order to not interfere with on-going and continuing Maintenance and operational Requirements.		
	In order to ensure a seamless transition, the following activities shall take place prior to opening the Tolling Locations in revenue collection.		
	a) The RSS shall be installed and Commissioned at the primary and secondary locations and its interface to the existing NCTA CSC Back Office shall be validated;		
	b) NCTA shall confirm the existing NCTA CSC Back Office is ready for conversion and give Approval for Go-Live. At such time, the Roadway System shall be switched to production mode and ready to begin collecting revenue;		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
733	c) Upon Approval to proceed with an Installation and Commissioning Test, the Contractor shall conduct such test at each Tolling Location prior to opening each location to revenue collection. The Contractor shall be responsible for scheduling the required lane closures during the conversion as Approved by NCTA;		
	d) The MOMS shall be configured for Go-Live; inventory recorded; technicians scheduled, and notifications set up;		
	e) The DVAS shall be installed and validated and Authorized NCTA personnel shall have access to the DVAS;		
	f) The OIT shall be conducted and System functionality and performance validated at the OIT Tolling Locations and		
	g) An end-to-end test shall be conducted in the RSS and existing NCTA CSC Back Office test environments to validate the flow of transactions and images from the Roadway System to the existing NCTA CSC Back Office.		
734	The Contractor shall plan for possible variances in the sequencing of the transition on the different Roadways due to construction and readiness of the existing NCTA CSC Back Offices and Operations in its Transition Plan.		

No.	Requirements	Required Inputs: Compliance (Y - Yes, N - No)	Required Inputs: Comments (If "Compliance = N" then Proposer must provide an explanation in this column)
4. ROADSIDE TOLL COLLECTION SYSTEM INSTALLATION REQUIREMENTS			
	This section details the Requirements for the installation of the new RTCS, including the RSS. Unless Approved by NCTA, no System installation on any Toll Facility shall occur prior to the satisfactory Approval of Installation Design and the FAT for the specific Toll Facility.		
4.1 Installation Program			
	The Contractor shall have an Installation Program that addresses all aspects of the installation of the RTCS and the RSS, including all installation Design, submissions and coordination.		
735	The Contractor is responsible for the Design, procurement, installation, cabling, configuration, check-off, and testing of all Hardware, Equipment, communications, and Software and fixtures provided by the Contractor as part of the RTCS at each of the Tolling Locations on each Roadway.		
736	In the event the Contractor decides to re-use existing conduits and junction boxes on previously tolled Roadways, the Contractor is responsible for ensuring that such elements are in their fully operational condition and will meet the Requirements of the Contract for the Contract Term.		
737	The Contractor shall ensure that the Contractor's installation activities do not interrupt or interfere with the existing System Operations.		
738	The Contractor shall install the RTCS servers and Hardware in the vaults provided by the Constructor.		
739	The Contractor shall install the RSS at the primary and secondary locations for each Roadway.		
740	The Contractor shall work with NCTA to test the WAN and the connections to the existing NCTA CSC Back Office locations. Testing shall include expected traffic loads and all types of production operation data.		
741	The Contractor shall coordinate all lane closure activities with NCTA.		
742	On new Toll Facilities, the Contractor shall review and comment on the Constructor infrastructure installation and confirm they are in compliance with the Approved civil drawings. A Site Acceptance Checklist, based on the Approved civil drawings that must be Approved by NCTA. The Site Acceptance Checklist shall be Approved by NCTA prior to Acceptance.		
743	The Contractor shall make Final Acceptance of the physical network, that will be Designed and installed by a separate vendor(s). The Final Acceptance shall be based on completion of all items on a NCTA developed and Approved Commissioning Checklist.		
744	The Contractor shall install, configure and tune the RTCS using the NCTA-provided, certified AVI Equipment to the AVI vendor specifications and shall be in compliance with the NCTA Interoperable Partners requirements. In addition, the AVI vendor will then certify that the lanes are tuned to the Approved AVI specifications.		
4.2 Installation Plan			
	The Contractor shall submit an Installation Plan that identifies its approach to installation and drawing package submissions, and covers the major elements of the installation, including coordination with Constructor and existing systems.		
745	The Contractor shall develop an Installation Plan for each Roadway that documents all installation related activities for the Project. The Installation Plan shall be the master document from which the elements of the System shall be installed.		
	The Installation Plan shall include and define, at a minimum, the following items:		
	a) The installation schedule detailing all activities, shifts and resources for the installation of the RTCS and ITS, including third-party, existing system integrator and Constructor activities. Once the baseline schedule is Approved by NCTA, Updates during the installation periods identifying all schedule changes and Work progress in the form of percentage completions shall be submitted to NCTA for Approval.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
746	b) The minimum resource allocation requirement for any installation phase and segment.		
	c) How the Contractor manages delivery and staging of the RTCS and ITS Equipment to be installed, including any staging, installation and testing performed at the Contractor or third-party facilities and their subsequent delivery and installation at the production sites.		
	d) The coordination between other contractors, including the Constructor, and service providers.		
	e) Coordination of the lane closures with NCTA for each phase for each of the Projects.		
	f) Coordination with the Constructor for the installation of the vaults and the generators at new Roadways.		
	g) Coordination activities as applicable with other third-party entities for the various interfaces.		
	h) Testing of the Contractor provided WAN communications for connection to RSS and the existing NCTA CSC Back Office.		
	i) Quality Control, Quality Assurance, inspection, and testing processes including validation of Contractor installation to the Requirements of the Contract installation drawings.		
	j) The order in which Equipment items are to be installed with estimated durations.		
	k) Special or unique installation Requirements.		
	l) A detailed component list and a description of how each item version number and serial number shall be recorded for each installation and configuration into the MOMS.		
	m) Organization Chart defining Key Team Personnel, roles and responsibilities and contact information. All Subcontractors shall be identified.		
	n) Contingency Plan.		
4.3	**Installation and Construction Coordination and Meetings**		
	During the Project Design, development and installation periods there shall be a series of meetings between the Contractor, the existing system integrators, and the Constructor; during these meetings it shall be required that both NCTA and NCDOT be represented to clearly define and develop the installation Requirements, methodology, timetables, test Plans, roles, and contingency Plans. The Contractor is responsible for coordinating and scheduling all meetings necessary to complete the Design and installation phase of the Project.		
747	The Contractor shall schedule, manage and attend weekly installation meetings during the active Design and installation phases of the Project and report on progress of the installation. The Contractor shall identify and communicate any issues regarding System construction and installation immediately upon discovery to the Constructor, NCDOT, existing system integrator and NCTA.		
748	The Contractor shall ensure that the appropriate personnel are present at these meetings who can represent the Contractor's interest and provide the information necessary in a meaningful manner.		
749	Prior to the meeting, the Contractor shall update the installation schedule based on the construction schedule and all changes shall be identified.		
750	The Contractor shall prepare and distribute a meeting agenda at least forty-eight (48) hours prior to the scheduled meeting. The meeting agenda shall consist of those items pertaining to the installation and schedule for the previous and current week's installation efforts and for an agreed to "look ahead" period. The meeting agenda should include any potential risk items identified and corresponding mitigation efforts.		
751	It is the Contractor's responsibility to make sure all issues that arose during the installation activity for the week are addressed and resolved or is scheduled for resolution.		
752	At these meetings, the Contractor shall also be prepared to address any issues or questions raised by the Constructor, other contractors, and NCTA or its representative.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
753	The Contractor shall document the meeting discussions and distribute the meeting minutes within one (1) Business Day to everyone from the team invited to the meeting. It shall be up to the recipients of the meeting minutes to distribute to other interested parties. The Contractor shall also record and maintain an action items list that tracks all installation related issues.		
4.3.1	**Construction Coordination with Infrastructure Contractors**		
	The Contractor shall coordinate all installation activities with NCTA; existing system integrators on existing facilities; any Constructors, and NCDOT to ensure all RTCS Equipment specifications are addressed in the Design and installation of all new or updated Roadway infrastructure. The Installation Responsibility Matrix defines the areas of responsibility for the parties involved in the Project Design and for transition of existing Roadways and construction for new Roadways.		
754	For new AET Facilities: The NCTA (or its Constructor) is responsible for the construction of the overhead structures/toll gantries, installation of the vaults and provision of the generators, and the Contractor shall coordinate closely with NCTA, and NCTA third-party contractors. The Contractor is responsible for supplying the roadside Equipment cabinets.		
755	The Contractor shall participate in the Design and installation of the infrastructure on the new Roadways, including but not limited to:		
	a) provide all required Design and installation drawings, operating Requirements and installation specifications to NCTA and the Constructors for all toll and ITS System Equipment provided;		
	b) review and reach consensus of the ITS physical network Design provided by the Constructor;		
	c) support and supply all information requested by the Constructor and civil designer in the form of request for information (RFI);		
	d) review all Constructor-provided drawings with respect to the toll System;		
	e) reach consensus on all aspects of such drawings related to the toll System; and		
	f) ensure the RTCS infrastructure provided by the Constructor will meet the Requirements set forth in this Scope of Work and Requirements are met with regard to such Design.		
756	The Contractor shall be responsible for ensuring that the locations, positions, installation, connections and other elements of the Contractor inputs identified on the Design and installation drawings provided by the Contractor, for all Contractor and NCTA provided Equipment, whether in-roadway, structure/toll gantry mounted, in the toll Equipment vault or otherwise located are accurate and correct.		
757	Contractor shall also ensure that the installed roadway, infrastructure, structures/toll gantries, vaults, and generators meet the Design Requirements provided by the Contractor and shall certify in writing such installed work with regard to the Design provided.		
758	Contractor shall cooperate with NCTA, NCDOT and infrastructure contractors to minimize required number of lane closures and to maximize the use of other scheduled lane closures. The Contractor shall transmit all lane closure requests to NCTA for Approval.		
759	Contractor shall work with NCTA and agree to a reasonable plan for scheduling and approving lane closures, including a procedure for advance notice of cancellations of lane closures and allowable conditions for such cancellations as described in this Scope of Work and Requirements. The Contractor is responsible for administering all lane closures and traffic controls during the installation phase and for all testing through Acceptance.		
4.3.2	**Construction Coordination with Constructor**		
760	The Contractor shall coordinate all installation activities with NCTA, NCDOT, and the civil contractor ("Constructor") where applicable. ***Attachment 10: Responsibility Matrix*** defines the areas of responsibility for the parties involved in the Project Design and System installation on the NCTA Roadways.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
4.4	**General Installation Requirements**		
761	The Contractor shall be responsible for procurement, installation, cabling, termination configuration, testing, and check-off of all Equipment and Software required meeting the Requirements of the Contract.		
762	The Contractor shall install all appropriate Roadside servers and Equipment required by the System in the vaults provided by NCTA through a third-party.		
763	Procurement, installation, configuration, and testing of all local area communications Equipment and connection to the Contractor installed network Equipment in the toll Equipment building shall be the responsibility of the Contractor as further set forth in this Scope of Work and Requirements.		
764	Procurement, installation, configuration, and testing of all appropriate RSS servers, Equipment and Software required by the RSS at the NCTA Approved location and validating communications to its interfacing systems shall be the responsibility of the Contractor as further set forth in this Scope of Work and Requirements.		
4.5	**Compliance to Standards**		
	The Contractor shall adhere to all installation standards, applicable laws, ordinances and codes as required.		
765	The Contractor shall meet all electrical codes, traffic control, seismic considerations, calibration, configuration, and environmental Requirements of and including but not limited to:		
	a) Equipment manufacturer's;		
	b) NEC;		
	c) UL standards;		
	d) NCTA;		
	e) NCDOT;		
	f) FHWA;		
	g) MUTCD;		
	h) IEEE (Institute of Electrical and Electronics Engineers);		
	i) OSHA Requirements; and		
	j) any local authorities having jurisdiction.		
766	The Contractor shall adhere to latest NCDOT Roadway Standard Drawings, the latest NCDOT Standard Specifications, and the AET Standard Drawings unless the Contractor receives written Approval by the NCTA.		
767	The Contractor shall be responsible for all costs associated with any permits, plan reviews, and inspections related to toll System work.		
768	It shall also be the Contractor's responsibility to procure all Documentation required to install and adhere to the proper installation standards, law, ordinance, or codes.		
769	The Contractor shall procure Services of Subcontractors qualified to work in this industry. If a vendor's component requires a vendor approved installer, the Contractor shall use an approved component installer, including qualified vendor staff.		
4.6	**RTCS Installation Requirements**		
	The installation responsibilities for the System shall include but not be limited to:		
	a) HVACs, Equipment vaults and external generators will be provided by the Constructor. The Contractor shall furnish and install clean, uninterruptable power to all RTCS Equipment on the overhead structures/toll gantries, in cabinets and in the toll equipment vaults.		
	b) Furnish and install all connecting conduit from wire ways and conduits provided and installed by others and/or stub conduits to the Equipment. The Constructor will install the conduits from the toll Equipment vaults to the demarcation point on the overhead structures/toll gantries.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
770	c) Furnish and install separate ground wires for the RTCS, surge protection devices (SPD), junction boxes, pull boxes, conduits, and other such items as required by the installation standards and Requirements.		
	d) Furnish and install all wiring for all in-lane Equipment and connections to the Equipment racks in the vaults and/or to the roadside cabinets. This includes the proper termination of all power, communication, and RF cables and/or wiring (copper or fiber optic) required to connect the individual components into a fully operational System as specified by the manufacturer.		
	e) Furnish and install all Equipment racks required for the in-lane electronics and toll network communications in the vault.		
	f) Install all NCTA-provided AVI readers in the vault (if applicable) or at Approved NCTA location.		
	g) Furnish and install all zone controller computers and other servers (Hardware and Software) into the Equipment racks and test the connection between the zone controller and the RSS.		
	h) Furnish and install facility servers (if required) in the Equipment racks, including Software, and test their respective connection to the zone controller and the RSS.		
	i) Furnish and install all electronics and other devices in their respective Equipment racks as required to provide a fully operational System.		
	j) Furnish and install all Equipment mounting brackets to support structures for the installation of all toll System Equipment on the mounting arms on the overhead structures/toll gantries.		
	k) Furnish and install the AVDC System Equipment, including in-pavement sensors (if part of Contractor's design) and overhead mounted Equipment and controllers as specified by the manufacturer. Includes all the NCTA Approved materials, Equipment and supplies required for saw-cutting, wiring and sealing of wires in the roadway.		
	l) Install the AVI System Equipment, including antennas, readers, related Equipment, cables, and any support brackets required. All AVI mounting Hardware, junction boxes, and cables shall be procured and supplied by the Contractor.		
	m) Time synchronize the new Roadway System with the AVI System, including the provision of required cables as needed.		
	n) Furnish and install the ICPS Equipment, including cameras, ICPS illumination, and any video controller Equipment, sensors, Software, controllers/servers, or specialty Equipment associated with the ICPS. Configure and tune the cameras to meet the Performance Requirements of the Scope of Work and Requirements.		
	o) Validate all cable and wire terminations via a test process to ensure that the cable is connected to the correct location on each end and that the cable/wire is properly terminated.		
	p) Power up and provide a field check out/installation Acceptance test of all systems, to be witnessed and Approved by the NCTA or its designated representative. Provide the completed installation checklist as described in this Scope of Work and Requirements.		
	q) Tune and test the AVI System, as described in, and in full accordance with, manufacturer's guidelines.		
	r) Calibrate and test the ICPS in full accordance with manufacturer's guidelines and to meet the image processing Requirements specified in the Scope of Work and Requirements		
	s) Calibrate and test the AVDC System in full accordance with manufacturer's guidelines.		
	t) Furnish, install, calibrate and test the DVAS cameras and Equipment.		
	u) Integrate, calibrate and test the toll-related ITS elements that are provided by the Contractor.		
	v) All other items, materials, and Equipment to complete installation in accordance with the Contract.		
4.7	**Roadway Support System (RSS) Installation Requirements**		

No.	Requirements	Required Inputs: Compliance (Y - Yes, N - No)	Required Inputs: Comments (If "Compliance = N" then Proposer must provide an explanation in this column)
	The Contractor is responsible for installation of all Equipment associated with the RSS Operations identified in this Scope of Work and Requirements at the primary and secondary locations identified in the Scope of Work and Requirements.		
771	The Contractor shall coordinate all RSS installations and testing of the LAN/MAN/WAN and interfaces to the existing systems with NCTA.		
772	The Contractor shall install all RSS, including primary and secondary RSS servers, DVAS, MOMS, and central image servers (if provided) at the primary and secondary locations specified in the Scope of Work and Approved by NCTA.		
773	All servers, storage devices, communications Equipment, and other RSS Hardware shall be installed in the designated locations as prescribed in the drawings submitted by the Contractor and Approved by NCTA.		
774	The Contractor is responsible for the following activities, including but not limited to:		
	a) furnish, install, configure and test the necessary servers in accordance with the Approved Design documents;		
	b) furnish, install and test the storage units and back-up devices;		
	c) furnish, install and test the network Equipment at the primary and secondary RSS locations;		
	d) validate communications to the network Equipment at the vaults;		
	e) establish and validate communications from the RSS to each of the zone controllers at each of the Tolling Locations;		
	f) establish and validate communications from the RSS to the existing NCTA CSC Back Office;		
	g) furnish, install and validate third-party Software and Contractor Software on all servers and Equipment required to support the RSS;		
	h) furnish, install, configure and test all servers and Equipment for correct point-to-point installation, proper connectivity, acceptable termination of all cables and successful communications linkage;		
	i) Configure the RSS support interfaces as defined in the Approved ICDs; and		
	j) All other items, materials, Equipment and Software required to complete installation of a fully functional RSS in accordance with the Contract.		
4.8	**Installation Checklist**		
775	The Contractor shall develop an installation checklist that tracks the progress and completion of all ITS installation activities; RTCS and RSS installation activities for the RTCS installation; and the primary and secondary RSS facilities installation.		
776	The checklist shall be the document detailing those items required for the installation crew and technical team to complete the installation process for all Equipment and components, including terminations, connections and configurations.		
777	A copy of the checklist signed and approved by the Contractor, attesting to the completeness of the installation, shall be provided to the NCTA after the completion of the installation activities for each lane at each Tolling Location.		
778	The Contractor shall conduct a final inspection of all installations and certify the installation Work.		
779	NCTA reserves the right to obtain the services of a certified engineer to witness the Contractor inspection and conduct an independent inspection. The Contractor shall coordinate and support such inspections at each Tolling Location.		
780	The checklist shall identify all non-conformances, discrepancies and exceptions and Contractor shall be responsible for all corrections.		
781	The checklist shall document all changes identified during the installation process and all such changes shall be Approved by NCTA or its designated representative.		
4.9	**Electrical Work**		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
782	Electrical Work to be performed under this Contract shall include, but not be limited to the following general items of Work:		
	a) Provide and install surge protection devices as required to protect the all toll collection Equipment and electronics.		
	b) Install junction boxes and terminate new cable and conduit attachment devices, where applicable.		
	c) Bond all conduits, manhole frames, and other conductive items to the grounding System in conformance with the NEC.		
783	All electrical Work shall be performed in accordance with the applicable regulations and Approved by NCTA and NCDOT. Appropriate NEC compliance shall be adhered to with all electrical articles for installation pertaining to wiring, enclosures, and other electrical Equipment in hazardous locations. UL labels shall be provided for all electrical panel boards, enclosures, and accessories.		
784	All electrical Equipment must be inspected prior to installation for defects that could damage the Equipment or harm personnel. Any Equipment found to have defects shall not be installed but shall instead be replaced with a fully functioning replacement.		
785	All electrical Equipment shall be properly grounded for safety. Equipment shall be furnished with grounding pads or grounding lugs. All ground connections shall be cleaned immediately prior to connection.		
786	The Contractor shall provide all grounding material required for installation of the Contractor Equipment and all installations shall be in compliance with the applicable standards.		
4.10 Lane Closure and Traffic Control			
787	Contractor shall perform all MOT activities associated with completing Contractor Work during the Implementation Phase. All lane closures shall be coordinated with the Constructor and lane closure schedules shall be submitted to NCTA in advance for Approval.		
4.10.1	General Requirements and Conditions		
788	Roadside Equipment installation shall be scheduled to minimize traffic delay during the installation process. The Contractor shall make every effort to schedule Work around peak traffic movement times as documented in Attachment 16 – Lane Closure Restrictions.		
789	For all lane closures the Contractor shall conform to the provisions in the latest version of the NCDOT Standard Specifications for Roads and Structures. The NCDOT Standard Specifications for Roads and Structures (2018 Standard Specifications for Roads and Structures.pdf) is located at: https://connect.ncdot.gov/resources/Specifications/StandSpecLibrary/Forms/AllItems.aspx. The Contractor shall conform to the provisions in the latest version of the NCDOT Roadway Standard Drawings. The NCDOT Roadway Standard Drawings are located at: https://connect.ncdot.gov/resources/Specifications/Pages/2018-Roadway-Standard-Drawings.aspx		
790	Roadside Equipment installation shall be scheduled to minimize traffic delay during the installation process. The Contractor shall make every effort to schedule Work around peak traffic movement times.		
791	By 12:00 p.m. Monday, the Contractor shall submit to NCTA a written Closure Schedule that details the schedule of planned closures for the following week period, defined as Sunday 12:00 p.m. through the following Sunday 12:00 p.m.		
792	Closures involving work (temporary barrier placement and paving Operations) that will reduce horizontal clearances, traveled way inclusive of shoulders, to two (2) lanes or less shall be submitted not less than twenty-five (25) Days and not more than one hundred and twenty five (125) Days before the anticipated start of Operations.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
793	Closures involving work (pavement overlay, overhead sign installation, falsework and girder erection) that will reduce the vertical clearances available to the public, shall be submitted not less than twenty-five (25) Days and not more than one hundred and twenty five (125) Days before the anticipated start of operation.		
794	The Closure Schedule shall show the locations and times of the proposed closures. The Closure Schedule shall be submitted in the format requested by NCTA, and must be made in accordance with the Closure Charts for Freeway/Expressway Lane and Multilane Requirements for the Project (No.'s 1 through 9) and in observation of the Lane Closure Restriction for designated Legal Holidays. Closure Charts for Freeway/Expressway Lane and Multilane Requirements and the Lane Closure Restriction for designated Legal Holidays may be obtained upon request from NCTA.		
795	Closure Schedules submitted to NCTA with incomplete or inaccurate information will be rejected and returned for correction and resubmittal. The Contractor will be notified by NCTA of disapproved closures or closures that require coordination with other parties as a condition of approval.		
796	Closure Schedule Amendments, including adding additional closures, shall be submitted by 12:00 p.m. to NCTA, in writing, at least three (3) Business Days in advance of a planned closure. Approval of Closure Schedule Amendments will be at the discretion of NCTA. NCTA shall be notified of cancelled closures two (2) Business Days before the date of the closure. Closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of NCTA.		
797	Any Work involving removal/relocation of Equipment (both existing Equipment and the Contractor's Equipment) (loosening or removal of nuts/screws, cables, connectors etc.) shall be done with appropriate lane closures during nighttime period or off-peak hours as listed within this section.		
798	In the event that extended lane closures (lane closure exceeding 2 hours) are required, the lane closures shall be completed between the hours of 11:00 P.M. EST and 6:00 A.M. EST, excluding Holiday periods as set forth in the lane closure Requirements.		
799	Lane closures scheduled for less than 2 hours shall be Approved by NCTA in accordance with the Documentation provided on the website, and shall not occur during peak traffic times, and shall be solely at NCTA's discretion for Approval and continuance in cases where the lane closure is underway.		
4.10.2	Contingency Plan		
800	A detailed contingency Plan shall be prepared for reopening closures to public traffic. A general contingency Plan shall be included in the Installation Plan; however, a site specific contingency Plan shall be submitted to NCTA before Work at the job site begins.		
4.11	**Work Standards and Requirements**		
801	The System Equipment installation shall be performed to an Approved set of Plans, which has previously been submitted and Approved by NCTA or their designated representative.		
802	The Contractor shall provide Project management and oversight of all Work performed. At all times when installation Work is taking place, the Contractor shall have an individual designated in the Organization Chart as Site Manager onsite to supervise the installation.		
803	The Contractor shall install the Equipment using experienced and knowledgeable personnel. For example, journeyman electricians shall terminate all cables, wiring, or fiber optic cables.		
804	All tools such as crimpers, fiber optic termination tools, and test Equipment shall have been properly calibrated prior to being used.		
805	The Contractor shall provide a safe environment for the installation process in accordance with all applicable local, State and federal requirements, as well as any NCTA policies. Examples include but are not limited to the following:		
	a) safety harnesses shall be included and employed on all lifts, and the personnel trained on their use;		
	b) hard hats and safety vest shall be worn in all construction areas;		

No.	Requirements	Required Inputs: Compliance (Y - Yes, N - No)	Required Inputs: Comments (If "Compliance = N" then Proposer must provide an explanation in this column)
805	c) safety toe shoes shall be worn in construction areas and around active roadways while performing installation processes;		
	d) Contractor issued identification badges shall be worn at all times; and		
	e) regular safety meetings shall be scheduled to review safety procedures.		
4.12	**Design and Documentation during Construction and Installation**		
4.12.1	Engineering Design		
806	The Contractor shall secure the services of a fully-qualified engineering design firm(s) for the purpose of performing any necessary infrastructure related engineering Design (civil, structural, electrical, mechanical, and architectural) and the preparation of related plans and Documentation under the Contract for any Design that impacts life safety.		
807	All Design Work shall be performed under the direct supervision of a Licensed Engineer of the appropriate discipline in the State of North Carolina. All design professionals shall be licensed and authorized to practice in the State of North Carolina.		
808	If the Engineering Design effort is performed by the Contractor, the Contractor shall submit Documentation showing that the Contractor has met the required qualifications described in this section.		
4.12.2	Document Control		
809	The Contractor shall maintain a Document Management System to control all Project-related documents and drawings. Each document shall be properly titled (per an agreed upon naming convention), date updated, numbered by revision and version and shall incorporate signature blocks for authorship and approvals.		
810	All Documentation regarding the Roadside System Equipment and RSS Equipment installation shall be maintained by the Contractor. All drawings and other such Documentation shall be made accessible to NCTA for review on a periodic basis as Approved by NCTA. The Contractor shall identify and track the status of all Deliverables/Submittals on the Project via the use of a Contract Data Requirements List (CDRL) maintained by the Contractor.		
811	The Contractor shall maintain all non-conformance reports (NCR) submitted by the inspectors and document the correction and resolution of all issues identified.		
4.12.3	Installation Design and Drawings		
	The System Equipment shall be installed on existing infrastructure or overhead structures/toll gantries that will be designed and constructed by others separately procured by NCTA.		
812	The Contractor shall provide the installation Requirements including acceptable tolerances for the System Equipment, including all related plans and documents. The Design and Constructor shall rely on the installation Requirements provided by the Contractor to Design and construct the overhead structures/toll gantries for the System Equipment to function as intended, and Contractor shall be fully responsible for the accuracy of its installation Requirements.		
813	The installation Requirements provided by Contractor shall be consistent with those provided in Contractor's Proposal and shall accommodate the Design provided to support the lane configurations listed in ***Attachment 2, Attachment 2A,*** and ***Attachment 3.***		
814	The Contractor shall certify the installation Requirements provided are accurate and appropriate for its intended purpose to the satisfaction and Approval of NCTA.		
815	Contractor shall indemnify all related parties as more fully described in the Terms and Conditions for any damages that result from reliance on the installation Requirements provided by Contractor.		
816	The Contractor shall submit shop drawings detailing the installation Design that shall be used onsite for installation Work. Detailed drawings shall be provided for each site where Equipment procured and supplied under the Contract shall be installed.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
817	The Contractor shall submit the following Design drawings as part of the drawing package in accordance with NCTA submission Requirements for each Tolling Location/site where System Equipment is installed, including but not limited to:		
	a) detailed installation drawing for each piece of Equipment;		
	b) detailed drawing showing the Equipment mounting brackets and details of their installation to the mounting arm;		
	c) details related to the range of Equipment adjustments;		
	d) detailed electrical schematics;		
	e) all junction boxes and panels;		
	f) detailed Equipment rack layout and interconnections drawings;		
	g) detailed communications layout;		
	h) detailed conduit layout for power and communications;		
	i) power and communications cabling schedules; and		
	j) pavement installation details for in-pavement sensor installations.		
818	The Contractor shall use only the latest Approved drawing version for installation.		
819	During installation, the Contractor shall maintain a red line version of the drawing package that is submitted to NCTA upon the completion of the installation.		
820	Documentation shall include memos denoting changes or modification to Requirements.		
821	The Contractor shall submit detailed component level network drawings showing all WAN, MAN, LAN and VLAN connections, including connection to the Roadside Systems, the RSS, and the existing NCTA CSC Back Office System and the STOC.		
822	Contractor shall utilize a predefined range of IP addresses provided by NCTA. An IP schematic shall be submitted that shows all the IP addresses for all Contractor supplied Equipment on the network.		
823	The Contractor shall submit detailed component level primary and secondary server configuration instructions, including storage device mirroring, back-up devices and configuration, and network configuration and testing.		
824	The Contractor shall submit detailed instructions on the installation and configuration of the operating System, database, third-party Software, and application Software on the servers as customized for NCTA Operations.		
825	All testing required to verify successful installation and operation shall also be documented.		
4.12.4	As-Built Drawings/Documents		
826	The Contractor shall update the latest drawings with red-lines as changes are incorporated during the installation and check-out process. At the completion of the installation of the System, the Contractor shall gather all red line drawings into a single package.		
827	The red line drawings shall be verified and then incorporated into a final As-Built Drawing package. This final As-Built Drawing package shall include installation drawings, shop drawings and sketches, and other drawing types that may have been used to install the Roadway System.		
828	All other Documentation used regarding the installation shall be also be finalized and submitted as part of the As-Built Drawing Submittal.		

No.	Requirements	Required Inputs: Compliance (Y - Yes, N - No)	Required Inputs: Comments (If "Compliance = N" then Proposer must provide an explanation in this column)
5. ROADSIDE TOLL COLLECTION SYSTEM PROJECT REQUIREMENTS			
5.1	**Roadway System Project Management**		
	The Contractor shall employ a Project Management System that is sufficiently detailed to enable NCTA to review and confirm that the Contractor has the necessary management, staff, and controls in place to meet the Requirements of the Contract.		
5.1.1	Program Management and Project Management Plan		
	The Program Management Plan describes how the Contractor plans to implement and manage the Project, including staffing, scheduling and communication procedures for controlling all correspondence, Submittals, and other communications between the Contractor and NCTA, and communications with the Constructor, NCDOT, third-party entities and existing system integrators.		
829	The Program Management Plan shall at a minimum include the following elements:		
	a) Project scope and key Deliverables;		
	b) a description of the management and organization of the program, an organization chart, identification of Key Team Personnel and their responsibilities, percentage commitment to the Project, task leads for each functional area and location and identification of the resources to be used in fulfilling the Requirements of the Contract;		
	c) Project team (Contractor, NCTA, NCTA Representatives, NCDOT, and existing system integrators) contact information;		
	d) a description of the Project planning, Documentation and reporting methods to be utilized, both for use within the Contractor's staff and externally to NCTA and other entities;		
	e) A description of the process for communication, escalation and resolution of Project issues with NCTA;		
	f) meeting schedules with NCTA and other entities including the form of the meeting;		
	g) inclusion of the Approved Project schedule;		
	h) a description of the process for reporting, updating and tracking the Project schedule and Project performance;		
	i) a description of the coordination process with the civil designers, Constructor, NCTA and NCDOT during the tolling infrastructure Design phase;		
	j) coordination process with the Constructor, NCDOT and management of the installation drawing review process;		
	k) approach to change management, consistent with Contract Requirements, including a description of the process for documenting and submitting change requests, the Approval process and how the change management approach will be integrated into day-to-day Project management;		
	l) approach to document control, including Software (NCTA shall have the capability to download documents using this Software) and tools NCTA will use and have read-only access to via the Web;		
	m) approach to risk management;		
	n) approach to Quality Assurance and Quality Control;		
	o) documenting the invoice submission; invoice backup information; verification, and Approval process;		
	p) a section with all Approved Project forms including but not limited to, meeting agenda; meeting notes; action items tracking log; monthly progress report; and invoices; and		
	q) an emergency contact list as described further below.		
830	The Contractor shall identify the tools and products used to manage the Project including Software development lifecycle and the internal controls instituted by the Contractor to guarantee successful delivery of the Project.		
831	The Contractor shall develop and submit the Project Management Plan to NCTA for review and Approval.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
832	The Contractor shall develop and submit the communication procedures to NCTA for review and Approval that address the following, including but not limited to:		
	a) Correspondence: Correspondence shall be identified as to originator and designated receiver and include the form of transmission.		
	b) Document control: Tracking of document versions and changes including naming conventions.		
	c) Invoices: All invoices shall be submitted with accompanying backup information as required by the Contract and consistent with NCTA processes and invoicing and auditing policies. The Contractor shall work with NCTA to develop the appropriate invoice and back-up materials as a part of the PMP development.		
	d) Submittals: All Submittals shall be delivered as an enclosure to the Contractor's Submittal letter. Each Submittal letter shall be limited to a single subject or item. The Contractor's letter shall identify the Contract number, Contract name and subject of the Submittal.		
	e) Contract number and Contract name: All items of correspondence, invoices, Submittals and Documentation shall contain the Contract number and the designated Contract name.		
	f) Comments Log: Process for validating that all comments provided by NCTA on Contractor Deliverables are successfully addressed.		
5.1.2	Contractor's Project Management Office		
833	The Contractor shall establish a Project management office within a 25-mile radius of downtown Raleigh, NC. All Project management activities shall be conducted from this office.		
834	The Contractor Project Manager shall be assigned to the Project management office and shall be hundred percent (100%) dedicated to the Project for the Implementation Phase of the Contract for each Roadway.		
5.1.3	Staffing and Key Personnel		
	The Contractor is responsible for maintaining and assigning a sufficient number of competent and qualified professionals who speak fluent English to meet the Requirements of the Contract.		
835	The Contractor is responsible for maintaining and assigning a sufficient number of competent and qualified professionals who speak fluent English to meet the Requirements of the Contract.		
836	The Contractor shall ensure Key Personnel are readily accessible to NCTA or their authorized representatives during the Contractor's performance of this Contract.		
837	Contractor is required to provide staff at all times sufficient to meet the Project Requirements and Contract. The following are designated as Key Personnel for this Project and are subject to the Approval, replacement and removal Requirements of NCTA for Key Personnel as set forth in the Contract:		
	a) Project Principal – responsible for the overall conduct and performance of the Project; oversight of the Project; the performance of the Contractor Project Manager and a point of contact for any escalated Project issues that cannot be resolved by the Contractor Project Manager;		
	b) Contractor Project Manager – responsible for all day-to-day Work; the overall execution and delivery of the Project and the day-to-day Contractor contact person on the Project;		
	c) Deputy Project Manager – assists the Contractor Project Manager in the execution and delivery of the Project and the day-to-day Operations;		
	d) Technical Manager, Roadside Systems – responsible for management of all Roadside Systems technology and resources including selection of the lane solutions; peripherals; subsystems; Software development and Systems Maintenance;		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	e) Technical Manager, RSS – responsible for management of all technology and resources related to the RSS, including Software development, on-going Hardware/Software Maintenance, Equipment and Systems and information security as required to satisfy the Requirements of the Contract;		
	f) Installation/Maintenance Manager – responsible for the installation and Commissioning of the System and oversight of subsequent Maintenance Services;		
	g) Quality Assurance Manager – responsible for consistent quality throughout the Design, Development, Testing and Implementation of the Roadway System through good Quality Assurance and Quality Control practices;		
	h) Test Manager – responsible for the overall planning and implementation of the Roadway System testing program, and		
5.1.4	Cooperation with Other Contractors and Providers		
838	The Contractor shall cooperate to the fullest extent with the Constructor, Civil Designer, NCTA, NCDOT, and existing system integrators to ensure the Roadway System Implementation and Maintenance do not conflict with or cause any interruption in capability or service or safety issues to the traveling public or customers or impede NCTA's ability to collect tolls.		
839	The Contractor shall cooperate with the Constructor, Civil Designer,, NCTA, NCDOT, existing contractors, existing system integrators and external parties, as directed by NCTA, to support any activity related to the Roadway System Implementation, including but not limited to:		
	a) NCTA employees;		
	b) NCTA Designated Representatives;		
	c) other third parties, as directed by NCTA;		
	d) law enforcement;		
	e) inspectors;		
	f) auditors; and		
	g) all contractors.		
840	The Contractor shall cooperate with and immediately notify NCTA of any customer complaints and System issues identified in the toll lanes or facilities that come to Contractor's attention during the course of Implementation, Testing or Maintenance.		
841	The Contractor shall provide and maintain a current emergency contact list for NCTA's use at all times for handling emergencies and escalations. The emergency contact list shall name primary and secondary (multiple secondary contacts as applicable) points of contact for each anticipated emergency type. The emergency contact list shall name the Contractor's preferred points of contact, in Order of Precedence and shall include, at a minimum, the Contractor Project Manager, deputy Project manager, installation manager, technical manager, technology manager, and other support staff. The purpose of the emergency contact list is to ensure the Contractor can be reached outside normal working hours to address urgent matters.		
5.1.5	Monthly Report and Progress Meeting During the Implementation Phase		
	Monthly Project reports and progress meetings will enable NCTA and the Contractor to monitor the status, progress, and quality of the Work performed on the Project and to take proactive steps to ensure successful delivery of the Project.		
842	The Contractor shall provide and maintain a schedule for monthly progress meetings (in addition to the weekly Design/installation meetings during the active Design/installation periods) at a location designated by NCTA. The meeting shall be scheduled no later than the 20th day of the following month and shall cover progress up to the 15th of the current month.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
843	No less than five (5) Business Days prior to the meeting, the Contractor shall submit a draft monthly progress report to NCTA for the period covering the previous reporting period. NCTA shall review and comment on the progress report prior to or during the meeting.		
844	The Contractor shall obtain updated installation status prior to monthly meeting and include such updates in the Project Implementation Schedule which shall be submitted with the monthly progress report.		
845	The format of the monthly progress report shall be agreed upon as one of the initial Project tasks upon NTP and shall be incorporated by the Contractor into the Project Management Plan.		
846	The monthly progress report shall include but not be limited to the following items:		
	a) a summary outlining progress and status, and percentage of Work performed for each task as compared to planned activities in the Project Schedule. Comments shall be included where appropriate. The summary shall also identify key milestones met and missed in the period.		
	b) an analysis of all critical path tasks, potential risks associated with the tasks and proposed contingency/work around plans to circumvent or mitigate delays to the Project.		
	c) identification of any Approved changes to Approved milestone dates and Approved Project Schedule, clearly noting the details and identifying the Contract Amendment.		
	d) a discussion of schedule compliance and an updated Project Schedule showing current status against the baseline Approved Project Schedule. Past due tasks shall be updated and actual dates shall be recorded for completed tasks.		
	e) construction/installation coordination status;		
	f) an updated action items list that tracks the status of all outstanding action items, activities and issues that need decision/resolution.		
	g) an updated Deliverables list showing submission dates, current version, current review status, responsible party and due date.		
	h) a payment request, if applicable. Payment requests must identify the payment milestone, number and dollar amount. Payments requests shall be made for completed and Approved milestone payments only.		
	i) a list of change requests (Contractor and NCTA initiated) and their status.		
	j) the previous monthly final meeting minutes.		
	k) a six (6) week look-ahead schedule.		
847	No more than five (5) Business Days after the meeting, the Contractor shall submit the final monthly progress report and draft meeting minutes for NCTA's review and Approval.		
5.1.6	Project Meetings		
848	In addition to the monthly progress meeting, weekly or bi-weekly Project status meetings, as applicable and Approved by NCTA, and other regularly scheduled installation and ad-hoc Project meetings shall be required during the course of the Project to address specific Deliverables, Work items, Maintenance procedures and issues as they arise.		
849	The Contractor shall perform the following tasks related to all meetings, including but not limited to:		
	a) develop and coordinate the Project meeting schedule;		
	b) distribute Notices of Project meetings in accordance with document control Requirements;		
	c) prepare the agenda in coordination with NCTA;		
	d) attend the meeting with all required staff in attendance;		
	e) prepare minutes of the meeting and forward them to NCTA within five (5) Business Days after the day of the meeting; and		
	f) maintain an action item list for each type of meeting, identifying issues that need to be resolved at the Project level.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
5.1.7	**Project Schedule**		
	The Project schedule is a comprehensive list of Project milestones, activities and Deliverables, with intended start and finish dates, including a detailed Work Breakdown Structure (WBS) that identifies Project tasks down to the work package level and the activities required to complete the work package Deliverables.		
850	The Contractor shall provide and maintain a detailed Project Schedule for the Project for each Roadway in Microsoft Project format (Project 2010 or above) that lists all Project activities and tasks for all Phases of the Project, including but not limited to:		
	a) Requirements;		
	b) Design;		
	c) development;		
	d) testing;		
	e) installation;		
	f) transition; and		
	g) deployment and Acceptance of the System at the various Tolling Locations.		
851	The Project Schedule shall include coordination with Constructor, NCDOT, existing contractors, existing system integrators and NCTA and shall clearly document all interfacing tasks.		
852	The Project Schedule shall identify all milestones and tasks, starting with the Notice to Proceed (NTP) through the date of Acceptance for each Project phase.		
853	The Project Schedule shall be resource loaded, shall include all draft submissions and review cycles and shall include all tasks required of NCTA and other contractors and NCDOT with critical tasks.		
854	The Project Schedule shall identify all critical path tasks and shall be used to manage the Project.		
855	The baseline for the Project Schedule shall be submitted to NCTA for Approval ten (10) Business Days after NTP.		
856	The Contractor shall status and update the Project Schedule on a monthly basis, as identified in the Requirements for the Monthly progress report.		
857	The Contractor shall use the Project Schedule as the basis for all subsequent schedules and updates throughout the duration of the Project.		
858	The Contractor shall obtain Approval from NCTA for any and all changes to the Approved Baseline Project Schedule and associated milestones in accordance with the Contract process for changes and Amendments and schedule changes are not considered Approved unless an Amendment is executed through the Contract.		
5.2	**End of Contract Transition**		
	The Contractor acknowledges that the Services it provides under the terms of the Contract are vital to the successful operation of the System and that said Services shall be continued without interruption. Upon end of the Contract for whatever reason, a successor (NCTA or a new contractor) may be responsible for providing these Services. The Contractor agrees to exercise its best efforts and cooperation to affect an orderly and efficient transition to a successor in accordance with this Section 5.2 and Section 2.7, Section V – Terms and Conditions.		
859	Upon NCTA's written Notice, the Contractor shall furnish transition Services prior to the end of the Contract Term. The Contractor shall develop with the successor contractor or NCTA staff, a Contract Transition Plan describing the nature and extent of transition Services required.		
860	The Contract Transition Plan and dates for transferring responsibilities for each division of work shall be submitted within thirty (30) Days of such Notice. Upon completion of NCTA review, both parties will meet and resolve any additional Requirements/differences.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
861	The Contractor shall provide sufficient experienced Roadside System and RSS technical and Software support personnel in each division of Work during the entire transition period to ensure that the quality of Services are maintained at the levels required by this Contract.		
862	The Contractor shall provide sufficient staff to help the successor maintain the continuity and consistency of the Services required by the Contract. The Contractor shall allow the successor to conduct onsite interviews with the employees.		
863	The Contractor shall provide the necessary Software and Systems support Services to assist the successor contractor in setting up the systems, transfer of appropriate licenses and third-party Software, and transition of all data required to sustain uninterrupted service as directed by NCTA.		
864	The Contractor shall make all necessary provisions for transferring any leases or sub-leases held by the Contractor to the NCTA, including without limitation, all keys; security codes and other codes and other facility access information or devices.		
865	The Contractor shall make all other records, documents, data and Software which is licensed to the NCTA and pertaining to the Services rendered for this Agreement available within thirty (30) Calendar Days upon written Notice or as otherwise provided in the executed License Agreement.		
866	The Contractor shall make all operational records, documents, data, Systems, specialty tools and Equipment, and facilities required to support and maintain day-to-day Services being rendered under this Agreement available before the date of such termination, suspension, or expiration.		
5.3	**Software Design and Development Requirements**		
	NCTA expects the Contractor to propose a baseline product for the Roadside solution and the RSS, and that some custom development will be required. To ensure the Design Requirements for the Roadway System are fully understood by NCTA and the Contractor, a series of Requirements and Design review steps are specified following a sequential Design process or waterfall model. Requirements derived during the Design process or waterfall model will become part of the Contract Conformed Scope of Work and Requirements Document (CSWRD) shall be the basis for the Contractor to produce a Requirements Traceability Matrix (RTM). The RTM allows for verification that the Requirements are addressed in the Design and documented in the System Detailed Design Document (SDDD) and traced to test procedures that validate the developed Roadway System meets the Contract Requirements. The RTM shall be the basis for all Design, development and testing efforts and Documentation to be developed by the Contractor.		
867	The Contractor shall establish and maintain an effective Software Design and development program along with a documented Software Development Life Cycle (SDLC) to ensure compliance with the Requirements of the Contract.		
868	The Contractor shall employ effective techniques, methodologies and tools to develop the System Requirements and Business Rules for the Project and deliver the Project.		
869	Prior to conducting any workshops, Requirements reviews, focus group meetings and Design reviews, the Contractor shall develop the necessary Documentation for NCTA review and submit such Documentation ten (10) working Days prior to such meetings.		
870	The Contractor shall provide a Table of Contents for the Design document that identifies the required document Deliverables and any document templates that will be used to develop the Documentation. Such Documentation shall be tailored for the Project, and the Conformed Scope of Work and Requirements Documents (CSWRD) shall be used for developing such Documentation.		
5.3.1	System Requirements Review (SRR)		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	The Contractor shall conduct a series of System Requirements Review meetings with NCTA to outline how the Contract Requirements will be met. Separate set of meeting shall be scheduled for each Roadway unless Approved by NCTA. The outcome of these meetings shall be the Requirements Traceability Matrix (RTM) that will be used to validate each Requirement against a Design item(s), Design Documentation and testing procedure(s).		
871	The Contractor shall conduct a series of System Requirements reviews with user groups to identify user needs.		
872	The Contractor shall present lane logic and transaction framing rules of the baseline solution.		
873	Contractor's existing screens and presentation formats tailored to NCTA Operations shall be used to solicit user Requirements and feedback.		
874	During the System Requirements review phase the Contractor can also present the Contractor's standard product to NCTA, and use the feedback obtained in the presentation in the development of the RTM and SDDD.		
5.3.2	Business Rules Development		
875	The Contractor shall conduct Business Rules development workshops with the NCTA for each Roadway Project phase to develop and document the Business Rules according to the Business Policies and Procedures for the RTCS, including the Roadside System and the RSS.		
876	The Business Rules workshops can occur concurrent to the System Requirements reviews.		
877	The Contractor shall provide Business Rules utilized at other AET Facilities and Toll Facilities; however, they shall be tailored to meet the NCTA's Requirements and shall comply with the Scope of Work and Requirements.		
878	The Contractor shall track the Design, development and testing of the Business Rules through the RTM.		
5.3.3	System Detailed Design Review		
	Based on the RTM and Business Rules documents, the Contractor will Design the Roadway System and submit a preliminary Design document for NCTA to review and provide comments. The Contractor will then conduct a series of Design meetings with NCTA to address the comments and to create the SDDD, defining how the System Design will meet the Contract Requirements. Upon the Submittal of an updated SDDD another review cycle will take place.		
879	The Business Rules document and the RTM shall be used to develop the System Design and the SDDD.		
880	The Contractor shall schedule Design meetings with NCTA to fully understand the Design Requirements.		
881	The Contractor shall support a phased Design process to support the anticipated phased implementation of the RTCS on the NCTA Roadways. The Design process shall accommodate for the changes in technology that is inevitable given the duration of the Project.		
882	The Contractor shall demonstrate pre-production working products (such as, beta versions) during the Design review process, and stakeholders shall be walked through the workflow, utilizing screens and data flow diagrams.		
883	The Contractor shall trace how the System Design meets the SRD, the Business Rules and the Contract Requirements using the RTM.		
884	The Contractor shall conduct as many meetings and submission review cycles as deemed necessary by NCTA to address all Design issues to NCTA's satisfaction.		
5.3.4	Reports Design Workshops		
	The Contractor will conduct a series of workshops with NCTA to facilitate the Design of the Roadway System reports. The existing reports shall be used as a basis for the workshops.		
885	The Contractor shall employ an effective and productive methodology for Designing and finalizing the reports for the Project.		
886	The reports Design process shall be iterative and the Contractor shall conduct multiple workshops with NCTA's stakeholders, and Contractor shall bring subject matter experts to the meeting.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
887	Subject matter experts must provide a means for explaining each report, its intended purpose, columns, fields and components and its connection with other reconciling and validating reports.		
888	Report templates from existing operational systems shall be submitted and changes to meet the NCTA Roadway System Requirements shall be noted. Sample reports shall have correct and accurate data and shall reconcile across other reports.		
889	Upon receiving feedback from the stakeholder, the Contractor shall develop/modify the reports and resubmit the updated reports for review.		
890	The modified and new reports shall be demonstrated to NCTA using accurate and reconciled data. Reports that are expected to reconcile to one another shall be demonstrated together.		
891	The iterative series of workshops and demonstrations shall continue until baseline reports are Approved by NCTA.		
892	The Approved baseline reports shall be used as the basis for the Design document.		
5.3.5	Software Walkthrough		
	The intent of the Software walkthrough is to provide an overall status on the Contractor's Software development progress to ensure the Contractor is on track to deliver the Project on schedule and to obtain NCTA's feedback on the direction of the development prior to the full rollout of the Software.		
893	The Contractor shall conduct a series of Software walkthroughs including product demonstrations to solicit input from NCTA during the development of the Roadway System.		
894	Prior to the Software walkthrough, the Contractor shall develop and submit the use cases that will be demonstrated to NCTA for review and Approval. The walkthrough shall follow the process flow and emulate normal Operations.		
895	The product shall be demonstrated in a test environment that allows data to flow as it will in the final integrated System.		
896	The Software walkthrough shall demonstrate to NCTA that the developed Software product meets the technical and functional Requirements of the Contract.		
897	Comments and feedback provided during the Software walkthrough shall be documented and resolved by the Contractor and the resolution shall be Approved by NCTA.		
898	The Contractor shall be responsible for identifying and correcting any Software issues or defects in its Design or product that impact the Contractor's ability to deliver the Roadway System that meets the Contract Requirements. This shall apply to issues or defects found during or after Software walkthrough, the FAT or in the subsequent testing and Implementation. Any such changes shall be Approved by NCTA in writing.		
5.4	**Documentation**		
	The Contractor is required to provide various Project; Hardware; Software; Requirements; Business Rules; Design; testing; installation and Maintenance Documentation that include Contractor-developed Documentation and third-party Documentation. All Documentation provided under this Contract shall meet the Requirements described below.		
899	The Contractor shall use an NCTA-provided online, electronic document management System (such as SharePoint) that is accessible to both NCTA and the Contractor by username and password, to control all Project-related documents, submissions and drawings.		
900	The electronic document management System shall be indexed and searchable.		
901	All Project documents submitted under this Contract shall be available to NCTA at all times using the online, electronic document management System provided by the Contractor.		
902	The Contractor shall maintain a Deliverable tracking list that accurately tracks all Contractor submissions; NCTA's comments review documents; resubmissions and final Approval.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
903	Each document shall be properly titled, date updated, numbered by revision and version, and shall incorporate signature blocks for authorship and Approvals. The Contractor shall provide a logical indexing system making use of documents metadata for ease of access for NCTA to locate documents in the electronic document management System.		
904	Updated submissions of the document shall also include the red-lined version showing all revisions to the document since the last submission.		
905	The Contractor shall utilize acceptable standards agreed upon by the Contractor and NCTA when updating documents and submitting revisions.		
906	All Documentation submitted by the Contractor under this Contract shall be accurate and comply with Contract Requirements. All Deliverables shall be submitted in accordance with the Approved Project schedule.		
907	A Table of Contents, for all Documentation that requires one, shall be submitted by the Contractor to NCTA for review and comment prior to the submission of the preliminary draft.		
908	The Contractor shall submit a minimum of: a preliminary draft, a final draft and a 100% final to NCTA for review and comment. All final documents shall incorporate all NCTA's review comments to NCTA's satisfaction. Each subsequent submission of a Deliverable shall also include NCTA's comments review log with the resolution of each comment updated by the Contractor.		
909	NCTA shall have the right to require additional interim drafts from the Contractor at no additional cost should the draft Documentation submitted not be of adequate quality, have missing or incorrect information or if it does not satisfactorily address NCTA's review comments.		
910	NCTA shall review and Approve all documents submitted under the Contract. For documents containing less than one hundred (100) pages, NCTA will review and provide comment on preliminary draft documents within ten (10) Business Days. For documents containing more than one hundred (100) pages, NCTA will review and provide comment on preliminary draft documents within fifteen (15) Business Days. NCTA will review and provide comment on all final draft and final documents within ten (10) Business Days. When multiple documents are submitted to NCTA simultaneously, or within one week of each other, the number of Business Days required for review shall be adjusted to reflect the overlapping submissions.		
911	NCTA will provide the Contractor with written comments on all submitted documents, and the Contractor shall respond in writing to all comments. A meeting may be conducted to clarify and resolve any remaining questions and issues concerning the comments and responses provided. The Contractor shall prepare a revised version of the document for Approval by NCTA.		
912	The Contractor shall submit five (5) hard copies and the electronic version of all Contractor developed Documentation for NCTA review and Approval unless directed by NCTA to provide fewer hard copies. Acceptable electronic formats are Microsoft Office 2010 Suite (or higher), unsecured PDF and professional CAD applications for Contractor-prepared Documentation.		
913	The Contractor shall update Documentation as changes occur through the Implementation Phase (and the Maintenance Phase) and shall maintain a document Submittals list on the electronic document management site identifying all versions of documents, the date submitted, the nature of changes and provide relevant updates to NCTA as they are published.		
914	The Documentation package for all Submittals as applicable shall include all required electronic media to install, operate and maintain the System/Deliverable/document being supplied.		
5.4.1	Requirements Traceability Matrix (RTM)		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
915	Upon completion of the Requirements and Business Rules review process the Contractor shall deliver an RTM that details all the technical and functional Requirements for the Roadway System.		
916	The RTM shall build on the specifications documented in the CSWRD and shall capture all user needs identified during the Requirements and Business Rules review process.		
917	Upon Approval of the RTM, this document shall be the basis for functional verification of Design, development and testing.		
918	During the Design and development of the Software, the Contractor shall update the RTM to reflect any changes to the Requirements that have been Approved by NCTA.		
919	During Design and testing, the RTM shall be used to verify the System compliance to the Contract Requirements and test procedures.		
920	All changes to the System Requirements during the course of the Project shall be tracked through the RTM.		
921	The RTM shall include, but not limited to:		
	a) listing and categorization of all functional Requirements;		
	b) listing and categorization of all Software related technical Requirements;		
	c) identification of the source of all Requirements;		
	d) identification of the Design section of the SDDD that addresses the Requirement and		
	e) identification of the test procedure that addresses the Requirement.		
5.4.2	**Business Rules Document**		
	As an outcome of the Business Rules workshops and review meetings, the Contractor will provide a Business Rules Document.		
922	The Contractor shall submit a Business Rules Document that includes but is not limited to:		
	a) detailed Business Rules for all aspects of the RTCS, including policies and processes developed by the Contractor and Approved by NCTA;		
	b) detailed description of all System Configurable options, ranges and thresholds (Configurable within the System or Configurable by Authorized User) for each Business Rule (if applicable);		
	c) categorization of all Business Rules, providing indication for the source of the Business Rule;		
	d) cross-referencing of all Business Rules to the underlying Requirements and		
	e) System and operational impacts of each Business Rule.		
5.4.3	**System Detailed Design Document**		
923	The Contractor shall develop and submit a System Detailed Design Document (SDDD) that describes the Design specifications of all Hardware and Software provided as part of the RTCS to meet the Approved Contract Requirements. The SDDD shall demonstrate that the Contractor understands the functional, technical and Performance Requirements of the RTCS and has the processes, Hardware and Software Design in place to provide a high-quality and reliable product that meets the Requirements of the Contract.		
924	The SDDD shall be clear, well-written and organized into volumes to manage the submission and review process.		
925	The SDDD shall include the use of diagrams, figures, tables and examples, and it shall apply to all environments, including primary and secondary production and testing environment.		
	The SDDD shall include but not be limited to:		
	a) System architecture, including overall System Design concept;		
	b) in-lane Equipment layout for each Tolling Location type,		
	c) placement of the Equipment on the toll gantry;		
	d) lane layout electrical and logic diagrams;		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
926	e) image processing details and image review screens;		
	f) Dashboard layouts and Design;		
	g) the Requirements for all peripheral device Interfaces and control;		
	h) Roadside server Design, including sizing and processing calculations;		
	i) storage system Design, including sizing and processing calculations;		
	j) data backup Systems Design, including sizing and processing calculations;		
	k) network sizing and Design details including IP scheme;		
	l) cabinet/vault/Equipment rack layout and interconnections;		
	m) cabinet/vault/Equipment rack space Requirements;		
	n) UPS sizing information detailing all Equipment on the UPS(s) and their total power Requirements;		
	o) high System availability Design, including Servers, storage, network, database and application;		
	p) Disaster Recovery Design, including Servers, storage, network, database, data resiliency and application;		
	q) Business Continuity Design, including cameras, AVI equipment, and other associated equipment near a tolling point in the case of catastrophic damage to the gantry at a damaged Toll Zone;		
	r) Hardware dependencies and inter-dependencies;		
	s) detailed primary and secondary locations rack and server placement Design;		
	t) detailed infrastructure Software Design,		
	u) detailed operating systems Design;		
	v) detailed peripherals configurations, including Requirements for all peripheral device Interfaces and control;		
	w) all internal System Interfaces;		
	x) all custom developed Software;		
	y) all Software provided by the Contractor or a third-party;		
	z) Software dependencies and inter-dependencies;		
	aa) detailed database Design, schema and data modeling, including sizing and processing calculations;		
	bb) Entity Relationship Diagram (ERD):		
	cc) data flow diagrams, state diagrams and data queues;		
	dd) Module level descriptions and interaction among various Modules;		
	ee) detailed description to the Module and/or process level for all of the functions according to the functional Requirements of the System;		
	ff) lane logic and vehicle framing Design and rules with illustrations;		
	gg) degraded mode of Operations and impacts of failures on System Operations;		
	hh) transaction audit and pre-processing;		
	ii) transaction processing Design, including sizing and processing calculations;		
	jj) detailed Interface specifications between all Software components;		
	kk) Design of all System Interfaces (both sides of the Interface), including electronic Interface to the RSS and existing NCTA CSC Back Office.		
	ll) detailed data management Design and processes, including summarization, archiving and purging;		
	mm) all user Interfaces (including reports and screen formats);		
	nn) System data dictionaries;		
	oo) application performance monitoring Design;		
	pp) access/identity security methodology;		
	qq) Access Control and Security Monitoring System layout and interconnections;		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	rr) environmental specifications;		
	ss) specification sheets for all Equipment;		
	tt) complete Bill of Materials, including Hardware, Software and support/Maintenance agreements; and		
	uu) A logical division and an index of all contents within the SDDD.		
927	Upon the completion of the Software development, and prior to the start of the Roadway System formal testing, the Contractor shall submit the Final Updated SDDD that includes all changes/clarifications made during the Software development and validation phases.		
928	The Contractor shall submit an updated SDDD on an annual basis throughout the Contract Term that includes all changes/clarifications made during the just-completed year.		
5.4.4	RTCS System Installation Design Requirements Package		
929	The Contractor shall prepare and submit the RTCS System Installation Design Requirements and Documentation package to the NCTA for review in accordance with the Approved Project Schedule.		
930	Generally speaking the Contractor's Design submittals will not be required to be signed / sealed by a licensed engineer. However, should the Contractor provide custom manufactured infrastructure that is structural in nature or other structure(s) or appurtenances (e.g. Equipment mounting brackets, Equipment arms, etc.) that have the potential to impact life safety the Contractor shall secure the services of a fully-qualified engineering design firm(s) licensed in North Carolina for the purpose of performing engineering design and the preparation of related Plans and Documentation under the Contract.		
931	The Contractor shall develop a half-size (11" by 17") set of drawings providing sufficient and accurate detail to install the System components.		
932	In addition, the drawing shall contain notes and other detail defining specific processes that cannot be graphically depicted. The notes shall also be used to delineate specifications, tolerances, special conditions, or any other factor required to install and integrate a fully functional System.		
933	The drawings shall include but not be limited to the following:		
	a) lane geometry and dimensions of actual size and placement of all Roadside Equipment;		
	b) For existing Roadways, details on all existing Equipment, conduits, junction boxes and panels that will be re-used clearly identifying any temporary installations;		
	c) Equipment bracket mounting detail to the mounting arm;		
	d) specifications and tolerances;		
	e) conduit and cable schedule showing all conduits, cables and wires used for each Tolling Location;		
	f) placement of in-road components;		
	g) size and depth of loop cuts;		
	h) for concrete pavement, any requirements or design parameters related to dowel or tie bars;		
	i) loop tolerances (induction, resistance, impedance, Q factor);		
	j) any specific infrastructure limitations (i.e. proximity of rebar);		
	k) any specific requirement of how the loop cable is placed into the cuts;		
	l) all homeruns from loops;		
	m) any cable twist requirements for loop homeruns;		
	n) placement of overhead sensors;		
	o) details describing termination process for each termination;		
	p) lightning and surge suppression system;		
	q) a graphical diagram of the network connectivity and data flow;		

No.	Requirements	Required Inputs: Compliance (Y - Yes, N - No)	Required Inputs: Comments (If "Compliance = N" then Proposer must provide an explanation in this column)
	r) detailed interconnection diagrams for all Systems;		
	s) detailed electrical schematics; and		
	t) detailed communications layout.		
5.4.5	Roadway Support System (RSS) Installation Design and Documentation		
934	The Contractor shall prepare and submit the RSS Installation Design and Documentation package to NCTA for review in accordance with the Approved Project Schedule.		
935	The Contractor shall develop a half-size set of drawings (11" by 17") providing sufficient and accurate detail to install the System components.		
936	The drawings shall include but not be limited to the following:		
	a) detailed interconnection diagrams for all Systems;		
	b) detailed electrical schematics;		
	c) detailed communications layout;		
	d) UPS sizing specifications;		
	e) Equipment rack layout, including power panels and connection to the UPS;		
	f) a detailed diagram of the network connectivity, including IP scheme;		
	g) server set-up and configuration;		
	h) other RSS Hardware installation and connections; and		
	i) floor loading calculations.		
937	The Contractor shall provide the installation Requirements for the Equipment, including all related Plans and documents. The Contractor shall certify the installation Requirements provided as accurate and appropriate for its intended purpose, to the satisfaction and Approval of NCTA.		
938	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all RSS Equipment at the primary facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.		
939	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all RSS Equipment at the secondary facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.		
940	The Contractor shall develop and submit to NCTA a half-size (11" by 17") set of drawings, providing sufficient and accurate detail to install the System components.		
941	The Contractor shall submit UPS sizing information for the primary and secondary facilities, detailing all Equipment on the UPS and their power specifications.		
942	The Contractor shall submit detailed network drawings showing all WAN, MAN, LAN and VLAN connections, including all interface connections and IP addresses for all Equipment on the network.		
943	The Contractor shall submit detailed Server configuration instructions, including the configuration of storage devices, back-up devices and network connectivity.		
5.4.6	Quality Assurance Plan		
944	The Quality Assurance (QA) Plan that details the Contractor's QA Program shall be submitted to the NCTA for review and Approval in accordance with the Approved Project Schedule.		
945	The QA Plan shall include the Contractor's QA Program through planning, Documentation; Design; development; production; purchasing; testing; installation; Commissioning; transition and Acceptance of all Hardware and Software provided under this Contract.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
946	The Quality Assurance Plan shall describe the Quality Assurance procedures and methodology for the Project, including but not limited to:		
	a) quality management and organizational structure;		
	b) System Design;		
	c) Software development and defect management;		
	d) installation including civil installation sign-off;		
	e) Equipment purchase, delivery and validation;		
	f) inspection and verification for in-process, final assembly, unit tests and System testing;		
	g) configuration management;		
	h) change management and change control process;		
	i) training and safety;		
	j) quality management Documentation;		
	k) transition;		
	l) compliance to Contract Requirements;		
	m) quality review and verification; and		
	n) reporting and metrics.		
5.4.7	Software Development Plan (SDP)		
947	The Contractor shall develop and submit a Software Development Plan (SDP) to NCTA for review and Approval in accordance with the Approved Project Schedule that includes but is not limited to:		
	a) Documentation of the Software development approach to the application architecture, behavior, architecture, business processes, security and data structures;		
	b) approach System Design and Development given the Roadway System Project phasing;		
	c) development resources and responsibilities, such as Software developers, system engineers, security engineers, test engineers, Quality Assurance and control personnel, configuration management administrator, Documentation specialists and Project management staff;		
	d) describe natural segregation of development areas or teams, such as development of user Interfaces, development of reports, development of the functionality and development of Interfaces;		
	e) Software development standards;		
	f) security standards;		
	g) Software development methodology, such as use cases, modeling and other development tools;		
	h) Software development language strategy, platforms and technologies related to both development and Software Maintenance;		
	i) description of the Software Development Life-Cycle and Maintenance;		
	j) approach to segregation of environments (development, testing and deployment) and the number of environments;		
	k) Maintenance of standard and baseline codes and management of major releases;		
	l) gap analysis of baseline code to Contractor Requirements;		
	m) development problem reporting, defect tracking and remediation;		
	n) code reviews and code development standards;		
	o) source control;		
	p) informal and internal testing methodology;		
	q) regression testing and security and vulnerability testing;		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	r) development and integration approach for the major functional modules;		
	s) Software Quality Control processes;		
	t) Software end-user Documentation review and usability;		
	u) development Documentation;		
	v) technical Software code Documentation and standards for all code;		
	w) Software configuration and change management approach and standards;		
	x) samples of detailed Software Documentation for both external and in-line Documentation;		
	y) Software deployment approach, release management and validation; and		
	z) detailed Documentation of the development environment, including enough information that the environment could be completely replicated.		
5.4.8	Master Test Plan (MTP)		
948	The Contractor shall provide to NCTA, for review, comment and final Approval a Master Test Plan (MTP) in accordance with the Approved Project Schedule that outlines the scope and testing concepts to be used to administrator each test identified in the Contract.		
949	The MTP shall document the methodology used to validate the Roadway System compliance to the Requirements and demonstrate the Roadway System satisfies the technical, functional and Performance Requirements of the Contract.		
950	The Approved Master Test Plan shall be used as the basis for the detailed test procedures that shall be submitted to NCTA for review and Approval.		
951	The Master Test Plan shall cover all aspects of the RTCS and the RSS testing from initial development through deployment, Roadway Acceptance and Project Acceptance, including but not limited to:		
	a) overall approach to testing;		
	b) approach to each informal and formal testing;		
	c) approach to creation of data set for each test;		
	d) Software test automation tools utilized for each test;		
	e) approach to validating all System Requirements through the testing methodology;		
	f) approach to validating all System Business Rules through the testing methodology;		
	g) describe the entry and exit criteria for each test;		
	h) document the severity and Priority descriptions and levels for each test;		
	i) include a detailed schedule for each test identifying each test activity and resource;		
	j) describe the methodology for testing the Performance Requirements and sample size for each phase of testing;		
	k) describe the methodology for load testing;		
	l) describe the purpose; scope; duration; System resources, and human resources for all tests identified in the Scope of Work and Requirements;		
	m) approach to validating all reporting Requirements;		
	n) approach to end-to-end testing, validation and Reconciliation;		
	o) approach to interface testing and compliance to standards,		
	p) document how defects will be triaged; tracked; reported; resolved, and retested, including tools used to document defects; and		
	q) a set of regression test procedures that will be exercised each time Software changes are made after the Approval of the FAT.		
	The Contractor shall provide detailed test procedures for NCTA's Approval for each test outlined in the Requirements and Approved MTP, including but not limited:		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
952	f) test logistics including test vehicles; drivers and test Equipment (including test transponders);		
	g) test scenarios;		
	h) detailed test steps with expected outcomes;		
	i) test entry and exit criteria;		
	j) test preparation;		
	k) test data creation;		
	l) periodic status meetings;		
	m) all necessary human resources; and		
	n) all necessary Hardware and Software.		
953	NCTA's Approval of any aspect of testing shall not relieve the Contractor of its responsibility to meet the full Requirements of the Contract.		
954	The Contractor shall update the RTM linking every Requirement to a set of test cases to demonstrate the Requirement has been satisfied and which test satisfied the Requirement.		
5.4.9	Maintenance Plan		
	The Contractor shall submit Maintenance Plans listed below that describes how the Contractor plans to facilitate NCTA in performing the Maintenance of the RTCS: Roadside Systems, RSS, and all Hardware at the vaults/cabinets in accordance with the Requirements of the Contract. The Contractor shall have appropriate Documentation available to all Maintenance and Software Support personnel, as required to perform their respective duties.		
5.4.9.1.	*System Maintenance Plan*		
955	The System Maintenance Plan defines the approach to Services, staffing and resources to fulfill the System Maintenance Requirements. The Plan shall include:		
	a) organizational structure, organizational chart and job descriptions and responsibilities;		
	b) detailed matrix of responsibilities (NCTA and Contractor);		
	c) staffing Plan;		
	d) approach to staffing and training;		
	e) detailed System monitoring Requirements;		
	f) coverage and personnel locations;		
	g) Third-party System support agreements overview;		
	h) schedule of all System Maintenance activities;		
	i) all System Maintenance related communication methods;		
	j) Maintenance procedures, communication protocols and approval processes for System Upgrades, scheduled Maintenance activities, change management and scheduled downtime;		
	k) Maintenance procedures and communications protocols for unscheduled downtime;		
	l) communication protocol for coordination with NCTA Operations and third-party entities;		
	m) communication protocol for coordination with NCTA's existing system integrators;		
	n) trouble reporting processes;		
	o) escalation processes;		
	p) Spare parts levels and reorder thresholds, Equipment and Software warranty tracking and return material processes;		
	q) monitoring the MOMS Dashboard;		
	r) monitoring Maintenance performance for compliance to Performance Requirements;		
	s) sample Maintenance reports;		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	t) Equipment obsolescence/replacement/refresh schedule;		
	u) Upgrades to third-party Software and tools;		
	v) process in place to meet Maintenance Performance Requirements; and		
	w) pervasive methodology and activities.		
5.4.9.2.	*Software Maintenance and Warranty Plan*		
	Software Maintenance and Warranty Plan shall define the approach to Services, staffing and resources to fulfill the Software Maintenance and Warranty Requirements including but not limited to:		
	a) organizational structure, organizational chart and job descriptions and responsibilities;		
	b) detailed matrix of responsibilities (NCTA and Contractor);		
	c) staffing Plan;		
	d) approach to staffing and training;		
	e) approach to receiving and prioritizing Software defects (bugs);		
	f) reporting, categorization, prioritization, remediation and disposition of Software defects;		
	g) coverage and personnel locations;		
	h) all Software Maintenance related communication methods;		
956	i) Maintenance procedures, communication protocols and approval processes for Software Upgrades, Software releases, testing, scheduled Maintenance activities, change management and scheduled downtime;		
	j) Maintenance procedures and communications protocols for unscheduled downtime;		
	k) trouble reporting processes;		
	l) escalation processes;		
	m) sample Maintenance reports;		
	n) Software Updates and testing to comply with Interoperability specification changes, and third-party interface changes;		
	o) Software and security Updates, remediation and testing to be compliant to PCI and NCTA Audit Requirements; and		
	p) process in place to meet Maintenance Performance Requirements.		
5.4.10	Disaster Recovery Plan		
	The Disaster Recovery Plan (DRP) shall be a comprehensive, documented statement of actions to be taken before, during and after a disaster to protect and recover the information technology data, assets and facilities of the RTCS.		
957	The Contractor shall develop and submit a DRP and subsequent DR Procedures that describe the approach, as well as activities and procedures that take place in the event of a disaster for each element of the RTCS.		
	The DRP shall document the Contractor's approach to recovering from a disaster, including but not limited to:		
	a) events that constitute a disaster and party responsible for declaration of a disaster;		
	b) assessment of disaster risks;		
	c) mitigation of disaster risks;		
	d) preparations in the event of a disaster;		
	e) disaster declaration and DR process to invoke;		
	f) organization chart illustrating DR team members, roles and responsibilities;		
	g) notification contact list, including contact information;		
	h) notification protocol;		
958	i) sites and Equipment for DR, presented in a diagram format;		
	j) DR process initiation and completion checklist;		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	k) Software and data replication processes;		
	l) detailed logistical processes for activation of DR site and systems;		
	m) detailed technical processes for activation of DR site and systems;		
	n) detailed procedures for failover and failback of the RSS including a check list for ensuring that it failed over and failed back properly;		
	o) detailed operational functions for activation of DR site; and		
	p) detailed technical processes for reactivation of primary site (or moving to a new primary site if the original primary site is destroyed), Operations and Systems.		
959	The DRP shall be tested no less than annually.		
960	The DRP shall include a Business Continuity Plan (BCP) that details the Contractor's approach to accommodating the personnel, Equipment, Systems, network, applications and data components required to ensure the resumption and continuity of critical Roadway System processes.		
961	The BCP shall include but not be limited to:		
	a) Recovery Point Objective (RPO) maximum acceptable amount of data loss for all critical Roadway System Services after an unplanned data-loss incident, expressed as an amount of time;		
	b) Recovery Time Objective (RTO) maximum acceptable amount of time for restoring a critical Roadway System Services and regaining access to data after an unplanned disruption;		
	c) Level of Service (LOS) the combination of throughput and functionality required to sustain Roadway System business Operations;		
	d) detailed description of how site and System security will be maintained to ensure continued compliance with security Requirements; and		
	e) response plan in the event of a security breach or cyber-attack at the roadside network, or either RSS sites in accordance with the State of North Carolina Statewide Information Security Manual.		
5.4.11	Training Program and Plan		
962	The Contractor shall develop and submit a Training Plan for NCTA Approval in accordance with the Approved Project Schedule that describes the approach to training supervisors; auditors; administrators; end users; Maintenance and support personnel.		
963	The Training Plan shall describe the plan for training new personnel and shall outline the required operational/Maintenance and System knowledge for each position to be gained from the training.		
964	For each position/user type, the plan shall include a training instructor guide, training manual and other materials to be used in training. The Training Plan also shall include a schedule for follow-up training and continuing education for staff.		
965	The Training Plan shall provide a plan for cross-training staff from other areas of Operations or management for peak period, emergency or temporary assignments to provide for staff redundancy. The Training Plan also shall include the training schedule for regular staff training and continuing education/training.		
	The Training Plan shall address the following areas including but not limited to:		
	a) overall description of the training program;		
	b) training techniques;		
	c) training delivery schedule;		
	d) names and descriptions of each training class;		
	e) purpose of each training class;		
	f) who should attend the class;		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
966	g) qualification requirements for trainer;		
	h) minimum qualifications for personnel attending the class;		
	i) duration of the class;		
	j) training materials, including syllabus, schedule, training goals, manuals, guides, other support materials and techniques to be used;		
	k) data preparation, such as users and test transactions;		
	l) trainee assessment and scoring methods;		
	m) trainee surveys and feedback;		
	n) required Equipment; and		
	o) facility requirements.		
967	Courses shall be limited to a maximum of eight (8) hours per day.		
968	The Contractor shall be responsible for maintaining a training database baseline and supporting data files that can be restored at the beginning of each training session.		
5.4.12	Third-Party Documentation		
	Third-Party Documentation includes standard commercial Documentation for third-party provided Hardware, Software, Services and materials.		
969	The Contractor shall catalogue all third-party Documentation and include the catalogue with the third-party document submissions.		
970	The Contractor shall provide and maintain standard, commercially available, updated Documentation for third-party provided Hardware, Software, Services and materials provided under this Contract. This set of third-party Documentation shall be retained at the NCTA offices for the duration of this Contract and upon termination of the Contract.		
971	All updated documents shall show the revisions and also include a version of the clean document.		
972	An electronic copy of all third-party COTS Hardware and Software installation and user manuals, with updates, shall be provided to NCTA. Acceptable electronic formats are Microsoft Office 2010 Suite or higher, unsecured PDF and professional CAD applications.		
973	Documentation shall include sufficient detail to describe the configuration of the Software as it was installed by the Contractor for the RTCS. These should include any customization or modifications made to the Software or configurations specific to the NCTA environments.		
974	The Contractor shall provide five (5) hard copies of all Hardware and Software installation and user manuals for custom-developed (non-COTS) third-party products and Services.		
5.4.12.1.	*Third-Party Software Documentation*		
975	The Contractor shall provide third-party Software Documentation, including but not limited to:		
	a) all user manuals;		
	b) programmer's reference manuals;		
	c) warranty Documentation;		
	d) installation manuals;		
	e) Interface documents;		
	f) Maintenance manuals; and		
	g) any other information required to utilize the Software, such as the operating System, utilities, programming languages, application Software and communications Software.		

No.	Requirements	Required Inputs: Compliance (Y - Yes, N - No)	Required Inputs: Comments (If "Compliance = N" then Proposer must provide an explanation in this column)
976	The third-party Software Documentation shall be provided by the Contractor in a standard and organized format, with appropriate labels, tabs and cross references to allow NCTA to easily access and reference information on each Software component on the System.		
5.4.12.2.	*Third-Party Hardware Documentation*		
977	The Contractor shall provide third-party Hardware Documentation, including but not limited to:		
	a) all technical manuals;		
	b) operator's guides;		
	c) installation guides;		
	d) warranty Documentation;		
	e) Hardware reference manuals;		
	f) available options and versions;		
	g) catalogs, components; and		
	h) illustrated parts lists.		
978	The Contractor shall provide all third-party Hardware Documentation in a standard and organized format, with appropriate labels, tabs and cross references to allow NCTA to easily access and reference Hardware information on each Equipment component.		
979	Third-party Hardware Documentation shall include sufficient detail to describe the configuration of the Hardware as it was installed by the Contractor for the Roadway System.		
5.5	**Manual Requirements**		
	Various manuals shall be provided as described below to allow NCTA to understand the Operations of the RTCS, including the Roadside System and RSS. New manuals developed under this Contract that are not standard commercial catalogs or manuals, shall meet the Requirements set forth in this section.		
980	The Contractor shall submit the Project manuals to NCTA for review and Approval in accordance with the Approved Project Schedule.		
981	Whenever possible, all data shall be printed on 8-1/2" x 11" sheets; foldouts shall be 11" x 17".		
982	Each manual shall include, but not be limited to:		
	a) a title sheet;		
	b) revision history;		
	c) table of contents;		
	d) list of illustrations (if applicable);		
	e) list of reference drawings and Exhibits (if applicable); and		
	f) a parts list (if applicable).		
983	All manuals shall have a consistent look and feel and shall be professionally written and presented in clear and organized fashion.		
984	All manuals prepared for NCTA under this Contract shall be produced, or editable, using Microsoft Office 2010 Suite (or higher). In addition, electronic copies of manuals shall be provided in native file format and unsecured PDF, if requested by NCTA.		
985	Any special Software required to produce scalable typefaces or other graphs shall be provided by the Contractor as part of the Documentation for the manuals.		
5.5.1	Manual Submissions and Quantities		
986	The Contractor shall submit hard copies of manuals to NCTA in the quantities listed in the table below.		
987	The Contractor shall submit electronic copies of all manuals listed below.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
988	All manuals shall be maintained in electronic format in the Contractor's document management System.		
989	The Contractor shall be responsible for producing an additional quantity of the manuals for the Contractor's use, sufficient to fulfill the Contractor's Requirements under the Contract.		
5.5.2	Manuals to be Submitted		
5.5.2.1.	*RTCS System Maintenance Manual*		
990	The Contractor shall submit RTCS System Maintenance Manual prepared for properly trained technical personnel assigned to the Maintenance of the Hardware and Software installed under this Contract.		
991	The Roadway System Maintenance Manual shall document information required to support Roadside Maintenance and repair activities, including but not limited to:		
	a) lane Equipment layout for each Tolling Location Type;		
	b) schematics and layouts of the Hardware in the lane cabinets, Equipment racks and the interconnection diagrams;		
	c) parts lists required to service each piece of Hardware installed under this Contract;		
	d) general and detailed description and concepts of lane Operations and functions;		
	e) detailed lane monitoring activities, specialty tools and schedule;		
	f) detailed Software monitoring activities and troubleshooting procedures;		
	g) Maintenance instructions to repair and replace parts and modules;		
	h) mechanical functions and installation of all Hardware;		
	i) listing of all event and error logs;		
	j) testing and basic troubleshooting procedures; and		
	k) Preventative, pervasive and corrective Maintenance procedures.		
992	The RTCS System Maintenance Manual shall document information required to support RSS monitoring, including but not limited to:		
	l) all Dashboards, monitoring screens, notifications and data that needs to be checked;		
	m) listing of all jobs/process, their dependencies and their schedule;		
	n) listing of all folders and directories that need to be checked;		
	o) details related to the activity that needs to be checked;		
	p) frequency of the validations;		
	q) actions to take when results are not as expected;		
	r) notification and escalation process;		
	s) basic troubleshooting procedures; and		
	t) creation of work orders in MOMS.		
993	Provide description about the tools and Software for personnel to record the monitoring activity and instructions to use the tools/Software.		
994	The RTCS System Maintenance Manual shall document information required to support RSS Maintenance and repair activities including but not limited to:		
	a) detailed Hardware Maintenance activities and schedule;		
	b) detailed database Maintenance activities and schedule;		
	c) detailed Software monitoring activities and schedule;		
	d) detailed monitoring procedures for file transfers and exception handling;		
	e) detailed procedures and processes for all Maintenance activities;		
	f) detailed procedures for backup, archiving and purging of data;		
	g) detailed procedures for testing DR systems;		

No.	Requirements	Required Inputs: Compliance (Y - Yes, N - No)	Required Inputs: Comments (If "Compliance = N" then Proposer must provide an explanation in this column)
	h) detailed schedule for desktop and peripheral preventive Maintenance activities;		
	i) detailed schedule for all preventative Maintenance activities;		
	j) technical contact lists for all external interfaces and NCTA system integrators;		
	k) technical contact lists for Hardware and Software providers; and		
	l) details and copies of all third-party System support agreements.		
995	Standard service manuals for commercial products used for the Equipment shall be acceptable if they contain sufficient information to properly service the Equipment.		
996	Large-size logic diagrams and mechanical assembly diagrams do not have to be reduced or incorporated into the manuals if these drawings are provided with the manuals and presented in a useable and durable form.		
997	Photographic Documentation of Equipment with appropriate labels and call-outs are satisfactory if they contain sufficient information to properly identify components, parts and features.		
5.5.2.2.	*Standard Operating Procedures for Image Review*		
998	Standard Operating Procedures shall provide a description of the policies and detailed, step-by-step procedures for every task that the image review personnel have to perform in the operation of the System. Screen shots shall be included in the detailed description of the task.		
999	Standard Operating Procedures shall integrate the Roadway System application with the associated manual procedures required to fully complete each task, including but not limited to:		
	a) Image review clerk activities;		
	b) Image review supervisor activities;		
	c) Image review QA management;		
	d) audit and reconciliation; and		
	e) Operations monitoring.		
5.5.2.3.	*Reconciliation and Audit Manual*		
1000	The Reconciliation and Audit Manual shall detail all procedures used to reconcile the System and audit the toll Operations.		
1001	The reconciliation of electronic transactions and revenue within the System and reconciliation of transactions to the existing NCTA CSC Back Office shall be fully described.		
1002	Investigation of variances, discrepancies and exceptions processing shall be described.		
1003	A detailed description of the screens, reports, and functions shall be provided that will allow a qualified auditor to access, understand and work with the all financial aspects of the System.		
1004	A complete description of all audit procedures and a non-technical description of the screens, reports, and functions shall be provided.		
1005	The manual shall contain illustrations and pictorial diagrams to demonstrate the step-by-step Operations required for performing the audit and reconciliation functions.		
1006	The manual shall contain Quality Control and audit procedures to ensure Systems, Maintenance, and Operations meet the Performance Requirements.		
1007	Samples of all reports shall be included in an attachment to the manual with any specific instructions that may be applicable to a given report. Reports included in the Submittal shall have correct and accurate data and this manual shall be used to train the auditors validate the System.		
5.5.2.4.	*Roadway Support System (RSS) Administrators Manual*		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
1008	The Contractor shall provide an RSS Administration Manual that serves as a guide to the overall management and administration of the RSS and shall include:		
	a) description of the programs and processes that need to be monitored to ensure that the System is operational;		
	b) procedures for validating tasks, processes and jobs have successfully completed, and errors and exceptions encountered;		
	c) procedures for validating the successful transfer and receipt of files for all interfaces, including RSS and existing NCTA CSC Back Office;		
	d) a listing of all the error codes, their meaning and potential associated problems shall be included in the manual, with a step by step guide to troubleshooting and correcting the problem, including any specialty tools and/or software currently in use to debug, validate and correct the problem;		
	e) all database Design, and database Maintenance activities required to keep the System operational shall also be clearly documented, including the scheduling of such activities;		
	f) detailed procedures for backup, archiving and purging data;		
	g) detailed schedule for all preventative Maintenance activities;		
	h) technical contact lists for Hardware and Software providers;		
	i) detailed procedures for monitoring System security;		
	j) details and copies of all third-party System support agreements;		
	k) ad-hoc reporting tools and use of the tools to generate ad-hoc reports shall be documented; and		
	l) details of monitoring tools supplied by the Contractor to include but not limited to Roadway and MOMS Dashboards and MOMS.		
5.5.2.5.	*RTCS System User Manual*		
	The Contractor shall develop and provide a comprehensive set of System Documentation and user manuals for the RTCS System users. At a minimum, the Documentation shall include all user and training manuals, screen layouts, reports definitions and data flow diagrams.		
1009	The Contractor shall develop and submit RTCS System User Manuals to be used by NCTA staff to operate the toll collection System and for training purposes.		
1010	The Contractor shall develop a separate manual for each job category that details all the processes, procedures and policies developed by the Contractor and Approved by NCTA required to fulfill the Requirements of each specific job description.		
1011	The manual shall include screen images detailing the step-by-step activities that need to be completed in order to fulfill a specific functionality.		
1012	The manual shall not include any information that could jeopardize the integrity of toll Operations or the toll collection System.		
1013	Each User Manual shall include but not be limited to:		
	a) step-by-step actions to take to complete an operation;		
	b) screen images detailing the step-by-step activities needed to fulfill a specific functionality;		
	c) flowcharts to provide NCTA staff a clear understanding of the workflow;		
	d) all screens, reports and data fields, clearly explained using sample formats applicable to the RSS; and		
	e) samples of all reports, included in the manual or as an attachment to the manual, with any specific instructions that may apply to a given report.		
5.5.3	As-Built Documentation		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	Prior to NCTA Acceptance of each Roadway, As-Built Documentation shall be provided that documents the final Roadway System Design and implementation.		
5.5.3.1.	*System Detailed Design Document*		
1014	After the Approval of the Operational and Acceptance Test for each Roadway and prior to NCTA Acceptance of the RTCS System, the Contractor shall submit the As-Built SDDD that includes all Software and Hardware changes made during the System development, implementation, and testing phases.		
1015	The Contractor shall submit two (2) hard copies in addition to the electronic version of the As-Built SDDD.		
5.5.3.2.	*As-Built Drawings*		
1016	The Contractor shall provide to NCTA a complete set of As-Built Drawings which shall be delivered as two (2) full-size and five (5) half-size complete sets of prints, and shall deliver the same in electronic format for all Equipment installed and furnished under this Contract.		
1017	As material changes are made to the System the Contractor shall update the As-Built Drawings to reflect the current status.		
1018	The sets shall include, but not be limited to:		
	a) all schematics;		
	b) logic diagrams;		
	c) layouts;		
	d) wiring diagrams;		
	e) interconnection diagrams;		
	f) all attachment Hardware details;		
	g) installation diagrams;		
	h) cable schedule;		
	i) Interface details;		
	j) facility build-out details; and		
	k) network diagrams, so as to provide a complete record of the As-Built status of the Equipment.		
1019	All drawing revisions to standard commercial assemblies or components of the Equipment shall be included in the As-Built Drawing set.		
1020	All As-Built Drawings shall contain a table of contents that shall include a listing of all drawings with headings for drawing number, drawing title, revisions number and date, and the type of material list, wiring diagram, wire list, specification control drawing, or similar categories.		
1021	The Contractor shall update the latest drawings with red lines as changes are incorporated during the installation process. At the completion of the installation, the Contractor shall gather all red line drawings.		
1022	The red line drawings shall be verified and incorporated into a final As-Built Drawing package. This final As-Built Drawing package shall include all updated installation drawings, shop drawings and sketches, Plans and other drawing types that were used to install the Roadway System.		
1023	All other Documentation used regarding the installation also shall be finalized and submitted as part of the As-Built Drawing Submittal.		
5.6	**Quality Assurance Program**		
	The Contractor shall establish and maintain an effective Quality Assurance (QA) program on all aspects of the Project to ensure compliance with the Contract. This Quality Assurance Plan will detail the process and procedures instituted by the Contractor to ensure the QA program is in place.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1024	The Contractor shall establish and maintain an effective Quality Assurance (QA) program that ensures adequate quality throughout all areas of Project Contract performance.		
1025	All supplies and Services under this Contract, whether manufactured or performed within the Contractor's facilities or at any other source, shall be controlled by the Contractor at all points necessary to ensure conformance to the Requirements of the Contract.		
1026	Purchase, delivery, verification, testing and assembly of Equipment, Hardware and Software conducted within the Contractor's facilities and onsite shall be controlled completely by the Contractor.		
1027	Delivery, verification, testing and assembly of Servers and network Equipment conducted within the Contractor's facilities shall be controlled completely by the Contractor.		
1028	The QA program shall provide for the prevention and early detection of discrepancies and for timely and positive corrective action.		
1029	The QA program shall include effective Quality Control of purchased materials and Subcontracted Work.		
1030	The Contractor shall make objective evidence of quality conformance readily available to NCTA, and NCTA shall have the right to review and verify the Contractor's compliance to the process.		
5.6.1	Records		
1031	The Contractor shall maintain records or data essential to providing objective evidence of quality until the expiration of the Contract and these records shall be made available to NCTA upon request.		
1032	Quality-related records and data shall include but not be limited to:		
	a) inspection and test results;		
	b) records of Subcontractor QA programs;		
	c) cost records pertinent to Acceptance of nonconforming material;		
	d) inspection check-off of Constructor work;		
	e) change request Documentation;		
	f) Design reviews and walkthroughs; and		
	g) results of internal and Contractor audits.		
1033	Records shall be maintained in a manner that allows for easy access and analysis of the status of the overall QA Program.		
5.6.2	Control of Purchase		
1034	The Contractor shall be responsible for ensuring that all supplies, components, developmental tools, assemblies, subassemblies, and Services procured from Subcontractors and vendors conform to the technical requirements and Contract.		
1035	The Contractor shall have a Quality Control process in place for tracking and handling non-conforming Equipment and products.		
1036	The Contractor's responsibility includes the establishment of procedures for the selection of qualified Suppliers. In selecting qualified Suppliers, the Contractor shall ensure that the Subcontractors and vendors control the quality of the supplies and Services provided.		
5.6.3	Handling, Storage and Delivery		
1037	The Contractor shall document the approach to assembly of the Equipment, including the location where Equipment and Systems are assembled.		
1038	The Contractor's QA Program shall provide for adequate and documented handling, storage, preservation, packaging, and shipping instructions to protect the quality of products.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1039	All NCTA assets shall be tracked and entered into the MOMS inventory and the location of each asset shall be recorded.		
1040	Any unique or special Requirements applicable to procured items shall be delineated in the procurement documents. All procurement documents shall be made available to NCTA upon request.		
5.6.4	Inspection at Subcontractor-Vendor Facilities		
1041	NCTA reserves the right to inspect, at the source, supplies or Services not fabricated or performed within the Contractor's facility.		
1042	NCTA's inspection shall not constitute Acceptance, nor shall it in any way replace the Contractor's inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.		
5.6.5	Access to/Inspection of Contractor's Facilities		
1043	Upon request, NCTA or its designated representative shall have access to the Contractor's facilities and personnel.		
1044	This access may be restricted to those portions of the facilities and personnel involved with or who are otherwise performing Work under this Contract.		
1045	Such access shall be for the purpose of inspecting the facilities; verifying progress; inspection of materials; Work-in-progress; or finished goods, or verifying test performance or results.		
1046	NCTA's inspection shall not constitute Acceptance or Approval, nor shall it in any way replace the Contractor's inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.		
5.7	**Training**		
	The Contractor shall provide comprehensive training for all aspects of the RTCS System, including but not limited to the Operations, System monitoring, problem detection and resolution, reconciliation and audit, and Maintenance of the RTCS. The training program will recognize and incorporate the plan for NCTA to operate the toll collection System. As such NCTA Operations staff will be fully trained to successfully perform all aspects of the toll collection Operations.		
5.7.1	Overview of Training Program		
1047	The Contractor shall be solely responsible for supplying all items necessary, including but not limited to training Documentation, Software, Hardware and any other Equipment required to complete the delivery of the training program.		
1048	The Contractor's program shall include but not be limited to instruction, models/devices, manuals, diagrams and component manuals and catalogs as required.		
1049	Where practical and useful, the Contractor's training shall be hands on and use actual Hardware and Software in the training environment.		
1050	The Contractor shall produce all training materials and manuals in hard copies sufficient to provide one (1) reproducible set of the latest Documentation in electronic form to be used and printed for future training sessions.		
1051	The Contractor shall ensure NCTA or their representatives have the right to attend any training sessions and to make recordings and copies of all training program materials for their use in training new employees.		
1052	The Contractor shall obtain releases from all employees/Subcontractors to allow unlimited, royalty free use and copies of PII compliant recordings and provide the same to NCTA upon request.		
5.7.2	Training Requirements		

No.	Requirements	Required Inputs	
		Compliance	Comments
		Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1053	The Contractor shall provide the training courses listed below for NCTA's personnel in accordance with the Approved Training Plan, including but not limited to the provision of all training manuals (including Contractor- provided manuals or relevant portions thereof), guides, training aids, as well as student and instructor work books accompanying the courses listed in the sections below.		
1054	NCTA may require additional courses be offered or additional personnel be provided training. The Contractor shall accommodate these requests to the extent possible with onsite personnel and Documentation that is readily available.		
1055	Lane level training shall include toll collection training and an overview of toll Operations and lane peripherals and creation of transaction data and their flow through the System.		
1056	All RSS training shall include a review and description of each of the appropriate RSS processes and procedures with actual RSS Software. All students shall have their own workstation and interact directly with the training environment.		
5.7.2.1.	*System Operation Overview*		
1057	The Contractor shall provide a System operation overview training course for NCTA's management personnel who require a general understanding of all aspects of the operation, including but not limited to personnel from senior management, procurement, information technology, marketing and public information.		
1058	The System Operations training shall include an overview of all aspects of the RTCS and RSS including System architecture, roadside devices, lane Operations, security access and monitoring, RSS Operations, DVAS, MOMS, System Operations, interface to the existing NCTA CSC Back Office network, and any other operational area of the RTCS.		
1059	System Operation Overview training will be conducted in one session with a class size of up to ten (10) people, for a minimum of four (4) hours.		
5.7.2.2.	*Audit and Reconciliation and Roadway Support System (RSS) Operations*		
1060	The Contractor shall provide an audit and reconciliation training course for NCTA's Operations and auditing staff to understand all aspects of the operation, particularly those related to audit and reconciliation.		
1061	Training shall include step-by-step description of the use of the System application to perform the audit and reconciliation functions.		
1062	Course shall include training all personnel who require a detailed understanding of the Operations of the RSS and how to access and view information and reports from the System on items such as status, alarms, performance, transactions and revenue.		
1063	Audit and reconciliation and Operations training will be conducted in one (1) session with a class size of up to five (5) people, for a minimum of four (4) hours.		
5.7.2.3.	*Image Review Operations*		
1064	The Image Review Operations training shall be attended by Contractor staff responsible for the manual image review and verification of the ICPS transactions, including image review clerks, supervisors, and QA staff. NCTA Operations staff will also attend these class sessions. The training shall include instruction, review and description of the processes and procedures relating to image review Operations activities to ensure that Image Review Performance Requirements are met. A training RSS and sufficient workstations for each training participant shall be used to create real-life examples to reinforce the training activity.		
1065	Multiple sessions of this course, at varying times to accommodate different shifts, will be required with a class size of up to 12 (twelve) people with a minimum of eight (8) hours per training class.		
5.7.2.4.	*RTCS Maintenance*		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
1066	To be attended by all Maintenance personnel and NCTA/NCDOT staff who require a detailed understanding of the Maintenance and troubleshooting for the RTCS, including the Roadside System and RSS (Toll Host System, DVAS, MOMS, Image Servers, etc.). Training shall be a combination of class room and on the job training (OJT).		
1067	RTCS System Maintenance training will be conducted in two (2) sessions with a class size of up to eight (8) people, for a minimum of forty (40) hours per session.		
5.7.2.5.	*System Monitoring and Roadway Support System (RSS) Administration*		
1068	The Contractor shall provide a System Monitoring and Administration training course for all personnel who require a detailed understanding of the System monitoring functions and management and administration of the interfaces, Software, database, applications, configurations and architecture of the RSS.		
1069	The Contractor shall provide various training programs that include but are not limited to:		
	a) an in-depth explanation of the System Operations, including all Interfaces, file/data transfers and interconnections;		
	b) functions of the monitoring and tools used to manage monitoring tasks;		
	c) functions of the DVAS;		
	d) functions of the MOMS;		
	e) RSS logs, error logs and processing of exceptions;		
	f) System dataflow and workflow queues;		
	g) explanation of the Dashboard data and analysis;		
	h) special use and monitoring tools; and		
	i) queries and reports.		
1070	System Monitoring and RSS Administration training will be conducted in one (1) session with a class size of up to five (5) people, for a minimum of eight (8) hours.		
1071	The Contractor shall ensure the System monitoring staff are properly trained in the Requirements of monitoring the RTCS and its uninterrupted Operations.		
1072	The Contractor shall provide a minimum of one (1) week of classroom and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned monitoring duties.		
1073	The Contractor shall provide Documentation this initial training has been successfully completed.		
1074	All System monitoring personnel shall attend the training sessions. NCTA's technical staff also shall attend all training sessions.		
1075	The Contractor shall keep accurate training records on all Maintenance and Software support services personnel. NCTA shall be permitted to review and verify Maintenance and Software support services personnel qualifications and training records at any time. Evidence of completion of training by Contractor personnel shall be provided to NCTA upon request.		
5.7.3	Training Facilities		
1076	The Contractor shall conduct training at classroom facilities provided by the Contractor and Approved by NCTA. Following review of Contractor's Training Plan, NCTA will confirm that it has the requisite space to accommodate the level of effort and physical requirements for each training session.		
5.7.4	Scheduling and Preparation for Training		
1077	It shall be the Contractor's responsibility to provide sufficient notice to NCTA on the types of training it will provide and the timing for each training session. NCTA will identify a list of participants that Contractor shall notify to schedule their participation in the training.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1078	The Contractor shall perform all scheduling activities and shall make every attempt necessary to accommodate the maximum number of persons for each training session given scheduling conflicts. Contractor shall provide sufficient notice to allow participants a reasonable lead time.		
1079	The Contractor shall notify NCTA of the dates or range of dates it would like to hold a training session at the NCTA offices and shall coordinate with the NCDOT IT office and Administrative services staff to arrange the proper classroom setting and computer Hardware and Software are installed and the space configured for each training session.		
5.7.5	Training Materials		
1080	Draft copies of all training materials shall be submitted to NCTA for review, comment and Approval, prior to final printing of quantities required for training.		
1081	NCTA shall have the right to require additional interim drafts at no additional cost should draft training materials submitted not be of adequate quality or have missing or incorrect information.		
1082	For each course described in the section above, Contractor shall provide the materials listed below.		
5.7.5.1.	*Instructor Guides*		
1083	The Contractor shall provide an instructor guide for each training course. The guide shall include the following elements:		
	a) course agenda;		
	b) course objective;		
	c) procedures for managing training session;		
	d) resource and facilities required, including laptops, power and communications requirements;		
	e) detailed lesson plans;		
	f) a description of training aids and items to aid in on the job performance (e.g., where applicable, pocket guides or reference sheets);		
	g) test to be administered to assure satisfactory completion;		
	h) instructions for using any audio-visual support Equipment or materials; and		
	i) student survey to obtain feedback on the training sessions and the training materials.		
5.7.5.2.	*Training Aids/Devices*		
1084	The Contractor shall provide training aids such as mock-ups, scale models, overhead displays, video demonstrations, and simulations as are necessary to successfully complete the course agenda and meet the course objective.		
1085	The Contractor shall provide all the System devices and Hardware required for the training.		
1086	The Contractor shall provide users a way to access training documents, aids and tips in an online, electronic format.		
5.7.5.3.	*Student Workbook*		
1087	For each course, the Contractor shall provide a student workbook, including but not limited to:		
	a) course agenda;		
	b) course objectives;		
	c) schedule of sessions;		
	d) copies of all overheads and visuals; and		
	e) lesson outlines and summaries.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1088	Materials such as Operations and user manuals may be used to supplement the material provided in the student workbook.		
1089	To the extent that the user manuals (and training aids) are appropriately detailed and fit for training purposes they shall be used for training. If NCTA deems they are not sufficiently detail then supplementary training material shall be provided.		
1090	If such material is used appropriate cross-references shall be included in the Student Workbook so as to identify the complete set of training materials provided to the student.		
5.7.6	Training Room Set-up and Software Installation		
1091	Contractor shall be responsible for loading any special Software required on the classroom computers (provided by the Contractor).		
1092	It is the Contractor's responsibility to ensure that the Software is operating as expected on each of the classroom computers.		
1093	It is the Contractor's responsibility to ensure that appropriate communications are in place and devices are functioning prior to the start of the training.		

No.	Requirements	Required Inputs: Compliance (Y - Yes, N - No)	Required Inputs: Comments (If "Compliance = N" then Proposer must provide an explanation in this column)
6. ROADWAY SYSTEM TESTING REQUIREMENTS			
6.1 Roadway System Testing Concept			
	NCTA is planning a Roadway Project Phased Approach to deploying the new toll collection System on the NCTA Roadways with the implementation of Triangle Expressway, Morrisville Parkway Interchange, and Complete 540. The implementation of other potential Toll Facilities occurring later if the option is exercised. Given the extended duration of the Project, and the potential differences in the various Roadway System solutions, the Contractor shall conduct the following tests if the option to implement each optional Toll Facility is exercised.		
1094	Various tests (outlined for reference immediately below and with detailed Requirements in subsequent sections) shall be prepared and conducted by the Contractor on all Roadways, including but not limited to:		
	a) Triangle Expressway		
	o FAT		
	o OIT		
	o Installation and Commissioning Test		
	o Operational and Acceptance test		
	b) Complete 540		
	o FAT		
	o OIT		
	o Installation and Commissioning Test		
	o Operational and Acceptance test		
6.1.1 General			
	The Requirements described in this section detail the labor, materials, facility, and support Services necessary to test the RTCS Roadside Systems and RSS and its interface to the existing NCTA CSC Back Office.		
	The Contractor shall prepare and conduct tests that validate adherence to the Requirements that guided its Design and development, compliance to Approved Design and Business Rules and demonstrate the RTCS functionality.		
1095	The Contractor shall be responsible for all aspects of testing performed as part of the Contract and to provide all necessary resources and facilities to conduct all tests including but not limited to:		
	a) test support personnel;		
	b) vehicles and drivers;		
	c) test transponders;		
	d) test facilities;		
	e) test Equipment, tools and safety devices;		
	f) test schedule and test sequence;		
	g) coordination with NCTA and existing system integrators;		
	h) coordination of lane closures and MOT; and		
	i) conducting the test.		
	The Contractor shall to the extent possible, develop and use specialized automated testing Software to, including but not limited to:		
	a) create test scripts;		
	b) control the automated testing;		
	c) exercise all conditions, configurations and scenarios;		
	d) conduct performance testing;		
	e) conduct security testing;		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1096	f) conduct regression testing;		
	g) compare actual test outcomes to expected outcomes;		
	h) test reporting;		
	i) conduct load testing;		
	j) conduct user Interface testing;		
	k) conduct stress testing;		
	l) WAN / MAN / LAN traffic testing;		
	m) conduct sustained operational testing; and		
	n) conduct sustained burn-in testing.		
1097	The Contractor shall provide a defect tracking system, accessible by NCTA, to document and track all defects identified as part of RTCS testing and any subsequent actions taken to correct and retest those defects.		
1098	The defect tracking system shall be capable of the following, including but not limited to:		
	a) rating (severity) defects;		
	b) categorizing defects;		
	c) prioritizing defects;		
	d) logging the date/time the defect was reported;		
	e) subsystems and test cases impacted by the defect;		
	f) the user who reported the defect;		
	g) the erroneous behavior;		
	h) the details on how to reproduce the defect;		
	i) the developers who worked on the defect and corrective action taken;		
	j) date the defect was corrected and formally re-tested;		
	k) life-cycle tracking; and		
	l) reporting.		
6.1.2	Master Test Plan		
1099	The Contractor shall provide to NCTA, for review, comment and final Approval a Master Test Plan that outlines the scope and testing concepts to be used to validate the RTCS compliance to the Requirements in the Contract and integration to the existing NCTA CSC Back Office.		
1100	The Approved Master Test Plan shall be used as the basis for the detailed test procedures that shall be submitted to NCTA for review and Approval.		
1101	The Master Test Plan shall cover all aspects of the RTCS Roadside and RSS testing from initial development through deployment, Roadway System Acceptance and Project Acceptance as defined in the Approved Master Test Plan document as described in section 5.4.8.		
6.1.3	Testing Sequence and Logistics		
1102	The Contractor shall obtain Approval from NCTA and shall have met the entry conditions prior to start of each test, including but not limited to:		
	a) Approval of all predecessor tests;		
	b) Approved test procedures for each individual test;		
	c) Approved test schedule;		
	d) successful closeout of all outstanding pre-test issues;		
	e) successful dry run testing with results provided to NCTA;		
	f) Submittal of the latest Approved version of the RTM showing test validation against the Requirements; and		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	g) confirmation that both the site(s) and System are ready for testing.		
1103	After the completion of each test, the Contractor shall submit for NCTA's review and Approval a test report that documents the results of the test.		
1104	The test report shall address the following, including but not limited to:		
	a) the test summary;		
	b) the results of each test case;		
	c) any anomalies and issues identified;		
	d) the corrective action/resolution of each item;		
	e) the test data;		
	f) calculations and back-up data supporting compliance to Requirements;		
	g) comments provided by NCTA; and		
	h) the results of any re-tests necessary to successfully complete each testing phase		
1105	NCTA shall participate in the testing and witness each test. NCTA shall have full access to the test data and results of the test.		
1106	Testing will not be considered complete by NCTA until all anomalies and "punch-list" items are closed-out, and the final test report is Approved by NCTA.		
1107	Testing shall occur in the following order, subject to NCTA's Approval of the final Master Test Plan and shall include the following tests for each facility transition at a minimum:		
	a) Factory Acceptance Test (FAT)		
	b) Onsite Installation Test (OIT) (also may be referred to as Site Acceptance Test)		
	c) Installation and Commissioning Test		
	d) Operational and Acceptance Test		
6.2	**Factory Acceptance Test (FAT)**		
1108	A separate and distinct FAT shall be conducted by the Contractor for each solution configuration required by each of the respective Projects and schedule, including the Triangle Expressway and Complete 540 Projects.		
1109	The FAT shall be conducted by the Contractor at the Contractor's facility in actual lanes with the complete test RTCS System in accordance with the Approved MTP described in Section 5.4.8 Master Test Plan (MTP), detailed testing procedures and Project schedule.		
1110	The test configuration shall be representative of the Contractor's AET Facility solutions for each lane configuration as required by each of the respective Projects.		
1111	The FAT shall be conducted by the Contractor to verify that all functional elements of the RTCS System are in conformance with the Contract Requirements.		
1112	Upon the successful completion of the FAT exit criteria and Approval of the FAT by NCTA, the Contractor shall be given the authorization to move forward to the Onsite Installation Test (OIT) at the selected Tolling Locations.		
1113	The FAT shall validate that the Roadway System Hardware meets the Requirements of the Contract including but not limited to:		
	a) 72-hour burn-in testing for customized and assembled Hardware and		
	b) Certification of Hardware compliance to environmental Requirements.		
	The FAT shall validate that the Roadside System meets the Requirements of the Contract including but not limited to:		
	a) accurate assignment and proper framing of each vehicle through various traffic conditions and test scenarios;		
	b) accurate capture of images and association of Transponders and images to the correct vehicles;		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
1114	c) accurate classification of vehicles, assessment of fare and processing of the transaction;		
	d) compliance to accuracy Requirements;		
	e) all exception processing Requirements;		
	f) correct application of Business Rules;		
	g) degraded mode scenarios;		
	h) all device failure conditions;		
	i) rush-hour traffic scenarios;		
	j) redundancy;		
	k) mobile enforcement Requirements;		
	l) DVAS capabilities;		
	m) throughput and load testing using simulated data;		
	n) interface to the RSS, ACSMS, and CEMS; and		
	o) transaction and image reconciliation.		
1115	The FAT shall validate that the RSS meets the Requirements of the Contract including but not limited to:		
	a) user interface and compliance to user interface standards;		
	b) facility Dashboard and monitoring;		
	c) Roadway Dashboards;		
	d) RSS functions;		
	e) Image review capabilities;		
	f) DVAS capabilities;		
	g) MOMS;		
	h) transaction audit;		
	i) correct application of Business Rules;		
	j) System performance;		
	k) reporting;		
	l) redundancy;		
	m) System loading;		
	n) compliance of RSS interface to Approved ICDs; and		
	o) OCR/ALPR (if applicable).		
6.3	**Onsite Installation Test (OIT)**		
1116	The OIT shall be conducted by the Contractor for each lane configuration at the onsite locations identified by NCTA in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1117	The OIT shall verify the full functionality of the RTCS System and its compliance with the Contract Requirements and the Approved Design in a controlled, onsite environment using transactions created during both live Operations and when lanes are closed to traffic.		
1118	The testing shall not interfere with the existing NCTA System.		
1119	Before the commencement of OIT, all Equipment and Software that are required under the Contract shall be in place, in a production environment and configured for revenue Operations. The RTCS interfaces to the existing NCTA CSC Back Office shall be connected to the respective test environments as Approved by NCTA.		
1120	In order to test the full functionality of the MOMS and System Monitoring during OIT, all Equipment shall be entered into the System prior to the start of OIT and the MOMS shall be configured for full Operations.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1121	The Contractor shall test the vehicle throughput and speed Requirements and generate sufficient transactions to prove the System can process transactions accurately and meet the Performance Requirements.		
1122	Performance Requirements shall be verified using a sample size Approved by NCTA.		
1123	The OIT shall validate that the RTCS meets the Requirements of the Contract including but not limited to:		
	a) Operations of in-lane Equipment and their ability to report failures to the MOMS including the UPS;		
	b) normal and exception processing using multi-vehicle traffic;		
	c) multi-lane multi-vehicle traffic conditions such as rush-hour traffic (bumper to bumper), vehicle straddling/changing lanes/merging;		
	d) accurate assignment and proper framing of each vehicle;		
	e) accurate capture and correct association of Transponders and images to the correct vehicle;		
	f) accurate classification of vehicles, assessment of fare and processing of the transaction;		
	g) transaction processing during Equipment failures, and degraded modes of operation;		
	h) Performance Requirements using live traffic and controlled vehicles;		
	i) redundancy;		
	j) receive and process comprehensive and incremental TSL, enforcement notification list and toll rate schedules;		
	k) DVAS functionality;		
	l) security access;		
	m) Interoperability using Interoperable test accounts;		
	n) lane Business Rules;		
	o) interface to the RSS, ACSMS, and CEMS; and		
	p) interface to the existing NCTA CSC Back Office System, and if applicable, to a new NCTA CSC Back Office System.		
1124	An Audit of the lanes shall be conducted using live traffic to verify that the RTCS is processing vehicles accurately and transactions can be reconciled in the System using the Approved audit tools.		
1125	The OIT shall validate that the RSS meets the Requirements of the Contract including but not limited to:		
	a) functionality of the RSS and MOMS Dashboards shall be verified as it applies to transactions, alarm and failure monitoring;		
	b) all failure conditions;		
	c) user interfaces and toll collection management functions;		
	d) RSS Business Rules;		
	e) reconciliation of transactions and revenue;		
	f) RSS reports;		
	g) Ad-hoc reporting capability;		
	h) accuracy of Performance Reports;		
	i) interface to the facility server (if applicable);		
	j) interface to the NCTA CSC Back Office System including reconciliation;		
	k) interface to the Roadside systems;		
	l) interface to the ACSMS and CEMS;		
	m) conformance with performance, load and stress test Requirements;		
	n) security Requirements;		

No.	Requirements	Required Inputs	
		Compliance	Comments
		Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	o) System backup Requirements;		
	p) archival and purging Requirements;		
	q) MOMS asset management; failure notification; work order tracking and performance reporting;		
	r) RSS redundancy Requirements; and		
	s) RSS DR Requirements.		
1126	As part of the OIT, an end-to-end testing shall be conducted that validates the following functionality, including but not limited to:		
	a) System's ability to process and post transactions to the RSS and on to the existing NCTA CSC Back Office;		
	b) The successful transfer of images from the Roadside Systems to the RSS, image review and on to the existing NCTA CSC Back Office;		
	c) Various transaction posting scenarios that verifies the transaction processing, transaction posting, disposition and reconciliation per the Business Rules; and		
	d) the RTCS System is configured for Go-Live.		
6.4	**Installation and Commissioning Test**		
1127	The Installation and Commissioning Test shall be conducted by the Contractor on each Toll Zone as a part of the Contractor's Roadway System installation in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1128	The Installation and Commissioning Test shall validate the functionality and operational status of the lanes including installation and configuration of all Equipment and Software. The lane Operations shall be verified end-to-end upon the completion of the installation checkout prior to opening the toll lanes and Equipment sites for revenue collection.		
1129	During the Installation and Commissioning Test every piece of in-lane Equipment and its interface to the lane/zone controller shall be verified to be fully operational. The lane/zone controller, its interface to the RSS and the security access system shall be validated to ensure that the interfaces are in place and the RTCS is ready for revenue collection.		
1130	An Installation and Commissioning Test shall be conducted on the RSS and shall include the interfaces to the existing NCTA CSC Back Office. All data identified for migration shall be migrated to the RSS in accordance the data migration plan. The Contractor shall support the possible Commissioning of the RSS prior to the Commissioning of the Roadside System.		
1131	A Commissioning test shall be conducted on the RSS and shall include the image server(s) and the interfaces to the existing NCTA CSC Back Office System.		
6.5	**RTCS Operational and Acceptance Test**		
1132	The RTCS Operational and Acceptance test shall be conducted by the Contractor at each Roadway Project Phase under this Project in accordance with the Approved MTP, detailed testing procedures and Project schedule after all lanes have been Commissioned in revenue collection.		
1133	The RTCS Operational and Acceptance Test shall be conducted for each Roadway upon authorization by NCTA to commence such testing. The RTCS shall be observed in live revenue Operations by the Contractor and NCTA for a minimum of two (2) monthly audit cycles.		
1134	The objective of the Roadway System Operational and Acceptance Test is to ensure that the RTCS System Software and Hardware functions over the test period with limited manual intervention in live Operations. It is intended to confirm that the Roadway System and the network are sized, tuned and configured correctly and data is processed without interruption or errors.		
1135	The RTCS Operational and Acceptance Test shall validate the interface of the RTCS System to the existing NCTA CSC Back Office, and reconcile the transactions and images end-to-end.		

No.	Requirements	Required Inputs	
		Compliance	Comments
		Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1136	During the test period, System accuracy, performance of the System and Operations shall be validated including:		
	a) all System accuracy Requirements specified in the Contract using representative sample size for each facility under test;		
	b) all Maintenance Performance Requirements;		
	c) all System Performance Requirements;		
	d) a two-hour vehicle audit during AM and PM peak hours for a total of four (4) hours on each lane at each Tolling Location in test;		
	e) transaction processing in accordance with NCTA Business Rules;		
	f) correct classification of vehicles and assignment of toll; and		
	g) monitoring of all interfaces for the accurate transfer and processing of all records.		
1137	System reliability and auditability shall be verified manually and through tools and reports provided in the System.		
1138	Dashboards and reports shall be verified daily for accuracy and reconciled to Operations and interface files. All exceptions shall be investigated. Queries and detailed reports shall be generated to validate the daily, weekly, monthly, yearly and comparative reports and compared to reports.		
1139	The alarms displayed on the MOMS and all interface status notification shall be verified to be accurate.		
1140	Failure of the Roadway System to meet a performance requirement shall result in the restart of that particular test until such time the accuracy Requirements are met.		
1141	The RTCS Operational and Acceptance Test shall be repeated until NCTA is satisfied that the RTCS meets the Contract Requirements as set forth in the Contract at each Roadway.		
6.5.1	Project Acceptance		
1142	Upon the successful completion of Operational and Acceptance Test for the RTCS for each Roadway of the Project, the closure of all punch-list items and completion and submission of all Contract required documents as set forth in the Contract, the Contractor shall be given the Project Acceptance as described in the Contract.		
6.6	**Performance Requirements - Testing**		
	The Contractor shall provide a RTCS that is Designed to meet the accuracy, performance and throughput Requirements set forth in this Scope of Work and Requirements. The testing logistics required to prove adherence to these Requirements shall be detailed in the Master Test Plan and the test procedures as set forth in the Scope of Work and Requirements.		
1143	The sample size for each requirement shall be the greater of N = log (1 - C) / log (A); or 20,000 transactions for the Operations test; where:		
	* N = Number in the sample		
	* C = Confidence level		
	* A = Accuracy		
	A value of 95% shall be used for the confidence level. Accuracy and confidence levels are expressed as decimals.		
6.6.1	General Accuracy Requirements		
1144	The Contractor shall provide a RTCS that meets the accuracy Requirements described below. The Contractor shall validate System compliance to the accuracy requirement by collecting data to the required sample size in live traffic Operations as described below for each requirement.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1145	Data collection shall include the use of live traffic and controlled vehicles intermingled with live traffic emulating normal Operations as specified below for each requirement.		
1146	Prior to the start of testing the System shall be confirmed to be fully operational and ready for testing. Transactions that fail to meet the Requirements shall be reviewed and audited and anomalies investigated.		
6.6.2	Transponder Capture Rate		
1147	A Transponder mounted in accordance with the manufacturer mounting instructions shall be captured by the AVI System under all conditions within the Design specification described in this Scope of Work and Requirements with an accuracy of 99.9 percent (no more than ten (10) missed reads or incorrect captures in ten thousand (10,000) equipped vehicle passages). Modifications to this AVI accuracy requirement may be required based on future implementation decisions required by the AVI System vendor and Approved by the NCTA.		
1148	This requirement applies to all facility types and Tolling Locations based upon the Transponder mix collected during the testing period for the given sample size. Testing shall require the use of controlled vehicles with known "good" Transponders intermixing with live traffic to create the required sample size.		
6.6.3	Transponder Reporting Accuracy		
1149	A Transponder that is detected and read by the AVI reader shall be reported to the zone controller with an accuracy of one hundred percent (100%) under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of Transponder reads collected during live traffic Operations.		
6.6.4	Vehicle Detection Accuracy		
1150	The zone controller shall detect and report all vehicles traveling through the Tolling Location with an accuracy of 99.99 percent under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of vehicle data collected during live traffic Operations.		
6.6.5	Transponder Association Accuracy		
1151	Every Transponder that is reported to the zone controller shall be assigned to the correct vehicle with an accuracy of 99.95 percent under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of controlled vehicles intermixing with live traffic.		
6.6.6	Vehicle Classification Accuracy		
1152	The zone controller shall classify all vehicles traveling through the Tolling Location in accordance with NCTA classification structure for each Toll Facility with an accuracy of 99.8 percent for AET Facilities under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of vehicle data collected during live traffic Operations.		
6.6.7	Image Capture Reporting Accuracy		
1153	The System shall capture, report and correctly associate an image to the correct vehicle as defined in NCTA Business Rules with an accuracy of 99.95 percent under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of vehicle data collected during live traffic Operations.		
6.6.8	Overall Image Quality		
1154	For images captured for Image-Based Transactions, 99.95% of the images that are included in the calculation, as defined below, shall have a human readable license plate, jurisdiction and plate type. For vehicles identified as requiring front plates the front image shall be used. Testing shall require the use of vehicle data collected during live traffic Operations.		
6.6.8.1.	*License Plates Excluded from the Accuracy Calculations*		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1155	A plate shall be considered excluded from the Accuracy calculation only when:		
	a) the vehicle has no plate;		
	b) plate is not in the normal camera field of view because it is not mounted in accordance with State laws;		
	c) the plate is covered by dirt, a trailer hitch, tailgate, or some other material such that the numbers/letters are not human readable; and		
	d) the plate is damaged so that numbers/letters are not human readable.		
6.6.9	Transaction Processing Requirements		
1156	All transactions generated by the zone controllers in accordance with the above accuracy Requirements shall be reported and transmitted to the RSS with an accuracy of 100% under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of vehicle data collected during live traffic Operations.		
6.6.10	False Read Processing		
1157	The false read processing (example cross lane reads and duplicate reads) shall be less than 0.001% of the Transponder transactions under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of vehicle data collected during live traffic Operations and test results will be verified by monitoring the existing NCTA CSC Back Office reported issues for accurate Account posting.		
6.6.11	Image Transmission Requirements		
1158	All image-based transactions and images from the RTCS shall be transmitted to the existing NCTA CSC Back Office System with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of vehicle data collected during live traffic Operations.		
6.6.12	AVI Transaction Transmission Requirements		
1159	All AVI transactions from the RTCS shall be transmitted to the existing NCTA CSC Back Office System with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of vehicle data collected during live traffic Operations.		
6.6.13	Transaction Transmission Requirements		
1160	All transactions from the RTCS shall be transmitted to the existing NCTA CSC Back Office with an accuracy of 100% under all conditions within the Design specification described in this Scope of Work and Requirements. Testing shall require the use of vehicle data collected during live traffic Operations.		
6.6.14	Audit and Reconciliation Requirements		
1161	100% of the transactions, images generated in the lanes and created on the RTCS shall be auditable and reconcilable through System Reports and the final transmission status and disposition of the transaction to the existing NCTA CSC Back Office shall be tracked and reported.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
7. MAINTENANCE AND SOFTWARE SUPPORT SERVICES			
	The Requirements described in this section detail the Hardware Maintenance and Software and Administrative Support Services for the Roadway System including any existing equipment integrated into the Contractor's solution (for example generators). The Hardware Maintenance and Software and Administrative Support Services ("Maintenance") include:		
	1. Hardware Maintenance Services for the RTCS Equipment, infrastructure and Hardware;		
	2. Network Maintenance Services for the Roadside Toll Collection System;		
	3. ITS Maintenance;		
	4. Toll Facility Maintenance;		
	5. RTCS System, Server and Database Administration Services, and		
	6. Software Support Services for the RTCS System.		
	The Contractor shall provide all Maintenance activities associated with the RTCS Maintenance and Software Support Services throughout the term of the Contract as further set forth in this Scope of Work and in **Section V, Terms and Conditions**.		
	The NCTA does not reimburse any Contractors for the cost of tolls incurred, nor will any "non-revenue" transponders be provided for the Contractor.		
	The Contractor shall be responsible for coordinating with the Constructor for any ITS equipment failures which occur during the manufacturer's warranty period for ITS elements provided by others.		
	The Contractor shall provide complete Maintenance Services for:		
	1. All Maintenance Work for a base period of up to 5 years and		
	2. All Maintenance Work for Two Optional 3-year periods.		
7.1 Roadway Maintenance Services – General Requirements			
1162	Hardware, Software and System Maintenance Services shall be for a period from Acceptance of the RTCS through the end of Contract Term (including extensions) as further set forth in **Section V, Terms and Conditions** with full warranties as further set forth therein.		
1163	The Contractor shall be responsible for supporting and maintaining the RTCS System for any time period in which the System is installed, Commissioned and placed into revenue service but has not passed required testing. The Maintenance of the RTCS provided under this Contract prior to Acceptance is not included in the term of the Maintenance and Software Support Services. The Contractor shall coordinate all Maintenance activities with NCTA during this period.		
1164	The Contractor shall provide a Software License and associated Escrow as further set forth in **Section V, Terms and Conditions**.		
1165	In the Operations and Maintenance Phase, Maintenance shall include all Services required to maintain the System, including Hardware, Equipment Software and components at the required performance levels. NCTA shall not be charged any additional amounts beyond those included in the Approved Price Proposal for all Services related to Maintenance; notwithstanding the foregoing, Force Majeure events shall be as set forth in the Contract as further set forth in **Section V, Terms and Conditions**.		
1166	All Equipment mounting Hardware and brackets provided as a part of this Scope of Work and Requirements shall be included under Maintenance Services and as such shall be warrantied for the life of the Project.		
1167	The Contractor shall provide one hundred (100) percent of the Roadside System and LAN, MAN, and WAN Maintenance Services.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
1168	The Contractor shall provide one hundred (100) percent of RSS Hardware, Software, Database and System Administration Maintenance Services including operating System and Software security Updates in coordination with NCTA.		
1169	The Services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with NCTA security and privacy Requirements. Contractor employees shall not discuss their Work with unauthorized personnel or any individuals not directly associated with NCTA.		
7.1.1	RTCS System Warranty Program		
1170	The Contractor shall be responsible for the development, implementation and administration of a Warranty Program for all Hardware, Contractor developed Software and third-party Software as further set forth in **Section V, Terms and Conditions**.		
1171	The Contractor shall maintain warranty records and service agreements for all Hardware including existing Hardware re-used by the Contractor and third-party Software, and shall review and implement Software Upgrades and available patch reports to keep the Roadway System current per the Approved Configuration Management Plan and as further set forth in **Section V, Terms and Conditions**.		
7.1.2	Detailed Maintenance Requirements		
	The Maintenance Services shall include monitoring; preventive; pervasive; corrective; security related and emergency Maintenance Services and certain Upgrades and Enhancements to be performed on all elements of the Roadway System.		
1172	Detailed assignments of Levels to incident types shall be in accordance with the Requirements and shall be defined and Approved during the Design phase of the Project.		
1173	The Contractor shall monitor MOMS work orders and initiate corrective actions to meet Requirements for response to Maintenance events and incidents that are under the Contractor's responsibility.		
1174	As part of the Software Support Services, the Contractor shall develop and test Software as required to accommodate corrective actions, changes to Business Rules or configurations. Scope shall include provision of Evidence Packages detailing the planned changes for NCTA's review and Approval, including installation of new Software and confirmation of successful installation per the Approved Configuration Management Plan.		
7.1.2.1.	*Maintenance Requirements*		
	The functions listed in this section are categorized as Maintenance tasks. Detailed listing of activities is described in Section 7.2.		
	All Maintenance incidents, activities and monitoring include but are not limited to:		
	a) monitoring the System for failures and alarms, and confirm a MOMS work order has been created for each failure as defined		
	b) acknowledging and responding to work orders assigned to the Contractor;		
	c) creation and assignment of a work order in MOMS if a work order has not been created;		
	d) performing the necessary Maintenance and closing the MOMS work order upon confirmation that the failure has been successfully corrected;		
	e) monitoring and Maintenance of the production, data warehouse and test environments;		
	f) Updates to Operating System and Software infrastructure in the production, data warehouse and test environments;		
	g) Performing Preventive Maintenance in accordance with an Approved Preventive Maintenance Plan.		
	h) general Equipment and Hardware Maintenance, replacement and spare parts inventory in MOMS;		
	i) general inspection and Maintenance of Roadside Infrastructure;		

No.	Requirements	Required Inputs	
		Compliance	Comments
		Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1175	j) Equipment and Hardware monitoring, Updates and general Maintenance and troubleshooting including diagnostic checks;		
	k) ongoing monitoring, Updates, Maintenance tasks related to roadside subsystems, Operations, controllers, servers and storage systems;		
	l) proactively addressing potential server and storage System Hardware issues;		
	m) Address and resolve third-party Software issues (OS, third-party, peripheral and infrastructure Software);		
	n) backup System monitoring (verification of successful backups), maintaining (applying Updates when needed) and managing (backup media rotation, offsite storage, etc.);		
	o) monitoring, updating and general Maintenance and troubleshooting of LAN communications and associated devices;		
	p) monitoring, updating and general Maintenance and troubleshooting of both active and redundant WAN/MAN communications and associated devices;		
	q) deployment of Roadway Systems Software to the production data warehouse and test environments;		
	r) maintaining the ongoing relationship (support and Maintenance agreements) with third-party vendors; and		
	s) performing Software licensing renewals.		
1176	Performance of all System administrative functions at regular intervals if not automated and recording and tracking such activities as preventive Maintenance work orders through MOMS.		
1177	Continuous monitoring of System Operations to verify System is functional; security posture is adequate; processes are being executed as scheduled; files are transmitted as specified, and System is operating to Contract Performance Requirements.		
1178	Manual retrieval of data from the zone controllers and download of Transponder status list and toll rate and schedule files in the event of extended communications failure.		
1179	Re-establishing or re-installing System files, programs and parameters, as required, following a failure or damage to the System and returning lanes to fully operational condition.		
1180	Performing Disaster Recovery (DR) procedures as needed and return lanes and RSS to fully operational condition when DR is initiated.		
1181	If OCR/ALPR is provided, continuously monitoring OCR/ALPR performance and performing OCR/ALPR Updates as required to support license plate changes.		
1182	Analyzing anomalies and periodic, daily and weekly trends to identify problems and initiating investigation and subsequent correction.		
1183	Additional Maintenance shall include but not be limited to the following:		
	a) Work orders and Alerts assigned to the Contractor as defined during the Design Phase.		
	b) development of defect fixes, security fixes, performance fixes and corrections to the Software and Applications as identified during audits;		
	c) Updates to all Software drivers to meet any new standard Operating System Upgrades as they become available;		
	d) Software changes required to accommodate changes to Business Rule, parameter changes, lane configurations and minor updates to existing ICDs;		
	e) source code Maintenance;		
	f) perform internal testing prior to releasing fixes to production;		
	g) ongoing Software Warranty Maintenance as set-forth in the Contract; and		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	h) change management and configuration management tasks prior to Software and Hardware changes.		
	i) (REQUIREMENT DELETED)		
7.1.3	Upgrades and Enhancements		
1184	The Contractor shall provide in electronic format all patches and Updates made to the System Software.		
1185	Upgrades and Enhancements shall be proposed by the Contractor or requested of the Contractor in accordance with the Change Order/Extra Work process as set forth in **Section V, Terms and Conditions**. Examples of Upgrades and Enhancements include but are not limited to: accommodating major changes to standards, statutes, or Interoperability Equipment or the addition of new Equipment or functionality providing demonstrable benefits in performance, costs or productivity.		
1186	Software modifications required to Maintain and support the RTCS System as a part of the normal course of business **shall not be** considered Upgrades or enhancements paid for by NCTA. These modifications include but are not limited to: version changes; configuration or parameter changes; minor changes to Software or code, such as changes to the existing ICDs; Software modifications required to ensure Roadway System is compliant to existing standards and changes for the Contractor's benefit that improve the Contractor's ability and efficiency to maintain and support the RTCS System.		
7.1.4	Software Deployment		
	The Contractor shall provide a reliable, repeatable, and easy-to-deploy method to update the RTCS Software and RSS Software in all lanes and environments as applicable.		
1187	The Contractor shall request Approval from NCTA prior to deploying any Software to the RTCS and RSS environments.		
1188	The Contractor deployment request shall include the purpose, risk level of the update/patch, primary point of contact, rollback process, and other relevant information, via a change request form.		
1189	The Contractor shall employ and apply industry standards for enterprise-grade Software deployment and shall provide Software Updates via easy-to-use executable installer files or similar.		
1190	The Contractor shall provide a wizard-like method so all aspects of the Software update process are encapsulated in a single automated installation package, avoiding requiring separate manual processes.		
1191	The Contractor shall provide an automated means for the installation to be verified ensuring that the version installed includes all appropriate Software elements (such as executable files, configuration files, components, libraries and registry entries) in place.		
1192	The Contractor shall provide full logging of the installation process so issues can be investigated.		
1193	The Contractor shall provide a seamless rollback feature as part of the Software installer that will automatically reverse the installation and restore its original version in the event a fatal error is encountered during the installation process.		
7.1.5	Maintenance Priorities, Response and Repair Times		
	Response and Repair time is defined as the combined time from when failure occurred or problem was reported to when the repair or correction of the failure occurred; the period of time beginning when the failure occurred (failure time) and ending when the fault condition is corrected and returned to normal Operations.		
1194	Response and repair times for every Maintenance event shall be recorded in the MOMS and reported and such reports shall be provided to NCTA in accordance with the reporting Requirements of this Scope of Work and Requirements.		
1195	The Contractor shall post a weekly schedule identifying personnel and times for onsite and on-call Maintenance. NCTA Approval is required for any change in Contractor staff. The Contractor shall provide to NCTA the updated active personnel list and contact information when there is a change in personnel.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
1196	Response to calls and repair times shall be determined by Priority as described below. Contractor failure to meet the response and repair time criteria described below shall result in monthly fee adjustments as specified in Section 8.		
1197	Regardless of coverage, onsite or on-call service, the Contractor shall acknowledge receipt of a Maintenance issue within MOMS within thirty (30) minutes after the failure notification was recorded or problem was reported.		
1198	The Priority of failures shall be defined during the Design phase. Time to respond and complete repair are determined by Priority and is defined as below.		
1199	Priority 1: Defined as any malfunction or fault that results in the immediate loss of revenue; security breach; closure of lanes outside of NCTA lane closure Requirements; hazard to personnel or driving public; loss of audit data; loss of functionality that impacts Interoperable Agencies or failure that negatively impacts the RTCS or RSS Operations.		
	a) For Roadside Systems Maintenance this Priority shall have a two (2) hour time to respond and complete repair.		
	b) For RSS Maintenance this Priority shall have a four (4) hour time to respond and complete repair.		
1200	Priority 2: Defined as any malfunction or fault that degrades the System performance but not the operational ability of the System. It includes, but is not limited to inaccurate reporting, inability to reconcile revenue or loss of System functionality that impacts access to data.		
	a) For Roadside Systems Maintenance this Priority shall have a four (4) hour time to respond and complete repair.		
	b) For RSS Maintenance this Priority shall have an eight (8) hour time to respond and complete repair.		
1201	Priority 3: Defined as any action or event that has the potential to result in a malfunction or degrading of the System performance, but has not impacted performance and is not anticipated to immediately impact performance, including, but not limited to loss of redundancy in any redundant System components.		
	a) For Roadside Systems Maintenance this Priority shall have a twenty four (24) hour time to respond and complete repair.		
	b) For RSS Maintenance this Priority shall have a forty eight (48) hour time to respond and complete repair.		
1202	Outages and tasks performed under the Approved Preventive Maintenance period shall be defined as Priority 4. The System shall be available and fully operational within the Approved time schedule for such activities and upon completion of the Preventive Maintenance period. Delays and problems associated with not completing scheduled Preventive Maintenance within the window specified may be included in the Performance Requirement Calculations. Any failures generated or resulting from Preventive Maintenance activities shall be accounted for as Priorities 1, 2 or 3 and be addressed in accordance with these Requirements.		
7.1.6	Notifications		
1203	The entry of a problem (either by the System or an Authorized User) into the MOMS or the presence of a failure notification shall constitute the start of the acknowledgment time for purposes of measuring the Contractor's acknowledgment time and response/repair time.		
	For purposes of measurement of performance and for the development of Maintenance policy and procedures, notification of System malfunctions, problems and discrepancies may be provided to the Contractor in three (3) different methods, summarized below.		
	a) Verbal notification: Defined as an in-person notification or telephone call to the Contractor's designated Maintenance personnel. In all cases, the first conversation with, or notification of the Contractor shall signify the start of the response time for purposes of measuring the Contractor's response time. All verbal notifications shall be recorded in MOMS by the Contractor.		

No.	Requirements	Required Inputs	
		Compliance	Comments
		Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1204	b) Written notification: Defined as a written description of a problem or condition, typically provided by NCTA or its representative. Written notification could be faxed, texted, or emailed to the Contractor by a customer or user. The time of receipt of fax, message or email shall signify the start of the response time for purposes of measuring the Contractor's response time. All written notifications shall be recorded in MOMS by the Contractor.		
	c) MOMS notification: Defined as an automatic notification through the MOMS identifying a problem within the Roadway System that is the Maintenance responsibility of the Contractor and sending out an automatic work order message by email or text to a Contractor's Maintenance staff to respond to the failure. In addition to the Contractor notification, the work order shall be posted on the MOMS and available via reports. The presence of a MOMS notification in the System shall constitute the start of the response time for purposes of measuring the Contractor's response time.		
	d) Generation of Alert: Defined as an automatic creation of an Alert identifying a problem within the Roadway System that is the Maintenance responsibility of the Contractor. The generation of the automatic Alert in the System shall constitute the start of the response time for purposes of measuring the Contractor's response time.		
1205	The Contractor shall provide the NCTA Traffic Management Center with any requests for lane closures to address emergency corrective repairs.		
7.1.7	Recording of Maintenance Activities		
1206	The Contractor and NCTA shall utilize the MOMS for initiating the work orders. MOMS shall be utilized for recording and tracking all Maintenance and Software Support Services performed on the Roadway System. All Equipment provided under this Contract shall be tracked through MOMS from the purchase to their disposal.		
1207	In all cases the Contractor is responsible for logging all reported Maintenance activities into the MOMS. The Contractor shall also be responsible for documenting all information and issues related to a failure condition, including all actions taken to complete the correction into the MOMS.		
1208	The work order shall contain as much information as possible in order for persons other than the technician or his supervisor to reasonably determine the fault, when it was worked on, the corrective action and any other information pertaining to the individual Maintenance event, including replacement of parts.		
1209	All performance metrics shall be recorded and tracked through the MOMS and compliance to Performance Requirements shall be validated using MOMS reports.		
1210	It is the Contractor's responsibility to ensure that its Maintenance staff has real time access to the MOMS and that all the required connections are established and ongoing to ensure that the Maintenance staff has secure remote access Approved by NCTA. Maintenance staff shall be trained in the use of the MOMS.		
7.1.8	Audits		
1211	The Contractor shall completely support NCTA in any audit activity relating to NCTA's Roadway System or Operations. In addition, the Contractor shall conduct audits in accordance with the Contractor's Quality Assurance Program. All deficiencies identified through the Audit process shall be successfully corrected by the Contractor. These audits may include, but are not limited to the following:		
	a) internal control procedures;		
	b) revenue/transaction reporting;		
	c) financial audit; and		
	d) System processing and performance.		
7.1.9	Security Certification		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1212	The Contractor shall perform monthly penetration and vulnerability tests that are scheduled in the MOMS, as well as every time a new Software release is deployed or new network Equipment is added or replaced to evaluate the security risk to the RTCS and identifying potential vulnerabilities. NCDOT IT Security shall be a party to these security tests and shall be notified in advance of any scheduled tests.		
1213	The Contractor is responsible for correcting all RTCS security deficiencies at the Contractor's cost and ensuring there are no security risks.		
7.1.10	Cooperation with Other Vendors and Providers		
1214	The Contractor shall cooperate to the fullest extent with other contractors and third-party vendors in order to ensure that the Roadway System operation and Maintenance do not conflict with or cause any deterrent in capability or service to the traveling public, customers, or NCTA.		
7.2	**Maintenance Responsibilities and Services**		
	This section details the Contractor's responsibilities for providing Maintenance Services and associated communications during this time period, including but not limited to:		
	· Roadside Equipment and Infrastructure Maintenance;		
	· System Hardware Maintenance (Servers, storage, network switches, firewalls, routers, etc.);		
	· ITS Maintenance;		
	· Toll Facility Maintenance;		
	· network administration;		
	· System administration;		
	· database administration;		
	· Software support services;		
	· monitoring services;		
	· System security; and		
	· Preventive maintenance.		
	In delivering the Maintenance Services, the Contractor shall perform the following Services, including but not limited to:		
	· onsite support of the System;		
	· well documented Maintenance schedules and processes;		
	· NCTA Approval and onsite supervision for all Maintenance Work;		
	· coordination with NCTA on all lane closures;		
	· Contractor-provided MOT for all lane closures;		
	· change and configuration management;		
	· complete around-the-clock Maintenance of the System;		
	· ongoing participation with NCTA's staff and involvement in meetings and processes; and		
	· provision of an ample spare parts inventory to meet all Performance Requirements.		
7.2.1	RTCS Hardware Maintenance and Software Support Services		
	The Requirements in this section describe Hardware Maintenance and Software Support Services.		
	Monitoring and troubleshooting of the Roadside System including, but not be limited to:		
	a) Zone/lane controllers;		
	b) AVI System;		
	c) AVDC System;		
	d) ICPS components and controllers;		

No.	Requirements	Required Inputs	
		Compliance	Comments
		Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1215	e) OCR/ALPR Software (if applicable);		
	f) card readers;		
	g) Image-based transaction alarms;		
	h) DVAS cameras;		
	i) ACSMS cameras;		
	j) inspection, test and repair of cables, wiring and terminations;		
	k) all conduits and cable trays;		
	l) all in-lane System electronics and controllers;		
	m) Contractor supplied network Equipment; and		
	n) all Roadside Contractor and third-party Software.		
1216	Performing routine diagnostics on all in-lane peripherals.		
1217	Performing routine diagnostics on all in-lane subsystems.		
1218	Inspection and Maintenance of environmental control devices, UPS, generators and CEMS monitoring devices.		
1219	Inspection and Maintenance of racks, cabinets, vaults, and general supporting infrastructure.		
1220	Monitoring and Maintenance of the Roadside System Software processes, Operations, and interfaces to the RSS and to the existing NCTA CSC Back Office.		
1221	Monitoring real-time Roadway Operations screens and Dashboards and responding to issues.		
1222	Analyzing periodic, daily and weekly trends to identify problems, including but not limited to:		
	a) high number of transactions without Transponder;		
	b) high number of Class Mismatch transactions;		
	c) abnormal changes in traffic counts and class;		
	d) high number of exceptions or unusual occurrences;		
	e) transaction exceptions;		
	f) high number of invalid Transponder transactions;		
	g) abnormal changes in Transponder counts and status changes; and		
	h) high number of rejected images.		
7.2.2	Monitoring and System Administration Services		
	The Requirements in this section describe the Monitoring and System Administration Services.		
1223	All System administrative functions, if not automated, shall be performed by the Contractor at regular intervals as part of the System preventive Maintenance Services according to the Approved Maintenance Plan to ensure System performance is optimized. All such System administrative functions shall be scheduled as preventive Maintenance work orders through MOMS and tracked.		
1224	Continuous monitoring of System Operations shall be performed by the Contractor in conjunction with NCTA to verify System is functional; security posture is adequate; processes are being executed as scheduled; files are transmitted as specified, and System is operating to Contract Performance Requirements.		
	Continuous monitoring of Operations including but not be limited to:		
	a) confirming and verifying receipt of all the MOMS messages and Alerts;		
	b) verifying the MOMS is receiving and processing System events and reporting the correct status;		
	c) evaluating sample transactions data for exception;		
	d) confirming data and image transmission to the RSS;		
	e) verifying processes, programs and scheduled jobs are successful;		
	f) reviewing comparative reports to identify System degradation;		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1225	g) confirming successful transfer of Transponder status list to the lanes;		
	h) reviewing OCR/ALPR or manual image processing results and poor quality images;		
	i) monitoring the DVAS video and event data;		
	j) verifying security access cameras are operational;		
	k) reviewing sample images from each Tolling Location;		
	l) monitoring traffic detectors;		
	m) correcting performance issues identified;		
	n) evaluating storage requirements;		
	o) verify time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold; and		
	p) reviewing error logs and Alerts.		
1226	Provide continuous 24x7 System administration services coverage on the RSS to ensure that it is performing and will continue to perform at a satisfactory level.		
1227	System administration services shall include monitoring and corrective action to ensure System performance is in accordance with Requirements of this Scope of Work and Requirements. This shall include but is not limited to:		
	a) monitoring RSS Hardware at the primary and secondary locations including servers; storage devices and backup systems;		
	b) verifying processes, programs, and scheduled jobs are successful;		
	c) all transactions and images are successfully transmitted to the receiving Systems;		
	d) all messages described in the ICD are being successfully exchanged between the RTCS Systems, ACSMS, CEMS and existing NCTA CSC Back Office;		
	e) confirm applications are functional and available to Authorized Users;		
	f) all scheduled reports are successfully generated and available to Authorized Users;		
	g) all processes are functioning and data and images are moving successfully though the queues;		
	h) all third-party interface are functioning and successfully exchanging files;		
	i) scheduling of preventive, corrective and predictive Maintenance activities;		
	j) any daily, weekly, or periodic Maintenance required to maintain the System at required performance levels (for example: indexing and tuning databases; archiving and purging in accordance with NCTA's retention policy);		
	k) maintaining and updating records of all Maintenance events and activities in the MOMS;		
	l) third-party Software or firmware Upgrades in conjunction with NCTA, as required and to be compliant to security Requirements including but not limited to performing security Software Upgrades, database Upgrades and operating System Upgrades;		
	m) contact with NCTA, Operations and contractors regarding System issues, performance, security posture, Software Release and Maintenance scheduling;		
	n) Approved manual actions, adjustments and Updates to the System data based on predefined criteria to correct issues and as Authorized by NCTA;		
	o) re-establishment or re-installation of System files, programs and parameters, as required, following a failure or damage to the System;		
	p) monitoring of error logs and System logs;		
	q) Maintenance of up-to-date Software backups (all System Software and data);		
	r) installation of new Software and confirmation of successful installation;		
	s) verify time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold;		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	t) assisting NCTA Operations staff as requested by NCTA;		
	u) troubleshooting Roadway System issues;		
	v) creation of Ad-hoc reports requested by NCTA;		
	w) generation of queries as requested by NCTA; and		
	x) analysis of data as requested by NCTA.		
1228	Software Support Services shall include monitoring and corrective action to ensure System performance is in accordance with Requirements of this Scope of Work and Requirements, to include database management and operation. This shall include, but is not limited to:		
	a) investigation and analysis of errors and exceptions and taking corrective action including correcting the problem and reprocessing the data;		
	b) monitoring of notifications, and initiating corrective actions on application programs to meet Requirements;		
	c) Updates to the RTCS System and application to support Upgrades to Hardware or third-party Software;		
	d) Updates to the RTCS System and application to support all changes to Business Rules and RTCS Configurable parameters, and deploy changes in production;		
	e) attend Interoperability meetings as requested by NCTA.		
	f) Updates to the RTCS System and application to support minor changes to NCTA Interoperable Partner and National Interoperability ICD;		
	g) Updates to the RTCS System and application to support the addition of new Interoperable Agencies;		
	h) Updates to the RTCS System and application to support changes to continue its compliance to updated security Requirements; and		
	i) Updates to the RTCS System and application to support legislative and statutory changes.		
1229	If OCR/ALPR is provided, the Contractor shall perform OCR/ALPR Updates as required to support license plate changes for North Carolina plates and the next eleven (11) most frequent visitor states license plates as defined in this Scope of Work and Requirements.		
1230	As part of the Software Support Services the Contractor shall develop and test Software as required in accordance with NCTA Change Order process to accommodate corrective action and changes to Business Rules. Scope shall include provision of evidence packages detailing changes for NCTA's review and Approval, installation of new Software and confirmation of successful installation.		
1231	The Contractor shall monitor all network alerts and alarms, as well as detect intrusion attempts and prevent intrusions.		
1232	The Contractor shall Upgrade and Update the network security and provide the required Software and monitoring tools to ensure the RTCS System is always in compliance with the most recent penetration and vulnerability test Requirements.		
7.2.3	Interoperability Requirements		
1233	The Contractor shall support the following NCTA Interoperable Partner and National Interoperability activities as required by NCTA. Activities include but are not limited to:		
	a) support NCTA Interoperable Partners and National Interoperability Agency testing as requested;		
	b) support substantial changes to the System to meet major modifications to NCTA Interoperable Partners and National Interoperability specifications; and		
	c) be compliant with the latest published NCTA Interoperable Partners and National Interoperable specifications for the duration of the Contract.		
7.2.4	Updates to Maintenance Plan and Other Maintenance Related Documentation		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1234	The Contractor shall periodically update the Maintenance Plan and other Maintenance Documentation to reflect any changes to the policies or procedures developed by the Contractor and Approved by NCTA for the Roadway System Maintenance Services. The Maintenance Plan shall be updated and submitted for review and Approval on an annual basis. However, sections of the Maintenance Plan or its Appendices shall be submitted for review and Approval as the changes are identified. A version update sheet shall be included with the Maintenance Plan, and the Maintenance Plan on file shall have the most recent version from the configuration management database. A final Submittal of the Maintenance Plan and other Maintenance Documentation shall be provided at the end of the Contract Term.		
1235	The Contractor shall provide in electronic format all patches and Updates made to the System Software (third-party and Contractor) after Acceptance.		
7.2.5	Types of Maintenance		
7.2.5.1.	*Preventive Maintenance*		
1236	The Contractor shall provide and perform onsite Preventive Maintenance on the Roadside System Hardware, RSS Hardware, Contractor LAN/MAN/WAN communications Equipment and Software in accordance with the Approved Preventive Maintenance Plan.		
1237	The Contractor shall inspect all Contractor installed Equipment, both major components and support components (fans, cables, connectors, cabinets, Equipment racks, storage units) that constitute the Roadway System and shall make such repairs; cleaning; adjustments, and replacements of components as necessary to maintain the Equipment in normal operating condition in accordance with the Approved Preventive Maintenance Plan.		
1238	The Contractor shall provide an Approved Preventive Maintenance Plan which includes a schedule of all preventative maintenance activities requiring lane closures for the upcoming month at least five (5) business days before the beginning of the month.		
1239	The Contractor shall provide changes to the Approved Preventive Maintenance Plan schedule as soon as changes become known due to weather, contractor availability, or any other reason.		
1240	In addition to required ongoing Contractor monitoring, the servers and data processing units shall be periodically checked by the Contractor to verify that storage space is not reaching limits, disks are not fragmented or damaged, Software being used is of latest version per the configuration management and data is being processed and transferred in an appropriate manner.		
1241	Transaction and image processing volumes and times shall be monitored by the Contractor and Systems optimized for performance with NCTA Approval.		
1242	Report generation times, System access times, and System response time shall be monitored by the Contractor to ensure performance meets the Contractual Requirements.		
1243	The Contractor shall include all Equipment and Systems as part of the Preventive Maintenance in accordance with the original Equipment manufacturer's guidelines. Any variations or exceptions shall be noted by the Contractor and Approved in advance by NCTA.		
1244	Preventive Maintenance shall be performed by the Contractor during the normal working hours when Maintenance technicians are scheduled to be onsite. NCTA Approved diagnostic aids, tools and Equipment to perform Preventive Maintenance Equipment analysis shall be provided by the Contractor, as necessary.		
1245	Preventive Maintenance requiring lane closure shall be scheduled by the Contractor for off-peak travel periods; evenings; Saturdays, and Sundays and coordinated with NCTA, so that the Work shall not interfere with normal traffic flow, unless otherwise Approved by NCTA.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1246	The Contractor shall provide a Preventive Maintenance schedule, to be Approved by NCTA, as part of the Maintenance Plan. The schedule shall detail the preventive Maintenance to be performed on each Equipment item and System. The schedule shall provide a description of the Work to be performed, expected duration and the frequency.		
1247	The preventive Maintenance schedule shall be entered by the Contractor into the MOMS and work orders shall be automatically created to Alert Contractor staff of required preventive Maintenance. Failure of the Contractor to perform required preventive Maintenance in accordance with the Approved schedule shall result in monthly fee adjustments, as specified below in the Maintenance Performance Requirements.		
7.2.5.2.	*Predictive Maintenance*		
1248	The Contractor shall establish a Predictive Maintenance program by which failure analysis can be determined by identifying potential failures through the MOMS records or data analysis. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that could disrupt toll collection Operations. Examples include the image quality, Image Toll (I-Toll) rate, and reader handshakes.		
1249	The Contractor shall maintain all failure analysis Documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.		
7.2.5.3.	*Pervasive Maintenance*		
1250	The Contractor shall establish a Pervasive Maintenance program by which failure analysis can be determined by identifying continuing or repetitive failures through the MOMS records. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that continue to occur on a particular item of Equipment, sub-system, or component.		
1251	The Contractor shall maintain all failure analysis Documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.		
7.2.5.4.	*Corrective Maintenance*		
1252	All Work performed by the Contractor to correct problems to meet the Requirements of the Contract or Software defects shall be considered as Corrective Maintenance. Such problems include but are not limited to:		
	a) failure of subsystem functions;		
	b) problems identified by the users, including the STOC, and customers;		
	c) interface issues;		
	d) failure of processes and programs;		
	e) data reconciliation issues;		
	f) report issues;		
	g) application failures;		
	h) toll System network issues;		
	i) inadequate security posture;		
	j) degraded System or component performance; and		
	k) non-conforming availability or MTBF.		
1253	NCTA shall be notified before any corrective Maintenance is performed.		
1254	Notwithstanding the foregoing, for repeated failure of Equipment, components, or Systems, the Contractor shall undertake an investigation. If the problem is determined by NCTA to be a Pervasive Defect, the Contractor shall be responsible for resolution as set forth in **Section V, Terms and Conditions**.		
7.2.6	Maintenance Coverage		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1255	The Contractor shall provide continuous (24x7) coverage for all monitoring and Maintenance-related activities sufficient to meet the Performance Requirements of the Contract.		
7.2.7	Spare Parts		
	The Contractor shall provide a storage location for the Contractor's use for the storage of the Roadway System spare parts.		
1256	Contractor shall be responsible for the inventory of all spare parts at the storage facility and shall be insured in this regard as set forth in the Contract. The Contractor shall account for all spare parts and shall provide safeguards against theft, damage, or loss of the spare parts.		
1257	The spares facility and storage area shall be secured and connected to an up-to-date security network System with alarm notification monitored by the Contractor. Further, it is required that NCTA shall have full and unrestricted access to the Maintenance and or storage facility.		
1258	The Contractor shall ensure that only spare parts and Equipment required to service the Roadway System and WAN/MAN/LAN communications spare Equipment are stored at this facility and shall only be used for NCTA Roadway Systems.		
7.2.7.1.	*Spare Parts Inventory Management*		
1259	The Contractor shall be responsible for the Maintenance of an adequate spare parts inventory during the Contract Period. The Contractor is responsible for monitoring and identifying the existing spare parts inventory, ordering spare parts as required, and proposing the quantity needed to maintain the required performance.		
1260	The Contractor shall, on a quarterly basis, update and recommend a spare part quantity to be maintained in order to support the RTCS System functionality and operational readiness.		
1261	The Contractor shall be responsible for purchasing and replenishing spare parts inventories to the levels required to meet the Performance Requirements. Contractor's failure to purchase or replenish the spare parts or consumables to levels necessary to meet the Performance Requirements is not an excusable failure and will not relieve the Contractor from Performance Requirements or any associated liquidated or actual damages resulting from the non-performance.		
1262	During the term of this Agreement the Contractor shall be responsible for purchasing all spare parts and miscellaneous repair items and consumable materials necessary to maintain the RTCS System at the performance levels specified in the Contract.		
7.2.7.2.	*Spare Part Inventory and Tracking*		
1263	The Contractor shall be responsible for recording the inventory into the MOMS, monitoring the inventory quantity and ensuring that the inventory is maintained to the levels required.		
1264	The Contractor shall keep accurate records of all parts entering and leaving inventory including but not limited to: time and date part was dispensed, and the location within the RTCS System where the part was dispatched and used.		
1265	The Contractor shall also be responsible for tracking of all warranty replacement for Contractor provided Equipment through Returned Material Authorization (RMA) process. If the replaced part is under warranty, the part shall be immediately replaced with a new part. If the replaced part is out of warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory.		
1266	If the Contractor is unable to repair the part, a new part shall be purchased and placed into spares inventory. The details of the repair efforts, including problem; status; inventory, and repair disposition shall be included in the MOMS inventory and repair database.		
7.2.7.3.	*Procurement and Control of Spare Parts*		

No.	Requirements	Required Inputs	
		Compliance	Comments
		Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1267	Thirty (30) days prior to placing the RTCS System in revenue collection the Contractor shall have purchased and have on hand at NCTA facilities the agreed upon inventory of spare parts, including at a minimum spares equivalent to one (1) Tolling Location (two tolling zones) of Equipment for AET facilities for at least six (6) lanes of equipment.		
1268	The spare parts shall be purchased on behalf of NCTA and shall be owned by NCTA.		
1269	The Contractor shall cooperate with and assist NCTA to ensure that all spare parts, Equipment and other NCTA owned property is stored or otherwise located on the Contractor's property or in Contractor controlled space shall not be subject to any risk of being confiscated, claimed, attached, withheld by a landlord, creditor, or similar risk.		
1270	The Contractor shall label/tag all Equipment identifying it as the property of NCTA with a NCTA specific part or control number and barcode. All spare parts and consumables shall be maintained by the Contractor free and clear of any liens and encumbrances of any kind. NCTA shall have the right to inspect the spares and consumables inventory upon request.		
1271	Provide the capability to enter new inventory items to MOMS via several methods, including but not limited to:		
	a) manually;		
	b) file upload; and		
	c) barcode (scanner).		
1272	Any spare parts that are lost or damaged due to the negligence, intentional act, or omission of the Contractor or its employees, Subcontractors, agents, or invitees shall be replaced by the Contractor at its sole cost.		
1273	NCTA may elect to assume responsibility at any time for storage of spare parts, and the Contractor shall deliver all spare parts to NCTA for storage after receipt of reasonable Notice from NCTA.		
7.2.7.4.	*Spare Parts Availability*		
1274	The Contractor shall maintain the required physical inventory of agreed to spare parts in accordance with the Contract.		
1275	For failure to maintain spare parts inventory at adequate levels for the month, the Contractor may be subject to monthly fee adjustment of $500 per month for each failure to maintain spare parts inventory per the counts required.		
7.2.8	Repair Depot		
1276	The Contractor shall be responsible for providing and staffing a repair depot for the return and repair of RTCS System components.		
1277	The Contractor shall be responsible for repairing failed RTCS System components and returning them to the spare parts inventory.		
1278	Failed components shall be tracked by the Contractor utilizing MOMS, including final resolution. Component tracking shall include but not limited to the following: receipt, repair date/information, replace reason, date of return.		
1279	The Contractor shall indicate the details of the repairs performed on any components. This shall include but not be limited to boards and connectors replaced.		
1280	If the replaced part is under Warranty, the part shall be immediately replaced with a new part by the Contractor. If the replaced part is out of Warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory. Except for Pervasive Defects, for out of Warranty components, the Contractor shall document why the component could not be repaired and advise NCTA that a new spare must be ordered.		
7.2.9	Annual System Certification		

No.	Requirements	Required Inputs	
		Compliance	Comments
		Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	At the end of Year 1 Maintenance, the Contractor shall conduct an annual System-wide Certification that shall include tuning of the lanes (including optional annual or bi-annual AVI System Certification performed by the AVI Vendor at the request of NCTA), Maintenance of the servers and database, and general System check-out. Upon the completion of the System-wide Certification, the Contractor shall conduct a Certification test similar to the RTCS Operational and Acceptance Test for a duration sufficient to collect the requisite sample size to validate System Performance Requirements. Discrepancies under the control of the Contractor shall be corrected by the Contractor at no additional charge to NCTA.		
1281	A sample size of 10,000 transactions shall be used to validate each accuracy requirement. Data shall be collected from all lanes at each Tolling Location.		
1282	DVAS recordings shall be performed for a two-hour period in each lane at each Tolling Location and compared to the transactions to validate vehicle detection accuracy.		
1283	A hundred percent (100%) end-to-end audit of the System shall be performed for a seven (7) day period to validate transaction and reconciliation Requirements.		
1284	A Certification reports shall be submitted to NCTA for Approval documenting the results of the annual Certification.		
7.2.10	Emergency Response Management		
	The Contractor shall have an emergency response management Plan Approved by NCTA and the Contractor shall follow the procedures set forth in this Plan when an emergency situation is invoked.		
1285	The Contractor shall immediately respond to any emergency situation and repair the System, as notified by NCTA or otherwise, that may arise that has already or could potentially damage the Roadway System. The Contractor shall be prepared to put forth all necessary resources to divert or correct an emergency condition.		
1286	Such emergency conditions shall be handled in accordance with the policies and procedures established by NCTA. The following are a few examples of emergency conditions:		
	a) weather related;		
	b) vehicle accident;		
	c) conditions that invoke the DRP;		
	d) third-party (power outage or communication failure);		
	e) vandalism that causes parts of the Roadway System to be inoperable; and		
	f) detection of security breaches, discovered vulnerabilities and activities that pose a security threat to the toll collection System;		
7.2.11	Roadway Support System (RSS) Disaster Recovery		
1287	The Contractor shall perform DR procedures in accordance with the Approved DRP in the event of a disaster and return the RSS to a fully operational condition.		
1288	The Contractor shall test the DR procedures on a yearly basis during the Contract Term to validate that they are functioning per the Design. NCTA shall witness the test and the Contractor shall provide a report outlining the test, test results and any anomalies encountered for NCTA's review and Approval.		
1289	The Contractor shall address any issues encountered from the yearly DR testing.		
7.2.12	Incident and Revenue Loss Reporting		
1290	The Contractor shall immediately notify NCTA of any incident or event whereby the potential or actual loss of revenue occurred or could potentially occur. The Contractor shall take immediate action to rectify the condition and return the Roadway System to normal functioning.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1291	A Monthly Incident Report shall be provided by the Contractor that includes a breakdown of lost transaction data and revenue by Roadway for each incident. If the condition is determined to be due to the fault of the Contractor, damages shall be assessed in accordance with the terms of the Contract.		
7.2.13	Maintenance Staffing, Materials and Training		
7.2.13.1.	*Maintenance Staffing Requirements*		
1292	The Contractor shall be responsible for maintaining an adequate level of technical staff to perform Maintenance and Software Support Services on the Roadway System. The Contractor shall ensure that sufficient staffing is available to cover all Maintenance activities identified in this Scope of Work and Requirements at all times but particularly during the following periods:		
	a) Weekends;		
	b) Holidays;		
	c) personnel on vacation/sick time;		
	d) after regular scheduled Work hours (on call); and		
	e) unexpected emergency or crisis.		
1293	The Contractor shall provide personnel to perform the following functions. It shall be the Contractor's responsibility to staff at appropriate levels to meet the Requirements, using the Maintenance Plan as the guideline for staffing levels and full job descriptions:		
	a) **Management:** Contractor's Maintenance Management responsibilities include all Maintenance Management business dealings with the Contractor Project Manager. Responsibilities include single point of contact for all Work-related issues, including System problems, material issues, or Contractor personnel issues. Maintenance Management responsibilities also include ensuring that Systems are properly functioning and that the Maintenance and repair Work are properly performed and documented.		
	b) **Monitoring Staff:** The monitoring functions shall include the support for the monitoring of the System Operations and ensuring that systems are properly functioning. Additionally, the monitoring staff shall coordinate with NCTA in confirming the Maintenance and repair Work are properly performed.		
	c) **Field Supervision:** The Field Supervisory functions include being responsible for the day to day Operations of the technicians, ensuring that all required Work is accomplished properly and efficiently.		
	d) **Maintenance Technical Staff:** Responsibilities include responding to Maintenance activities, Alerts and work orders and for field level preventive Maintenance. Maintenance technicians shall be qualified to troubleshoot Maintenance problems and identify the source of the problem.		
	e) **Network Engineering:** Network Administration shall include the configuration and Maintenance of the network systems and communications network.		
	f) **Database Administration:** Database administration shall include management of the servers and databases. The database administration shall cover all aspects of the System database and ensuring the database is optimized for peak performance. The responsibilities include the configuration and operation of the System database and generation of database queries as requested by NCTA and other support personnel.		
	g) **Systems Engineering:** Responsibilities include the configuration and monitoring of all System processing and verify that all Operations and processes are occurring as scheduled. All MOMS alarms relating to process failures shall be investigated and resolved by the System engineering staff. Systems engineering responsibilities also include ensuring the proper configuration of all servers and coordinating all server Maintenance. System engineering responsibilities also include identifying issues, communicating with the System Software personnel and coordinating resolution of the problem. All user-related problems (application Software) shall also be handled by the System engineering personnel.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	h) **Software Technical Staff:** Responsibilities include responding to Maintenance activities, Alerts and work orders and resolution of Software problems. Software technical staff shall be qualified to troubleshoot Maintenance problems, identify the source of the problem and correct the problem.		
	i) **Administrative Staff:** Responsibilities include support of the Contractor's Maintenance organization for the performance of Maintenance functions and to provide adequate phone and administrative support at the Maintenance management facility.		
7.2.13.2.	*Tools and Materials*		
1294	The Contractor shall provide all test Equipment and tools and support; including but not limited monitoring tools; smart phones; laptops, and any other items required for the Maintenance and Software Support staff to perform their Maintenance activities. All such devices shall have adequate and up-to-date security Software and be Approved by NCDOT IT before they are used on the RTCS System network. All required test Equipment, tools and Software tools shall be on site (as required) and in adequate supply, with all required personnel trained on their use. All test Equipment shall be standard units that are capable of achieving the measurement they are intended to make.		
7.2.13.3.	*Training Program*		
1295	The Contractor shall ensure that Maintenance and Software services staff is properly trained for Requirements of maintaining the System. The Contractor shall provide a minimum of two (2) weeks of classroom and On the Job Training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned Maintenance duties.		
1296	The Contractor shall provide personal identity information (PII) training to all personnel approved to work on the Project who has access to secure and personal information.		
1297	The Contractor shall provide trained qualified technical staff to support the Maintenance and Software Support Services described in the Scope of Work and Requirements. It is the Contractor's sole responsibility to develop training necessary to successfully perform all of the Maintenance actions required to keep the System operational.		
1298	The Contractor shall complete all required training and Certifications prior to performing actual Maintenance and Software Support Services within a revenue collection environment. In the event changes or modifications are made to the System Equipment or configuration, supplemental training shall be accomplished prior to the actual service date for the changes or modifications.		
1299	Training shall include the Contractor's safety standards and guidelines and applicable NCTA policies and procedures.		
1300	The Contractor shall provide Documentation that this initial training has been successfully completed.		
1301	Various training programs the Contractor shall institute shall include, but not be limited to, the following:		
	a) a thorough understanding and operating knowledge of the MOMS is required of all Maintenance personnel;		
	b) an in depth understanding of the Roadway System and Operations, including all Equipment, Software, interfaces, file transfers and interconnections;		
	c) use of Maintenance Documentation such as Maintenance manuals; drawings; vendor manuals, and parts list;		
	d) functions of the System monitoring tools used to manage the System monitoring tasks;		
	e) preventive Maintenance of all Systems and sub-systems;		
	f) troubleshooting; diagnostics; repair, testing, and Maintenance follow up;		
	g) System logs, errors logs and processing of exceptions;		
	h) System dataflow and workflow queues;		
	i) review of the Dashboard data and analysis;		
	j) discussion on the areas of responsibility;		
	k) special use Maintenance and monitoring tools; and		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	l) queries and reports.		
1302	All System Maintenance and Software Support personnel shall attend the appropriate training sessions. NCTA staff shall be notified of and invited to attend any or all training sessions two (2) weeks in advance of the training.		
1303	All System Maintenance and Software Support personnel shall be trained on scheduling, work assignments, escalation process, transportation requirements and communications;		
1304	The Contractor shall provide training offered by vendors and original Equipment manufacturer (OEM) for System components where available and required to properly operate, maintain, test and repair such Equipment and Software. Such training shall include but not be limited to:		
	a) ICPS Equipment;		
	b) AVI Equipment;		
	c) AVDC System;		
	d) lane peripherals devices;		
	e) microwave vehicle detectors;		
	f) DVAS;		
	g) MOMS;		
	h) network components and Software provided by the Contractor;		
	i) security Software and security tests;		
	j) SAN;		
	k) databases; and		
	l) servers.		
7.2.13.4.	*Training Materials and Ongoing Education*		
1305	Training material shall consist of Maintenance manuals, vendor manuals and any other Documentation that provides for the efficient and effective Maintenance of the System and its components.		
1306	The Contractor shall hold regular meetings with NCTA technical personnel to update Maintenance procedures, bring proposed System changes to the attention of the technical staff and discuss Maintenance issues identified in the field. The Contractor shall provide NCTA with the meeting schedule so that the appropriate NCTA staff can attend these meetings.		
1307	NCTA shall have the right to make recordings and copies of all training program materials. The Contractor shall provide releases from all employees/contractors to allow unlimited, royalty free use and copies of recordings.		
7.2.13.5.	*System Documentation*		
1308	The Contractor shall have appropriate System Documentation available to all Maintenance and Software Support personnel as required to perform their respective duties.		
1309	The Contractor shall update the System Documentation to reflect any changes to the System Approved by NCTA. A version update sheet shall be included with the System Documentation, and the Documentation on file shall have the most recent version from the configuration management database. A complete submission of the System Documentation shall be made every two (2) years that reflects all Approved changes to-date.		
7.2.13.6.	*Training Records*		
1310	The Contractor shall keep accurate training records on all Contractor and NCTA Maintenance personnel. NCTA shall be permitted to audit Maintenance personnel qualifications and training records at any time. Evidence of completion of training by Contractor and NCTA Maintenance personnel shall be provided to NCTA upon request.		
7.2.14	Safety		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1311	The Contractor shall adhere to all applicable safety standards and guidelines for working on or around energized Equipment and in a Maintenance environment, including but not limited to the following:		
	a) NCTA safety procedures and guidelines;		
	b) NCDOT safety procedures and guidelines;		
	c) OSHA (Occupational Safety and Health Administration);		
	d) NEMA (National Electrical Manufacturers Association);		
	e) NEC (National Electrical Code);		
	f) FHWA (Federal Highway Administration); and		
	g) any other local, State, or Federal ordinance, procedure, or guideline that provides for a safe operation and working environment.		
7.2.15	Security		
1312	All Contractor personnel shall be subject to appropriate security and background checks to the satisfaction of NCTA. The Contractor shall obtain written Approval from NCTA for all service personnel and each Contractor personnel shall be required to sign an acceptable use agreement.		
1313	Contractor's personnel shall be issued NCTA identification badges and shall wear such identification badges at all times when on NCTA property. Use of such identification badges for purposes other than Work associated with the Contract will result in termination of the employee from the Contract and possible other legal or disciplinary action.		
1314	The Services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with applicable current computer and data industry standards with regard to data and information security. All employees of the Contractor shall not discuss their NCTA-related Work with unauthorized personnel or any individuals not directly associated with NCTA.		
1315	NCTA will identify and designate a primary point of contact for the Contractor. Under most circumstances, the Contractor will limit communication with NCTA authorized staff and to NCTA's designated point of contact unless otherwise directed by NCTA.		
1316	Discussion by the Contractor of any Services or Work performed under the Contract with the media, in oral presentations, in written publications, or in any other form, not related to this Contract shall be Approved in advance by NCTA.		
7.2.16	Confidentiality		
1317	The Contractor shall keep all information regarding its activities pursuant to this Contract confidential and will communicate such information only with authorized NCTA personnel or designated representatives.		
1318	The Contractor personnel shall be required to sign a Non-Disclosure Agreement (NDA) on an annual basis. The updated NDA forms shall be submitted with the annual updated Maintenance Plan Documentation.		
7.2.17	Maintenance of Traffic (MOT)		
1319	The Contractor shall perform Maintenance of Traffic associated with the System Maintenance Phase for each Roadway. The Contractor shall develop as a part of the Maintenance Plan, an MOT procedure in accordance with NCDOT standards for Approval by NCTA.		
1320	The Contractor shall adhere to the Approved MOT Plan when setting up, working under MOT and restoring lanes to traffic. All lane closures shall also be coordinated in advance with the STOC.		
7.2.18	Maintenance and Software Support Records		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1321	NCTA shall have access to all Maintenance and Software Service records at any time for review and audit, upon reasonable Notice. The Contractor shall provide monthly reports generated in the System that permits NCTA to evaluate Contractor's Maintenance performance.		
1322	The Contractor's Maintenance manager shall maintain current, complete and accurate records for all Maintenance and Software Support Services activities. The Contractor's Maintenance manager shall institute procedures that make sure Maintenance staff enters complete information into the MOMS before closing a work order or trouble ticket.		
1323	All preventive, pervasive and predictive Maintenance activities shall be reported in the same manner as corrective or emergency Maintenance activities by the Contractor. The information shall be contained on the MOMS and shall be made available through various MOMS reports.		
7.2.19	Maintenance Summary Reports		
1324	The Contractor shall provide the Maintenance summary reports to NCTA on a monthly basis in advance of the Monthly Meeting. The format of the Monthly reports shall be Approved by NCTA and included in the Maintenance Plan.		
1325	The Contractor shall provide an annual Executive Summary report to NCTA that summarizes the Contractor's performance for the Maintenance Year. The format of the Executive Summary reports shall be Approved by NCTA and included in the Maintenance Plan.		
1326	Maintenance summary reports shall also be readily available on-demand through the System in detail or summary format to NCTA authorized personnel via the network on a daily, weekly, or other time period basis determined by NCTA. The Maintenance summary report shall include but not be limited to:		
	a) a summary of the Contractor's performance for the month under review noting all accomplishments and deficiencies;		
	b) all Maintenance and System Performance Reports that show Contractor's compliance to Maintenance Performance Requirements;		
	c) detailed listing of failures and the impacted subsystems where Contractor's and System performance for the month were not in compliance with the Performance Requirements;		
	d) any exceptions the Contractor believes are non-chargeable failures that Contractor is not responsible for;		
	e) detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;		
	f) status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);		
	g) trend analysis for repetitive failure;		
	h) status of spare parts inventory;		
	i) staffing report detailing positions and staff hours worked;		
	j) staff performance trends;		
	k) Software and firmware releases implemented;		
	l) major Maintenance activities that occurred and are scheduled to occur;		
	m) incidents that invoked emergency response or resulted in loss of toll revenue; and		
	n) summary of work order, Software defects and trouble tickets by Priority and category.		
7.3	**RTCS Maintenance and Software Support Services**		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	The Maintenance and Software Support Services shall include monitoring; preventive; pervasive; corrective; security related and emergency Maintenance Services and certain Upgrades and enhancements to be performed on all elements of the RTCS. Payment for Maintenance and Software Support Services on the RTCS for each Phase of the Project shall commence after Acceptance. The Contractor shall provide the following RTCS Maintenance and Software Support Services at the levels defined in Section VII.		
7.3.1	RTCS Systems Hardware Maintenance and Software Support Services		
	Monitoring and Maintenance functions described below shall be performed by the Contractor.		
1327	The Network Control shall monitor the System for failures and alarms, and confirm a MOMS work order has been created for each failure as defined regardless of Maintenance Level.		
1328	The Contractor shall automate the MOMS work order process to the maximum extent possible to anticipate and automate work orders. If a MOMS work order has not been created, the Contractor or Network Control shall create a work order in MOMS and assign it to a technician for Maintenance action or troubleshooting.		
1329	The Contractor shall perform the necessary Maintenance and close the MOMS work order upon confirmation that the failure has been successfully corrected. The Contractor shall notify Network Control that the repair action is complete and work order has been closed.		
1330	The Contractor shall perform all daily, weekly and scheduled preventive Maintenance on all RTCS System Hardware.		
1331	The Contractor shall inspect and test cables, wiring and terminations to detect problems and degradation. Any item not in compliance with Contract Requirements shall be replaced by the Contractor at no cost to NCTA unless such failure is considered non-chargeable as described in Section 8.1.8.1 Non-Chargeable Failures.		
1332	The Contractor shall maintain the RTCS LAN/MAN/WAN that includes all Contractor network connections in the toll Equipment vault and interconnections between the toll Equipment vaults as defined in ***Attachment 12: Communications Schematic*** .		
1333	The Contractor shall perform "credentialed" scans of the RTCS and produce ensuing reports at the request of NCTA.		
1334	The Contractor shall monitor for intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to NCDOT IT Security with twelve (12) hours of detection.		
1335	The Contractor shall perform any Maintenance, daily, weekly, or periodic, required to maintain the System at required performance levels (for example: archival and purging in accordance with NCTA's retention policy).		
1336	The Contractor shall update all Software drivers to meet any new standard Operating Systems as they become available and such Updates shall be deployed in accordance with NCTA standards.		
1337	The Contractor shall retrieve data manually from the zone controllers and download Transponder status list and toll rate and schedule files in the event there is an extended communications failure.		
1338	The Contractor shall re-establish or re-install System files, programs and parameters, as required, following a failure or damage to the System and return lanes to fully operational condition.		
1339	The Contractor shall perform Disaster Recovery procedures as needed and return lanes to fully operational condition.		
1340	As part of the Software Support Services the Contractor shall develop and test Software as required to accommodate corrective action, changes to Business Rules or lane configurations. Scope shall include provision of evidence packages detailing changes for NCTA review and Approval, installation of new Software and confirmation of successful installation.		
7.3.2	Roadway Support System (RSS) Servers and Database Administration, Maintenance and Software Support Services		
	The Requirements in this section describe the Services to be provided by the Contractor under the Maintenance and Software Support Service for the RTCS.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
1341	The Contractor shall provide Maintenance and Software Support Service for all elements of the RSS in all environments required in the Contract including but not limited to:		
	a) RSS Hardware;		
	b) operating systems;		
	c) databases;		
	d) application Software;		
	e) third-party Software;		
	f) security Updates;		
	g) Software configuration; and		
	h) Software version control.		
1342	The Contractor shall provide continuous 24x7 System administration services coverage on the RSS to ensure that it is performing and will continue to perform at a satisfactory level.		
1343	The Contractor support staff shall be available on-call 24x7 to investigate and perform Maintenance for those failures escalated to the Contractor.		
1344	Software Support Services shall include monitoring and corrective action to ensure System performance is in accordance with Requirements of this Scope of Work and Requirements, to include database management and operation. This shall include, but is not limited to:		
	a) investigation and analysis of potential errors and exceptions and taking preventative/corrective action including correcting the problem and reprocessing the data;		
	b) monitoring of notifications, and initiating corrective actions on application programs to meet Requirements;		
	c) Updates to the RTCS and application to support Upgrades to Hardware or third-party Software;		
	d) Updates to the RTCS and application to support all changes to Business Rules and RTCS Configurable parameters, and deploy changes in production;		
	e) Updates to the RTCS and application to support changes to NCTA Interoperable Partners ICD including the addition of new Interoperable Partners;		
	f) Updates to the RTCS and application to support the addition of new Interoperable Agencies;		
	g) Updates to the RTCS and application to support changes to continue its compliance to updated security Requirements; and		
	h) Updates to the RTCS and application to support legislative and statutory changes.		
1345	As part of the Software Support Services the Contractor shall develop and test Software as required in accordance with the NCTA Change Order process to accommodate corrective action and changes to Business Rules. Scope shall include provision of evidence packages detailing changes for the NCTA's review and Approval, installation of new Software and confirmation of successful installation.		
7.4	**Intelligent Transportation System Maintenance**		
	The Requirements in this section describe the Services to be provided by the Contractor under the category of Intelligent Transportation System (ITS) Maintenance.		
7.4.1	Triangle Expressway		
	As-Built ITS plans can be found in ***Attachment 17: TriEx As-Built ITS Design Plans.***		
	The Contractor will re-use the existing fiber-optic ITS and Tolls networks. Network switching for the tolls network can either be re-used or replaced by Contractor. Network edge switches for the ITS network will be phased out as they approach end of life and replaced with switches provided by NCDOT IT.		
7.4.2	Complete 540		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	The Design of the ITS for Complete 540 is currently underway. This Project will be a design-build procurement and the finalized specifications for the ITS will be provided as soon as they are made available. While the Design is not complete at this time, many of the details of the ITS Equipment to be provided can be assumed to be consistent with that provided for the Triangle Expressway project.		
	The Project will have a fiber connection to the STOC via an NCDOT trunk line. NCDOT will be designated fibers and cables for use for the ITS and Tolls networks. As is for the Triangle Expressway, the Constructor will build parallel but separate fiber networks for ITS and Tolls. The Constructor will provide complete, tested and operational network for ITS devices. The Tolls network fiber will be terminated and tested by the Constructor (both along the corridor and the homerun to the STOC) but not lit. The Contractor will provide all switching Equipment for the Tolls network. Further details of the ITS included in the Design-Build Team's scope of work can be found in ***Attachment 13: C540 ITS and AET Concept Plans.***		
7.4.2.1.	*ITS Maintenance Requirements*		
1346	The Requirements of Section 7.2.5 "Types of Maintenance" shall apply to ITS Equipment and subsystems.		
1347	The Requirements of Section 7.2.7 "Spare Parts" and 7.2.8 "Repair Depot" shall apply to ITS Equipment and subsystems. As the specific ITS Equipment parts and models (to be initially provided by others) are not known at this time, the Contractor is not being asked to provide the cost of Spares Replacement for ITS equipment at this time. Replacement parts and spares quantities shall be reviewed, approved, and paid for by NCTA.		
1348	The Requirements of Section 7.2.17 Maintenance of Traffic (MOT) shall apply to ITS Equipment and subsystems.		
1349	The Requirements of Section 8.1.10 "Time to Respond and Repair" shall apply to ITS Equipment and subsystems. The assignment of "Priority Levels" shall apply to ITS Equipment listed in ***Attachment 5: TriEx and C540 ITS Equipment List.***		
1350	All ITS Maintenance activity shall be maintained in MOMS.		
7.4.3	Statewide Traffic Operations Center (STOC)		
	The STOC is a NCDOT-owned and operated TMC in the Raleigh area. It is located at 1636 Gold Star Drive, Raleigh, NC 27607. The STOC is a secure, gated, access controlled facility. The STOC is manned 24/7/365. NCDOT & NCTA plan on partnering to provide personnel space and Equipment space to monitor the Triangle Expressway and Complete 540 projects.		
	The STOC has:		
	· Four consoles on the control room floor to monitor the video wall for toll system operators;		
	· Approximately four racks of available space in the climate-controlled server room for toll-related Equipment;		
	· The climate-controlled server room at the STOC has access to generator power provided by others. Any impact to the Contractor Performance Requirements directly due to a failed STOC generator should be considered non-chargeable failures;		
	Further details of STOC can be found in ***Attachment 14: STOC Floor Plan.***		
7.5	**Toll Facilities Maintenance**		
	The Requirements in this section describe the Services to be provided by the Contractor under the category of Facilities Maintenance. For Complete 540 the Constructor will provide at each AET Tolling Location a single vault and related support systems. This includes:		
	· 11'-8" x 15' concrete vault		
	· 60kW generator and automatic transfer switch		
	· Propane tank (anticipated to be 1,000 gal)		
	· 400A electrical service, meter & electrical panels		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	· Building and parking area lighting		
	· Power panels for raw and UPS power on both sides of road		
	· Equipment cabinet maintenance pads		
	· Lightning protection		
	For vault-mounted meters, the Contractor shall be responsible for repair/replacement of the disconnect and the meter housing. For free-standing combination panels/meter bases, such as ITS locations, the Contractor shall be responsible for repair/replacement of the disconnect, meter housing, and combination panel assembly, if damaged. The electric company is responsible for the meter itself and for conduit running from the right-of-way to the meter.		
	Further details of the infrastructure included in the Design-Build Team's anticipated scope of work is still currently under Design, but can be assumed to be similar to the Triangle Expressway infrastructure.		
	For Triangle Expressway, infrastructure details can be found in ***Attachment 2: NCTA TriEx ORT Lanes "As-Built" Drawings, Attachment 2A – NCTA TriEx AVI System Retrofit "As-Built" Drawings,*** and ***Attachment 3: NCTA TriEx – Veridea Installation Drawings***.		
	The Scope of Work, response & repair and reporting Requirements for Toll Facilities Maintenance are listed in ***Attachment 15: Toll Facilities Maintenance Scope of Work***.		
7.5.1	Toll Facilities Maintenance Requirements		
1351	The Requirements of Section 7.2.5 "Types of Maintenance" shall apply to Facilities Maintenance.		
1352	The Requirements of Section 7.2.7 "Spare Parts", 7.2.8 "Repair Depot" and 7.2.7.4 "Spare Parts Availability" shall apply to Facilities Maintenance. As the specific Facilities Maintenance Equipment parts and models (to be initially provided by others) are not known at this time, the Contractor is not being asked to provide the cost of Spares Replacement for this Facilities Maintenance equipment at this time. Facilities Maintenance replacement parts and spares quantities shall be reviewed, approved, and paid for by NCTA .		
1353	Failure to meet the response and repair times identified in ***Attachment 15: Toll Facilities Maintenance Scope of Work*** may result in reductions to compensation for Work performed according to the following reduction schedule:		
	a) Up to 1 hour late: $500.00 reduction		
	b) More than 1 hour late: $1,000.00 reduction per hour or fractional part thereof		
1354	Prior to beginning Maintenance Operations, the Contractor shall submit for NCTA Approval a Toll Facilities Maintenance Plan detailing methods for performing the required facility Maintenance Work. The Plan shall include:		
	a) Listing of contractors and personnel		
	b) Lines of communication with the NCTA, and the NCTA CSC Operations Firm		
	c) Emergency Action Plan		
	d) Maintenance Log Procedure		
1355	The Contractor shall periodically update the Toll Facilities Maintenance Plan and other Maintenance Documentation to reflect any changes to the policies or procedures developed by the Contractor and Approved by NCTA for the Toll Facilities Maintenance Services.		
1356	The Toll Facilities Maintenance Plan shall be updated and submitted for review and Approval on an annual basis. However, sections of the Toll Facilities Maintenance Plan or its Appendices shall be submitted for review and Approval as the changes are identified.		
1357	A version update sheet shall be included with the Toll Facilities Maintenance Plan, and the Toll Facilities Maintenance Plan on file shall have the most recent version from the configuration management database.		
1358	A final Submittal of the Toll Facilities Maintenance Plan and other Maintenance Documentation shall be provided at the end of the Contract Term.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1359	The Contractor shall develop and use a Toll Facilities Maintenance log. The Toll Facilities Maintenance log shall also be kept electronically in MOMS, and be located in a place easily accessible and available for NCTA to review at all times. Individual logs shall be kept for each Tolling Location. The log shall include, at a minimum:		
	a) Location;		
	b) Device/Item;		
	c) Date and time;		
	d) Name of contractor and personnel;		
	e) Action performed; and		
	f) Results and Future Action.		
1360	A printout of the Toll Facilities Maintenance log shall be submitted to the NCTA Roadway Operations Project Manager on a monthly basis as well as submitted with invoices. Logs shall be kept current as to the last routine Maintenance or repair activity performed. All logs shall be the property of the NCTA.		
1361	The Contractor shall provide all documentation, including service reports, provided by any sub-contractors utilized to perform Toll Facilities Maintenance.		
1362	Refilling of propane fuel shall be invoiced to NCTA as Cost Plus $250 per refuel.		
1363	Services for fiber-optic/utility location shall be invoiced to NCTA as Cost Plus $250 per locate.		
1364	NCTA-Approved repair or other Services that fall outside the Maintenance Services described herein shall be invoiced to NCTA as Cost Plus $250 per locate.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
8.	**Performance Requirements – MAINTENANCE AND OPERATIONS**		
	The Contractor shall provide a RTCS that is designed to meet the Requirements set forth in this Scope of Work and Requirements during Maintenance and Operations.		
	The NCTA requires the Contractor to continuously maintain and operate the RTCS in accordance with the standards of performance identified in these Performance Requirements and further, that the Contractor fully meet these Performance Requirements, beginning with the first month of Maintenance and Operations. In addition, as part of the Operational and Acceptance Test the Contractor shall validate that the RTCS meets the standards of performance identified in these Performance Requirements.		
	NCTA intends to focus on the outcomes from the RTCS by minimizing the number of Performance Requirements to be tracked, monitored and reported while still maintaining a high confidence in the RTCS performance. This is done by closely aligning performance measurement to the timely transmission of accurate and complete transactions to the NCTA existing Back Office and availability of the RTCS instead of focusing on the intermediate steps in the process.		
	The Contractor's performance will be monitored by the NCTA and shall be rated based on the Contractor's ability to meet these Performance Requirements. The Contractor shall use the Approved measurement and reporting methods developed collaboratively with the NCTA during the Design Phase, to report on the Contractor's performance against these Performance Requirements.		
	These Performance Requirements reflect the minimum tolerable performance expected of the Contractor to avoid unnecessary impact to the NCTA, customers or the general public.		
	The NCTA will utilize a points-based performance scorecard to track the Contractor's compliance with the Performance Requirements. If the Contractor fails to meet these Performance Requirements, the NCTA will assess non-compliance points for each failure. Non-compliance points will be summed, the total of which will determine any performance adjustments to be made to the Contractor's monthly invoice as further detailed below. The Contractor is also subject to direct damages for actual revenue loss.		
	The Contractor shall use best efforts to minimize the impacts that result from failure to meet the Performance Requirements, regardless of whether invoice adjustments are made. Furthermore, the Contractor shall take corrective action to immediately remedy any failures to meet the Performance Requirements and provide a Corrective Action Plan (CAP) to the NCTA for Approval that documents the corrective action taken to prevent future reoccurrence of the problem associated with the non-compliance.		
	A summary of the RTCS Performance Requirements is provided in Table 5, including measurement frequency and non-compliance points for each Performance Requirement. Additional detailed information about the Performance Requirements is provided in the subsequent sections.		
8.1	**General Performance Requirements**		
	The Contractor shall be required to meet all Operational Performance Requirements detailed herein and as part of the Monthly Invoice provide reports that show compliance to the defined Performance Requirements including details of failures that resulted in the non-compliance.		
1365	The Contractor shall Design, implement, maintain and operate the RTCS to meet the Performance Requirements specified herein.		
1366	The Contractor shall facilitate performance monitoring by reporting performance in clearly measurable and easy to understand terms and reports.		
1367	The NCTA will conduct a review of the Contractor's performance on a monthly basis, utilizing a combination of reports generated by the System, including MOMS, and other Approved reports provided by the Contractor, as determined by the NCTA to be necessary.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1368	The Contractor shall immediately notify the NCTA of any failure observed by the Contractor whereby actual loss of revenue occurred or the potential for losses exist.		
1369	If resolution of any failure is under the Contractor's control and/or responsibility, the Contractor shall take action to correct the failure condition and return the RTCS to normal functioning in accordance with the Contract. If the failure condition is determined to be due to the Contractor's fault and it results in failure to meet the Performance Requirements, the NCTA will assess non-compliance points for each failure as described in this Performance Section and may be subject to other remedies in accordance with the Contract.		
8.1.1	Performance Measurement		
	Performance will be measured in categories that align with the primary functions of the RTCS. These categories are:		
	• Availability		
	• Completeness		
	• Operations		
	Each of these categories represents a group of functions within the RTCS and each function includes individual Key Performance Indicators (KPIs), which will be used to measure the Contractor's performance in meeting the Performance Requirements.		
	The specific method of measuring the Contractor's performance will vary depending on the KPI being measured, but will generally be measured against the Performance Requirement on a monthly basis. Regardless of how a KPI is measured, the Contractor shall provide reporting for all performance measures monthly.		
	The amount by which the KPI is missed matters in determining how well the RTCS is performing so the non-compliance points for a particular failure are increased as the deviation from the KPI increases. For example, the AET lane is required to be available 99.95% of the time and the actual availability was measured to be 99.85%. The Contractor would be assessed 1 non-compliance point. If the availability was measured to be 99%, the Contractor would have been assessed 10 non-compliance points.		
	Table 5 provides a summary of the KPIs for the Contractor. A detailed description of each KPI and its associated Performance Requirement is provided in the subsequent sections.		
8.1.2	Performance Scorecard		
	Each KPI is assigned a weighted point value as shown in the above Table 5. The value of the non-compliance points ("points") assigned depends on the severity of the failure and its potential impact on the NCTA's business.		
	The Contractor shall Design and develop Performance Measurement reports including the Monthly Performance Scorecard. An example of a monthly Performance Scorecard is provided in Table 6. Failure to comply with the Performance Requirement for each KPI will result in the KPI's associated non-compliance points being applied to the Contractor's Monthly Performance Scorecard. If the accumulated non-compliance points reach a specified threshold, the Contractor's invoice for the month will be adjusted by a percentage of the total invoice value, as shown in Table 6.		
8.1.3	Non-Compliance Performance Adjustments		
	The Contractor's performance score shall be generated and determined each month by adding the points assessed for non-compliance in each performance category as described above. A Performance adjustment will be made to the monthly invoice in each month that the Contractor exceeds the allowable number of non-compliance points. The maximum monthly adjustment amount that may be made by the NCTA to the Contractor's monthly invoice is 25%.		
8.1.4	Escalation		
	Non-compliance points will accrue as follows:		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	The first month that a specific Performance Requirement is not met will result in the assessment of the initial value of the non-compliance points assigned in Table 7.		
	• If a specific Performance Requirement is not met again for a second consecutive month, the non-compliance points will be double the points assessed for the initial occurrence for all failures of that Performance Requirement for that month.		
	• If a specific Performance Requirement is not met again for a third consecutive month and for subsequent consecutive months thereafter, the non-compliance points will be set at double the points assessed for the second occurrence.		
8.1.5	Direct Damages		
	The Contractor may be charged Direct Damages related to Performance Requirement failures as defined in the Contract Documents.		
8.1.6	NCTA Identified Anomolies and Research Requests		
	In addition to the Contractor's monitoring of the RTCS performance, the NCTA will also review System and performance data and perform tests as deemed necessary. The NCTA may identify data which may indicate a failure to meet one (1) or more of the Performance Standards. As a result of the NCTA's activities, the NCTA may request that the Contractor research and/or provide additional data, identify the extent of the problem or explanation related to anomalies or trends identified by the NCTA.		
1370	The Contractor shall respond and fulfill the NCTA's requests for research, analysis and/or explanation and provide feedback/report within one (1) week or one (1) month as agreed to by the NCTA.		
8.1.7	Corrective Actions		
	Failure to meet a Performance Requirement does not relieve the Contractor of the requirement to complete the activity associated with the Performance Requirement. The Contractor shall identify the failure condition, take immediate action to remedy the condition and ensure that corrective action is taken to prevent repeated failures in the future. This will be documented in a Corrective Action Plan (CAP). For example, if the Contractor fails to completely and accurately transmit the transactions to the existing Back Office within the time required by the Performance Requirement, the transactions must still be completely and accurately transmitted and the Contractor must identify the root cause of the failure, identify the extent of the problem and provide a plan to prevent future occurrences.		
1371	Any failure to meet a Performance Requirement that requires the completion of a specific action(s), which is not completed in accordance with the requirement, does not relieve the Contractor of the responsibility to perform in accordance with the RTCS Requirements. The required specific action(s) must be completed within 48 hours. For example, if the Contractor fails to transmit all transaction files to the Agency within two (2) hours, the files must still be sent to the Agency.		
1372	The Contractor shall develop a CAP for each failure to meet a Performance Requirement identifying the root cause(s) and providing a plan to rectify the current situation, if applicable, and prevent future occurrences.		
1373	The CAP provided by the Contractor shall be in a format Approved by the NCTA.		
1374	The Contractor shall submit a CAP for each failure to meet a Performance Standard for NCTA's review and Approval. Until the NCTA approves the CAP the failure cannot be considered resolved.		
	The CAP shall identify the subsystem(s), component(s), processes and activities associated with the failure to meet a Performance Requirement in sufficient detail to allow the NCTA to understand the issue and why the proposed solution will prevent future occurrences. The RTCS elements include but are not limited to the elements below:		
	a) Vehicle Throughput Rate;		
	b) Transponder Capture Rate;		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
1375	c) Transponder Reporting Accuracy;		
	d) Vehicle Detection Accuracy;		
	e) Transponder Association Accuracy;		
	f) Vehicle Classification Accuracy;		
	g) Image Capture Reporting Accuracy;		
	h) License Plate Extraction (OCR/ALPR) Accuracy, if provided;		
	i) Image Review Accuracy;		
	j) Image Quality;		
	k) Assignment of the Correct Toll to the Transaction;		
	l) Transaction Processing Requirements;		
	m) False Read Processing;		
	n) Image Transaction Transmission Requirements;		
	o) AVI Transaction Transmission Requirement;		
	p) Toll Facility Speed Accuracy;		
	q) ITS System and		
	r) Facilities.		
8.1.8	**Non-Chargeable and Chargeable Failures**		
	For purposes of calculating Performance Requirements, chargeable and non-chargeable failures are defined as follows:		
	• **Non-Chargeable Failures** are those failures are identified in the following section. Non-compliance points will not be assessed for non-chargeable failures.		
	• **Chargeable Failures** are any failures not specifically identified as non-chargeable. Non-compliance points will be assessed for chargeable failures.		
8.1.8.1.	***Non-Chargeable Failures***		
1376	Non-chargeable failures shall include:		
	a) Force Majeure, as defined in the Contract Documents;		
	b) vandalism;		
	c) failure of a test facility or test instrumentation;		
	d) System component failures caused by externally applied stress conditions outside of the Requirements of this Scope of Work and Requirements;		
	e) System component failures caused by environmental or operating conditions outside of the Requirements of this Scope of Work and Requirements;		
	f) normal operating adjustments as allowed in the Test Procedure or Maintenance Plan, as applicable;		
	g) failures where the NCTA have Approved to waive a chargeable failure in advance; and		
	h) failures that are customer or NCTA user induced, or are caused by a Third-Party Service Provider not under the Contractor's control as determined by the NCTA.		
8.1.8.2.	***Chargeable Failures***		
1377	Chargeable failures shall include any failures not specifically identified as non-chargeable.		
8.1.9	**Acknowledgement of All Priority Events**		
1378	The Contractor shall acknowledge receipt of all Priority events within thirty (30) minutes of failure/event notification.		
1379	For the purposes of assessing monthly fee adjustments, 95% of failure or Priority events shall be acknowledged within thirty (30) minutes of receipt.		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
1380	The Contractor may be assessed monthly fee adjustment of $250 if the acknowledgment percent is below the 95% threshold every month for every Priority event not acknowledged within the time frame specified in these Requirements.		
8.1.10	Time to Respond and Repair (TTRR)		
1381	The Contractor shall respond to and complete repair of **Priority 1** failures/events as follows:		
	a) Roadside Systems: respond and complete repair within two (2) hours of failure/event notification.		
	b) RSS: respond and complete repair within four (4) hours of failure/event notification.		
1382	The Contractor may be assessed monthly fee adjustments of $100 per occurrence for every additional delay of one (1) hour to respond and complete repair of Priority 1 failures/events.		
1383	The Contractor shall respond to and complete repair of **Priority 2** failure/events as follows:		
	a) Roadside Systems: respond and complete repair within four (4) hours of failure/event notification.		
	b) RSS: respond and complete repair within eight (8) hours of failure/event notification.		
1384	The Contractor may be assessed monthly fee adjustments of $100 per occurrence for every additional delay of two (2) hours to respond and complete repair of Priority 2 failures/events.		
1385	The Contractor shall respond to and complete repair of **Priority 3** failures/events as follows:		
	a) Roadside Systems: respond and complete repair within eight (8) hours of failure/event notification.		
	b) RSS: respond and complete repair within twenty-four (24) hours of failure/event notification.		
1386	The Contractor may be assessed monthly fee adjustments of $100 per occurrence for every additional delay of two (2) hours to respond and complete repair of Priority 3 failures/events.		
8.1.11	Mean Time Between Failure (MTBF)		
	The RTCS shall be required to meet specific minimum duration Requirements for components and subsystems in continuous operation. This time requirement is defined as the MTBF. Although the Contractor will not be charged non-compliance points for not meeting the specified MTBF, the Contractor shall report on the MTBF each month. Many Equipment failures cause the Contractor to not meet one or more of the Performance Requirements resulting in non-compliance points.		
1387	The Contractor shall provide all third-party MTBF on individual components to be used in the System.		
1388	The Contractor shall report on the MTBF for all components of the RTCS each month.		
1389	MTBF Requirements for all components of the RTCS shall meet the MTBF as specified below:		
	a) Redundant Zone Controller - 20,000 hours		
	b) Automatic Vehicle Identification (AVI) System - 20,000 hours		
	c) Automatic Vehicle Detection/Classification (AVDC) System - 20,000 hours		
	d) Image Capture & Processing System (ICPS) - 20,000 hours		
	e) RTCS Servers - 50,000 hours		
	f) Network Devices - 50,000 hours		
1390	The reliability of the System components shall be calculated based on the following MTBF calculation: MTBF = # units x test period (hours) # failures		
8.1.12	Performance Reporting		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	The Contractor shall provide the NCTA a Monthly RTCS Performance Report package that includes the Contractor's Performance Reports and Monthly Scorecard. The Contractor's Performance Report package will include a series of reports detailing the Contractor's performance against each Performance Requirement and details related to the failure events that resulted in the non-compliance. The Contractor's Performance Report package shall contain all information necessary for the NCTA to verify the Contractor performance as reported by the Contractor.		
1391	The Contractor shall describe in detail how the performance against a requirement will be tracked, tested and reported, identifying specific reports and data elements. In the case of a KPI which cannot be tracked by the System, the form of manual tracking or testing must be described and included in the Maintenance Plan.		
1392	The Contractor shall prepare and submit to the NCTA the Performance Report package on an agreed-upon day each month as defined in these Requirements.		
1393	The Performance Report package shall include a Performance Scorecard calculating the non-compliance points assessed that month, if applicable, a series of reports, one (1) per Performance Requirement detailing the Contractor's performance against the requirement that month supporting the Scorecard for each KPI and a historical report detailing the Contractor's performance against each requirement for the most recent twelve (12) months. See Section 2.1.17.5 for details on these reports. Copies of all CAPs related to failures for that month must be Approved and included.		
1394	The Contractor shall provide the required Performance Report package to the NCTA before an invoice will be considered for payment.		
1395	Performance reporting by the Contractor and any associated adjustments related to Performance Requirements shall begin for the period beginning on the first day of the Operations and Maintenance Phase and shall continue for the duration of the Contract.		
8.2	**RTCS Performance Requirement Details**		
	These KPIs are based on performance that is measured in calendar hours, days and minutes as applicable. Any issues outside of the Contractor's control that affects its ability to meet a KPI should be noted, documented appropriately and with sufficient detail and discussed as part of Monthly RTCS Performance Reviews.		
	The NCTA places a great deal of importance on the controls the Contractor has in place for the RTCS and the effectiveness of those controls. The NCTA will monitor the Contractor's performance for compliance with the Performance Requirements. The Contractor will be required to meet all RTCS Performance Requirements as detailed in these Requirements.		
8.2.1	AET Lane Availability		
	Tolls are collected 24 hours a day, 7 days a week and as such the AET Lanes must achieve a high degree of availability. The AET Lane is viewed as a function; a combination of Hardware and Software that builds accurate and complete transactions. This Requirement will measure the function; thus, if one of two redundant components are not working, yet the component still performs the function as Approved in Design, it would not be counted against availability.		
1396	Each AET Lane with all of its subsystems properly functioning and available to collect revenue and send required transactions and images to the RSS 99.95% of the time excluding scheduled and Approved maintenance. Availability shall be calculated based on the following calculation: Availability = 1- (chargeable downtime min / (minutes in period-exception min in period))		
	a) System reporting detailing the AET Lane availability along with MOMS and help desk tickets, work orders and feedback from customers, Back Office staff, NCTA staff and consultants will be utilized to identify availability failures.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1397	b) For any month in which ALL components of the AET Toll Zones are not fully available and operational at least 99.95% of the time excluding scheduled and Approved maintenance, the Contractor shall be assessed 1.0 point for each 0.1% or portion thereof below the Performance requirement.		
8.2.2	Roadway Support System (RSS) Availability		
	Tolls are collected 24 hours a day, 7 days a week and as such the RSS must achieve a high degree of availability.		
1398	The RSS with all of its devices, Software, applications and processes properly functioning and available to the Authorized Users, successfully transmitting transactions to the existing NCTA Back Office systems, and communicating with the in-lane systems 99.95% of the time excluding scheduled and Approved maintenance.		
	Availability shall be calculated based on the following calculation:		
	Availability = 1- (chargeable downtime min / (minutes in period-exception min in period))		
	a) System reporting detailing the RSS availability along with MOMS and help desk tickets, work orders and feedback from customers, Back Office staff, NCTA staff and consultants will be utilized to identify availability failures.		
	b) For any month in which ALL components of the RSS are not fully available and operational at least 99.95% of the time excluding scheduled and Approved maintenance, the Contractor shall be assessed 1.0 point for each 0.1% or portion thereof below the Performance requirement.		
8.2.3	Toll Facility Maintenance Completeness		
	Tolls are collected 24 hours a day, 7 days a week and as such the Toll Facility plays a crucial role in providing infrastructure, power, environmental controls, and security to keep the toll System functioning at a high availability level. ***Attachment 15: Toll Facilities Maintenance Scope of Work*** has an extensive and complete list of Requirements for facilities Maintenance with activities specified to be conducted weekly, monthly, quarterly, semi-annually and annually as applicable. Each month the contractor shall report on all Maintenance activities as directed in the SOW.		
1399	The Contractor shall perform all required Maintenance activities as specified in Attachment 15 and provide the complete and accurate Facility Maintenance log to NCTA as part of the Monthly Performance package.		
	a) The Facility Maintenance log will be reviewed along with spot checks to verify the required facilities Maintenance activities have been completed as specified.		
	b) For any month in which any scheduled Maintenance activity is not performed, the Contractor shall be assessed 1.0 point for each weekly or monthly scheduled Maintenance activity not completed per schedule, and one half (0.5) points for each other Facility Maintenance activity due.		
8.2.4	ITS Complete and Timely Data Transmission		
	The ability of the STOC to accurately calculate travel information is directly affected by the data input from the ITS, mainly the traffic detectors. Missing data or data not received by the STOC in time impact customer satisfaction.		
1400	The ITS with all of its devices, Software, applications and processes properly functioning and available shall transmit all of the required traffic data to the STOC for processing in time to be used in the calculations 99.5% of the time.		
	a) System reporting detailing the data transmission date/time and the date/time that the STOC received the data will be compared.		
	b) For any month in which all required traffic data is not transmitted 99.5% if the time, the Contractor shall be assessed 1.0 point for each 0.1% or portion thereof below the Performance Requirement.		
8.2.5	AVI Transaction Complete and Timely Transmission		
	The Contractor shall be responsible for the timely processing of AVI transactions. The NCTA is subject to statutory requirements and is obligated to customers and Interoperable Agencies to process all transactions in a timely manner. The Contractor's performance in this area has a direct impact on the NCTA's revenue stream.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
1401	The Contractor shall process and transmit all AVI transactions to the existing Back Office within two (2) hours after the vehicle travels through the tolling point.		
	a) System reporting detailing the transaction date/time and the date/time that the transaction was acknowledged by the Back Office will be compared to a matching Back Office Report.		
	b) The Back Office validates the transactions to ensure that they comply with the agreed upon ICD and transactions which do not meet the ICD will be rejected as incomplete or inaccurate. Unless a rejected transaction is corrected and resubmitted with in the two (2) hour transmission period, they will not meet this KPI.		
1402	For any month in which 100% of the AVI transactions are not transmitted in accordance with the Approved ICD to the Back Office, the Contractor shall be assessed 1.0 point for each 0.1% or portion thereof below the Performance requirement.		
8.2.6	Image Transaction Complete and Timely Transmission		
	The Contractor shall be responsible for the timely processing of image transactions. The NCTA are subject to statutory requirements and are obligated to customers and Interoperable Agencies to process all transactions in a timely manner. The Contractor's performance in this area has a direct impact on the NCTA's revenue stream.		
1403	The Contractor shall process and transmit all image transactions to the existing Back Office within seventy-two (72) hours after the vehicle travels through the tolling point. This includes entering all required plate data or rejecting the plate if it meets the criteria to be rejected.		
	a) System reporting detailing the transaction date/time and the date/time that the transaction was acknowledged by the Back Office will be compared to a matching Back Office Report.		
	b) The Back Office validates the transactions to ensure that they comply with the agreed upon ICD and transactions which do not meet the ICD will be rejected as incomplete or inaccurate. Unless a rejected transaction is corrected and resubmitted within the seventy-two (72) hour transmission period, they will not meet this KPI.		
1404	For any month in which 100% of the image transactions are not transmitted in accordance with the Approved ICD to the Back Office, the Contractor shall be assessed 1.0 point for each 0.1% or portion thereof below the Performance requirement.		
8.2.7	AVI Transaction Accuracy		
	The Contractor shall be required to accurately process AVI transactions. Errors can result in the customers being charged at the incorrect rate or necessitate image review when the Transponder is not read; such errors impact customer service, public perception and NCTA costs.		
1405	The Contractor shall correctly build the transaction including all the necessary transaction components incorporating inputs from the AVI, AVDC, and ICPS subsystems to accurately identify the toll amount, the type of transaction, the vehicle class and all other required transaction data. Ultimately the AVI transaction shall be correctly associated to the vehicle with the correct classification and toll amount.		
	a) Feedback from customers, Back Office staff, NCTA staff and consultants will be utilized to identify inaccurate or incomplete transactions.		
	b) NCTA will utilize trend reporting to identify transactions, or lanes/zones for further review to identify possibly inaccurate transactions.		
	c) Transactions rejected by the Back Office will also be reviewed.		
	d) NCTA may conduct unannounced controlled testing in live traffic as well.		
1406	For any month in which the AVI transaction accuracy falls below 99.99%, the Contractor shall be assessed 1.0 point for each 0.1% or portion thereof below the Performance requirement.		
8.2.8	Image Transaction Accuracy		

No.	Requirements	Required Inputs	
		Compliance	Comments
		Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	The Contractor shall be required to accurately process image transactions. Errors in identified images can result in the incorrect customer being billed and/or the customer being billed at the incorrect rate; such errors impact customer service and public perception.		
	The Contractor shall correctly build the transaction including all the necessary transaction components incorporating inputs from the AVI, AVDC and image capture subsystems to accurately identify the toll amount, the type of transaction, the vehicle class and all other required transaction data. The Contractor shall also correctly determine and enter the plate information for all images which do not meet the criteria for rejection. Ultimately the image transaction shall contain the correct license plate data the license plate number, jurisdiction, plate type), classification and toll amount		
1407	a) A statistically significant sample set of image transactions which were not rejected will be selected by the System (random sample) based on the number of images reviewed that month and provided to NCTA for their review of the image review outputs.		
	b) In addition, transactions which were successfully disputed for the reason that the image was incorrectly reviewed shall be added to the errors for that month.		
	c) Feedback from customers, Back Office staff, NCTA staff and consultants will be utilized to identify inaccurate or incomplete transactions.		
	d) NCTA will utilize trend reporting to identify transactions, or lanes/zones for further review to identify possibly inaccurate transactions.		
	e) Transactions rejected by the Back Office will also be reviewed.		
	f) NCTA may conduct unannounced controlled testing in live traffic as well.		
1408	For any month in which the image transaction accuracy falls below 99.8%, the Contractor shall be assessed 1.0 point for each 0.2% or portion thereof below the Performance requirement.		
8.2.9	Image Rejection Accuracy		
	The Contractor shall be required to accurately process image transactions. The incorrect rejection of images results in the inability to collect a toll for that transaction and therefore has a direct impact on the NCTA's revenues.		
	The Contractor shall correctly determine that the plate meets the criteria for rejection and select the correct reject reason for all images which do not meet the criteria for identification.		
1409	a) Only images that are not human-readable shall be rejected and the correct reject reason code shall be selected 99.99% of the time.		
	b) A statistically significant sample set of rejected image transactions will be selected by the System (random sample) based on the number of images reviewed that month and provided to NCTA for their review of the image review outputs.		
	c) Feedback from customers, Back Office staff, NCTA staff and consultants will be utilized to identify inaccurate or incomplete transactions.		
	d) NCTA will utilize trend reporting to identify transactions, or lanes/zones for further review to identify possibly inaccurate transactions.		
	e) Transactions rejected by the Back Office will also be reviewed.		
	f) NCTA may conduct unannounced controlled testing in live traffic as well.		
1410	For any month in which the image rejection accuracy falls below 99.99%, the Contractor shall be assessed 1.0 point for each 0.1% or portion thereof below the Performance requirement.		
8.2.10	Image Quality		

No.	Requirements	Required Inputs: Compliance Y - Yes N - No	Required Inputs: Comments If "Compliance = N" then Proposer must provide an explanation in this column
	The ability to be paid for image transaction relies upon the capture of images of sufficient quality for image review processing. If the image quality is poor, image review will take longer and ultimately images may be rejected. The Contractor's performance in this area has a direct impact on the NCTA's revenue stream.		
1411	The RTCS shall provide images of sufficient image quality to achieve the Contractor's desired automation rate and NCTA's Requirements such that less than 0.1% of the images are rejected for reasons under the Contractor's control. Reject reasons not under the Contractor's control are:		
	a) the vehicle has no plate;		
	b) plate is not in the normal camera field of view because it is not mounted in accordance with State laws;		
	c) the plate is covered by dirt, a trailer hitch, tailgate, or some other material such that the numbers/letters are not human readable; or		
	d) the plate is damaged so that numbers/letters are not human readable.		
1412	The number of images rejected for reasons within the Contractor's control will be compared to the number of images reviewed that month to calculate whether or not the Contractor's image quality met the standard.		
1413	For any month in which the requirement is not met, the Contractor shall be assessed 1.0 point for each 0.1% or portion thereof below the Performance requirement.		
8.2.11	Back Office File Communications		
	The NCTA CSC Back Office will create daily Transponder Status List files, and periodic Tolls Rate files and Enforcement Notifications List files. Receipt of files from the existing NCTA CSC Back Office, their version, time of receipt and processing status shall also be tracked. Updates to some or all of these files will happen at intervals of no less than ten (10) minutes. The Contractor shall provide NCTA or their designee access adequate to validate application of Updates to files at locations within the system of their choosing.		
1414	The Contractor shall receive, process, transmit and apply 100% of the files and updates as applicable in accordance with these Requirements.		
	a) Daily files – Files transmitted daily will be tracked by the System and reported to NCTA. 1 point will be assessed for days wherein the daily file(s) were not applied within ten minutes of arrival to the RTCS System.		
	b) File incremental Updates – NCTA or designee will select locations and acquire validation data from the CSC to verify Updates have been applied to files in downstream portions of the RTCS System. Failure is determined by the current status of a RTCS file that should be updated is not after more than fifteen minutes following the update transmission. 1 point will be assessed each day that this testing fails.		
1415	For any month in which the files and Updates are not applied with in the applicable time (10 minutes for daily files and 15 minutes for Updates), the Contractor shall be assessed 1.0 point for each file not received and processed within the applicable time.		
8.2.12	Wrong-Way Vehicle Detection and Notification		
	The Contractor shall be required to accurately detect Wrong-Way Vehicles traveling in the wrong direction and to properly send notifications and alerts per the Requirements.		
1416	The Contractor shall accurately detect 100% of vehicles traveling in the wrong direction and shall send notifications and alerts in accordance with these Requirements.		
	a) The AVDC System shall detect and report vehicles traveling in the wrong direction.		
	b) Electronic wrong-way vehicle signs (provided by others) shall be illuminated.		
	c) The DVAS shall record a five (5) second looping DVAS video file upon detection of a Wrong-Way Vehicle.		
	d) The RTCS shall transmit the DVAS video file to the STOC and transmit an alert to STOC personnel (via email and SMS text message) within ten (10) seconds of the vehicle passing through the Toll Zone.		

No.		Required Inputs	
		Compliance	Comments
	Requirements	Y - Yes N - No	If "Compliance = N" then Proposer must provide an explanation in this column
	e) The DVAS video file shall be prominently displayed on the operators' video wall or monitors at the STOC.		
	f) The System shall transmit a vehicle transaction to the existing NCTA CSC Back Office with a flag indicating wrong-way vehicle transaction.		
	g) The System shall transmit image(s) (Configurable) of the Wrong-Way Vehicle and the vehicle Region of Interest (ROI) to the existing NCTA CSC Back Office, with the exception of vehicles traveling in the wrong direction on shoulders or straddling shoulders.		
1417	For any day in which a Wrong-Way Vehicle is not accurately detected and properly reported, the Contractor shall be assessed 1.0 point.		
8.2.13	Preventative and Corrective MOT		
	The Contractor shall be required to notify NCTA and NCDOT of all MOT placed on the Triangle Expressway and Complete 540 projects during the maintenance periods. NCTA must approve all MOT before work commences. For all Priority failures / events that require MOT for repair, the mean time to repair clock shall not start until NCTA Approval for MOT is granted.		
1418	The Contractor shall notify NCTA and NCDOT of all MOT activities on the Triangle Expressway and Complete 540 during the maintenance period.		
	a) The Contractor shall provide a schedule of all preventative and predictive maintenance MOT activities for the month by the 5th calendar day of the month.		
	b) The Contractor shall provide a minimum of twelve (12) hours of notice prior to any changes to the monthly maintenance schedule.		
1419	The Contractor shall conform to the latest version of the NCDOT Standard Specifications for Roads and Structures for regulations for MOT activities on the Triangle Expressway and Complete 540 during the maintenance period. The NCDOT Standard Specifications for Roads and Structures (2018 Standard Specifications for Roads and Structures.pdf) is located at: https://connect.ncdot.gov/resources/Specifications/StandSpecLibrary/Forms/AllItems.aspx		

Form D-7

Price Proposal

(An Excel Version of the forms are "paper clipped" to this NCTA RTCS Exhibits file for ease of completion.)

Sheet 1
NCTA Triangle Expressway and Complete 540 RTCS Project Summary
(Summary Only - No Proposer Input Required)

	Triangle Expressway Cost ($)	Morrisville Parkway Interchange Cost ($)	Complete 540 Cost ($)	Grand Total Cost ($)
Implementation Phase				
Roadside System Cost (Sheet 2)	$ -	$ -	$ -	$ -
Roadway Support System Cost (Sheet 3)	$ -		$ -	$ -
Intelligent Transportation System (ITS) Implementation Cost (Sheet 12)	$ -	$ -	$ -	$ -
Total Implementation Phase	$ -	$ -	$ -	$ -
Operations and Maintenance Phase				
Maintenance				
Roadside System Hardware Maintenance and Software Support Services Cost (Sheet 4)	$ -	$ -	$ -	$ -
Roadway Support System Maintenance and Software Support Services Cost (Sheet 5)	$ -		$ -	$ -
Intelligent Transportation System Maintenance Cost (Sheet 6)	$ -	$ -	$ -	$ -
Toll Facilities Maintenance (Sheet 7)	$ -	$ -	$ -	$ -
Total Maintenance	$ -	$ -	$ -	$ -
Operations				
AVI Transaction Processing Cost (Sheet 8)	$ -		$ -	$ -
Image-based Transaction Processing Cost (Sheet 8)	$ -		$ -	$ -
Total Operations	$ -		$ -	$ -
Total Operations and Maintenance Phase	$ -	$ -	$ -	$ -
TOTAL IMPLEMENTATION, OPERATIONS AND MAINTENANCE COST	$ -	$ -	$ -	$ -

Sheet 1
NCTA Triangle Expressway and Complete 540 RTCS Project Summary
(Summary Only - No Proposer Input Required)

Optional Extension Phase				
Extension #1 Roadside System Hardware Maintenance and Software Support Services Cost (Sheet 4)	$ -	$ -	$ -	$ -
Extension #1 Roadway Support System Maintenance and Software Support Services Cost (Sheet 5)	$ -		$ -	$ -
Extension #1 ITS Maintenance (Sheet 6)	$ -	$ -	$ -	$ -
Extension #1 Toll Facilities Maintenance (Sheet 7)	$ -	$ -	$ -	$ -
Extension #1 AVI Transaction Processing Cost (Sheet 8)	$ -		$ -	$ -
Extension #1 Image-based Transaction Processing Cost (Sheet 8)	$ -		$ -	$ -
Extension #2 Roadside System Hardware Maintenance and Software Support Services Cost (Sheet 4)	$ -	$ -	$ -	$ -
Extension #2 Roadway Support System Maintenance and Software Support Services Cost (Sheet 5)	$ -		$ -	$ -
Extension #2 ITS Maintenance (Sheet 6)	$ -	$ -	$ -	$ -
Extension #2 Toll Facilities Maintenance (Sheet 7)	$ -	$ -	$ -	$ -
Extension #2 AVI Transaction Processing Cost (Sheet 8)	$ -		$ -	$ -
Extension #2 Image-based Transaction Processing Cost (Sheet 8)	$ -		$ -	$ -
Total Optional Extension Phases	$ -	$ -	$ -	$ -
TOTAL IMPLEMENTATION, OPERATIONS AND MAINTENANCE COST INCLUDING OPTIONAL EXTENSION PHASES	$ -	$ -	$ -	$ -

Grand Total Dollars

Officer Signature

Date

Sheet 1
NCTA Triangle Expressway and Complete 540 RTCS Project Summary
(Summary Only - No Proposer Input Required)

Description of Items	Per Zone Roadside Cost ($)	Year 1 Per Zone Maintenance Cost ($)
Future Roadside System Cost (by Zone Type)		
Future Zone Type 1 - AET: 4 travel + 2 shoulders (Sheet 9)	$ -	$ -
Future Zone Type 2 - AET: 3 travel + 2 shoulders (Sheet 9)	$ -	$ -
Future Zone Type 3 - AET: 2 travel + 2 shoulders (Sheet 9)	$ -	$ -
Future Zone Type 4 - AET: 2 travel + 1 shoulder (Sheet 9)	$ -	$ -
Future Zone Type 5 - AET: 1 travel + 2 shoulders (Sheet 9)	$ -	$ -
Future Zone Type 6 - AET: 1 travel + 1 shoulder (Sheet 9)	$ -	$ -
Future Zone Type 7 - AET: 1 Fat 18' travel + 2 shoulders (Sheet 9)	$ -	$ -

Description of Items	Estimated Total
Estimated Lost Revenue (Sheet 10-1)	$ -

Sheet 2
Roadside System Cost by Roadway
(Summary Only - No Proposer Input Required)

	Toll Zone Type[1]	Total # of Toll Zones	Hardware Cost Per Toll Zone ($)	Labor Cost Per Toll Zone ($)	Cost Per Toll Zone ($)	Total Cost ($)
Triangle Expressway						
T01	Ramp 1	1	$ -	$ -	$ -	$ -
T02	Ramp 2	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 8						$ -
T05	Ramp 2	1	$ -	$ -	$ -	$ -
T06	Ramp 2	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 7						$ -
T09	Ramp 1	1	$ -	$ -	$ -	$ -
T10	Ramp 2	1	$ -	$ -	$ -	$ -
T13	AET 3	1	$ -	$ -	$ -	$ -
T14	AET 4	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 6						$ -
T17	AET 3	1	$ -	$ -	$ -	$ -
T18	AET 3	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 5						$ -
T21	Ramp 3	1	$ -	$ -	$ -	$ -
T22	Ramp 1	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 4						$ -
T25	AET 3	1	$ -	$ -	$ -	$ -
T26	AET 3	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 3						$ -
T29	Ramp 1	1	$ -	$ -	$ -	$ -
T30	Ramp 1	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 2						$ -
T31	Ramp 2	1	$ -	$ -	$ -	$ -
T32	Ramp 1	1	$ -	$ -	$ -	$ -
T33	AET 4	1	$ -	$ -	$ -	$ -
T34	AET 4	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 1						$ -
Total Triangle Expressway Roadside		20	$ -	$ -	$ -	$ -

Sheet 2
Roadside System Cost by Roadway
(Summary Only - No Proposer Input Required)

	Toll Zone/Type[1]	Total # of Toll Zones	Hardware Cost Per Toll Zone ($)	Labor Cost Per Toll Zone ($)	Cost Per Toll Zone ($)	Total Cost Toll Zones ($)
Morrisville Parkway						
T15	Ramp 1	1	$ -	$ -	$ -	$ -
T16	Ramp 1	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)						
Total Plaza 5						$ -
Total Morrisville Parkway Interchange Roadside		2	$ -	$ -	$ -	$ -

	Toll Zone/Type[1]	Total # of Toll Zones	Hardware Cost Per Toll Zone ($)	Labor Cost Per Toll Zone ($)	Cost Per Toll Zone ($)	Total Cost Toll Zones ($)
Complete 540						
T35	AET 3	1	$ -	$ -	$ -	$ -
T36	AET 3	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 10						$ -
T37	AET 3	1	$ -	$ -	$ -	$ -
T38	AET 3	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 11						$ -
T39	AET 3	1	$ -	$ -	$ -	$ -
T40	AET 3	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 12						$ -
T41	AET 3	1	$ -	$ -	$ -	$ -
T42	AET 3	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 13						$ -
T43	AET 3	1	$ -	$ -	$ -	$ -
T44	AET 3	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 14						$ -
T45	AET 3	1	$ -	$ -	$ -	$ -
T46	AET 3	1	$ -	$ -	$ -	$ -
Facility Server (Sheet 2-5)			$ -	$ -	$ -	$ -
Total Plaza 15						$ -
Total Complete 540 Roadside		12	$ -	$ -	$ -	$ -

Note 1:
Toll Zone Type - Ramp 1: 4' shoulder + 1 x 16' travel + 12' shoulder
Toll Zone Type - Ramp 2: 4' shoulder + 2 x 12' travel + 10' shoulder
Toll Zone Type - Ramp 3: 8' shoulder + 2 x 12' travel + 12' shoulder
Toll Zone Type - AET 3: 12' shoulder + 3 x 12' travel + 12' shoulder
Toll Zone Type - AET 4: 12' shoulder + 4 x 12' travel + 12' shoulder

Sheet 2-1 Backup
Ramp 1: Roadside System Cost Schedule

Lane Types & Item Description	Quantity per Toll Zone	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)	
Zone Type - Ramp 1: 4' shoulder + 1 x 16' travel + 12' shoulder						
1. Redundant Toll Zone Controller and In-lane Electronics						
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Redundant Toll Zone Controller and In-lane Electronics			$ -	$ -	$ -	
2. AVI System						
ETC Reader Modules (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
ETC Antennas (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVI System			$ -	$ -	$ -	
3. AVDC System						
Overhead Scanners	0	$ -	$ -	$ -	$ -	
In-pavement Sensors	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVC System			$ -	$ -	$ -	
4. ICPS						
Rear Cameras	0	$ -	$ -	$ -	$ -	
Front Cameras	0	$ -	$ -	$ -	$ -	
Illumination	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total ICPS			$ -	$ -	$ -	
5. Communications Equipment						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Communications Equipment			$ -	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks						
Equipment Cabinets/Enclosure	0	$ -	$ -	$ -	$ -	
Equipment Racks	0	$ -	$ -	$ -	$ -	
Cabinet HVAC	0	$ -	$ -	$ -	$ -	
UPS	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Equipment Racks			$ -	$ -	$ -	
7. DVAS						
Cameras	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total DVAS			$ -	$ -	$ -	
8. Access Control and Security Monitoring System						
Access Card Encoder	0	$ -	$ -	$ -	$ -	
Card Readers	0	$ -	$ -	$ -	$ -	
Cards	0	$ -	$ -	$ -	$ -	
Critical Environmental Monitoring System	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Access Control and Security Monitoring System			$ -	$ -	$ -	
9. Commissioning Test						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Commissioning Test			$ -	$ -	$ -	
Total			$ -	$ -	$ -	
Labor Check (from Sheet 2-1a, cell F50) should equal cell E76				$ -		

Note 1: All hardware/software provided under this Contract should be included in these costs.

Note 2: Use the additional rows as needed to itemize each components

Note 3: All roadways are current Year Cost.

Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.

Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in the Scope of Work

Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in the Scope of Work.

Note 7: Unit cost for AVI Readers and Antennas will be zero dollars as they are provided by NCTA from the AVI Contract.

Note 8: Assume all shoulder lanes shall be equipped with rear-only Image Capture & Processing Systems (ICPS), and sensors to trigger the cameras and detect and frame the vehicle traveling on the shoulder, as required to meet performance requirements.

Sheet 2-1a Backup
Ramp 1: Roadside System - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Loaded Hourly Billing Rates by Task		
			Roadside System Cost		
			Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		CADD Technician	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -
14		Installation Technician	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 2-2 Backup
Ramp 2: Roadside System Cost Schedule

Lane Types & Item Description	Quantity per Toll Zone	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)	
Zone Type - Ramp 2: 4' shoulder + 2 x 12' travel + 10' shoulder						
1. Redundant Toll Zone Controller and In-lane Electronics						
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Redundant Toll Zone Controller and In-lane Electronics			$ -	$ -	$ -	
2. AVI System						
ETC Reader Modules (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
ETC Antennas (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVI System			$ -	$ -	$ -	
3. AVDC System						
Overhead Scanners	0	$ -	$ -	$ -	$ -	
In-pavement Sensors	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVC System			$ -	$ -	$ -	
4. ICPS						
Rear Cameras	0	$ -	$ -	$ -	$ -	
Front Cameras	0	$ -	$ -	$ -	$ -	
Illumination	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total ICPS			$ -	$ -	$ -	
5. Communications Equipment						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Communications Equipment			$ -	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks						
Equipment Cabinets/Enclosure	0	$ -	$ -	$ -	$ -	
Equipment Racks	0	$ -	$ -	$ -	$ -	
Cabinet HVAC	0	$ -	$ -	$ -	$ -	
UPS	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Equipment Racks			$ -	$ -	$ -	
7. DVAS						
Cameras	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total DVAS			$ -	$ -	$ -	
8. Access Control and Security Monitoring System						
Access Card Encoder	0	$ -	$ -	$ -	$ -	
Card Readers	0	$ -	$ -	$ -	$ -	
Cards	0	$ -	$ -	$ -	$ -	
Critical Environmental Monitoring System	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Access Control and Security Monitoring System			$ -	$ -	$ -	
9. Commissioning Test						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Commissioning Test			$ -	$ -	$ -	
Total			$ -	$ -	$ -	
Labor Check (from Sheet 2-2a, cell F50) should equal cell E76				$ -		

Note 1: All hardware/software provided under this Contract should be included in these costs.

Note 2: Use the additional rows as needed to itemize each components

Note 3: All roadways are current Year Cost.

Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.

Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in the Scope of Work

Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in the Scope of Work.

Note 7: Unit cost for AVI Readers and Antennas will be zero dollars as they are provided by NCTA from the AVI Contract.

Note 8: Assume all shoulder lanes shall be equipped with rear-only Image Capture & Processing Systems (ICPS), and sensors to trigger the cameras and detect and frame the vehicle traveling on the shoulder, as required to meet performance requirements.

Sheet 2-2a Backup
Ramp 2: Roadside System - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Loaded Hourly Billing Rates by Task		
			Roadside System Cost		
			Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		CADD Technician	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -
14		Installation Technician	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 2-3 Backup
Ramp 3: Roadside System Cost Schedule

Lane Types & Item Description	Quantity per Toll Zone	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)	
Zone Type - Ramp 3: 8' shoulder + 2 x 12' travel + 12' shoulder						
1. Redundant Toll Zone Controller and In-lane Electronics						
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Redundant Toll Zone Controller and In-lane Electronics			$ -	$ -	$ -	
2. AVI System						
ETC Reader Modules (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
ETC Antennas (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVI System			$ -	$ -	$ -	
3. AVDC System						
Overhead Scanners	0	$ -	$ -	$ -	$ -	
In-pavement Sensors	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVC System			$ -	$ -	$ -	
4. ICPS						
Rear Cameras	0	$ -	$ -	$ -	$ -	
Front Cameras	0	$ -	$ -	$ -	$ -	
Illumination	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total ICPS			$ -	$ -	$ -	
5. Communications Equipment						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Communications Equipment			$ -	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks						
Equipment Cabinets/Enclosure	0	$ -	$ -	$ -	$ -	
Equipment Racks	0	$ -	$ -	$ -	$ -	
Cabinet HVAC	0	$ -	$ -	$ -	$ -	
UPS	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Equipment Racks			$ -	$ -	$ -	
7. DVAS						
Cameras	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total DVAS			$ -	$ -	$ -	
8. Access Control and Security Monitoring System						
Access Card Encoder	0	$ -	$ -	$ -	$ -	
Card Readers	0	$ -	$ -	$ -	$ -	
Cards	0	$ -	$ -	$ -	$ -	
Critical Environmental Monitoring System	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Access Control and Security Monitoring System			$ -	$ -	$ -	
9. Commissioning Test						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Commissioning Test			$ -	$ -	$ -	
Total			$ -	$ -	$ -	
Labor Check (from Sheet 2-3a, cell F50) should equal cell E76				$ -		

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in the Scope of Work.
Note 7: Unit cost for AVI Readers and Antennas will be zero dollars as they are provided by NCTA from the AVI Contract.
Note 8: Assume all shoulder lanes shall be equipped with rear-only Image Capture & Processing Systems (ICPS), and sensors to trigger the cameras and detect and frame the vehicle traveling on the shoulder, as required to meet performance requirements.

Sheet 2-3a Backup
Ramp 3: Roadside System - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Loaded Hourly Billing Rates by Task		
			Roadside System Cost		
			Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		CADD Technician	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -
14		Installation Technician	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 2-4a1 Backup
AET 3: Roadside System Cost Schedule

Lane Types & Item Description	Quantity per Toll Zone	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)	
Zone Type - AET: 12' shoulder + 3 x 12' travel + 12' shoulder						
1. Redundant Toll Zone Controller and In-lane Electronics						
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Redundant Toll Zone Controller and In-lane Electronics			$ -	$ -	$ -	
2. AVI System						
ETC Reader Modules (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
ETC Antennas (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVI System			$ -	$ -	$ -	
3. AVDC System						
Overhead Scanners	0	$ -	$ -	$ -	$ -	
In-pavement Sensors	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVC System			$ -	$ -	$ -	
4. ICPS						
Rear Cameras	0	$ -	$ -	$ -	$ -	
Front Cameras	0	$ -	$ -	$ -	$ -	
Illumination	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total ICPS			$ -	$ -	$ -	
5. Communications Equipment						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Communications Equipment			$ -	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks						
Equipment Cabinets/Enclosure	0	$ -	$ -	$ -	$ -	
Equipment Racks	0	$ -	$ -	$ -	$ -	
Cabinet HVAC	0	$ -	$ -	$ -	$ -	
UPS	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Equipment Racks			$ -	$ -	$ -	
7. DVAS						
Cameras	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total DVAS			$ -	$ -	$ -	
8. Access Control and Security Monitoring System						
Access Card Encoder	0	$ -	$ -	$ -	$ -	
Card Readers	0	$ -	$ -	$ -	$ -	
Cards	0	$ -	$ -	$ -	$ -	
Critical Environmental Monitoring System	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Access Control and Security Monitoring System			$ -	$ -	$ -	
9. Commissioning Test						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Commissioning Test			$ -	$ -	$ -	
Total			$ -	$ -	$ -	
Labor Check (from Sheet 2-4a2, cell F50) should equal cell E76				$ -		

Note 1: All hardware/software provided under this Contract should be included in these costs.

Note 2: Use the additional rows as needed to itemize each components

Note 3: All roadways are current Year Cost.

Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.

Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in the Scope of Work

Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in the Scope of Work.

Note 7: Unit cost for AVI Readers and Antennas will be zero dollars as they are provided by NCTA from the AVI Contract.

Note 8: Assume all shoulder lanes shall be equipped with rear-only Image Capture & Processing Systems (ICPS), and sensors to trigger the cameras and detect and frame the vehicle traveling on the shoulder, as required to meet performance requirements.

Sheet 2-4a2 Backup
AET 3: Roadside System - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Loaded Hourly Billing Rates by Task		
			Roadside System Cost		
			Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		CADD Technician	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -
14		Installation Technician	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 2-4b1 Backup
AET 4: Roadside System Cost Schedule

Lane Types & Item Description	Quantity per Toll Zone	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)	
Zone Type - AET: 12' shoulder + 4 x 12' travel + 12' shoulder						
1. Redundant Toll Zone Controller and In-lane Electronics						
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Redundant Toll Zone Controller and In-lane Electronics			$ -	$ -	$ -	
2. AVI System						
ETC Reader Modules (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
ETC Antennas (provided by NCTA) - Quantity	0	$ -	$ -	$ -	$ -	see note 7
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVI System			$ -	$ -	$ -	
3. AVDC System						
Overhead Scanners	0	$ -	$ -	$ -	$ -	
In-pavement Sensors	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total AVC System			$ -	$ -	$ -	
4. ICPS						
Rear Cameras	0	$ -	$ -	$ -	$ -	
Front Cameras	0	$ -	$ -	$ -	$ -	
Illumination	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cables and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total ICPS			$ -	$ -	$ -	
5. Communications Equipment						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Communications Equipment			$ -	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks						
Equipment Cabinets/Enclosure	0	$ -	$ -	$ -	$ -	
Equipment Racks	0	$ -	$ -	$ -	$ -	
Cabinet HVAC	0	$ -	$ -	$ -	$ -	
UPS	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Equipment Racks			$ -	$ -	$ -	
7. DVAS						
Cameras	0	$ -	$ -	$ -	$ -	
Servers	0	$ -	$ -	$ -	$ -	
Cable and Connectors	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total DVAS			$ -	$ -	$ -	
8. Access Control and Security Monitoring System						
Access Card Encoder	0	$ -	$ -	$ -	$ -	
Card Readers	0	$ -	$ -	$ -	$ -	
Cards	0	$ -	$ -	$ -	$ -	
Critical Environmental Monitoring System	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Access Control and Security Monitoring System			$ -	$ -	$ -	
9. Commissioning Test						
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
	0	$ -	$ -	$ -	$ -	
Total Commissioning Test			$ -	$ -	$ -	
Total			$ -	$ -	$ -	
Labor Check (from Sheet 2-4b2, cell F50) should equal cell E76				$ -		

Note 1: All hardware/software provided under this Contract should be included in these costs.

Note 2: Use the additional rows as needed to itemize each components

Note 3: All roadways are current Year Cost.

Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.

Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in the Scope of Work

Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in the Scope of Work.

Note 7: Unit cost for AVI Readers and Antennas will be zero dollars as they are provided by NCTA from the AVI Contract.

Note 8: Assume all shoulder lanes shall be equipped with rear-only Image Capture & Processing Systems (ICPS), and sensors to trigger the cameras and detect and frame the vehicle traveling on the shoulder, as required to meet performance requirements.

Sheet 2-4b2 Backup
AET 4: Roadside System - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Loaded Hourly Billing Rates by Task		
			Roadside System Cost		
			Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		CADD Technician	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -
14		Installation Technician	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 2-5 Backup
Facility Server by Location Cost Schedule

Lane Types & Item Description	Quantity per Toll Zone	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)
Facility Server					
1. Triangle Expressway - Plaza 8					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 8			$ -	$ -	$ -
2. Triangle Expressway - Plaza 7					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 7			$ -	$ -	$ -
3. Triangle Expressway - Plaza 6					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 6			$ -	$ -	$ -
4. Triangle Expressway - Plaza 5					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 5			$ -	$ -	$ -
5. Triangle Expressway - Plaza 4					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 4			$ -	$ -	$ -
6. Triangle Expressway - Plaza 3					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 3			$ -	$ -	$ -
7. Triangle Expressway - Plaza 2					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 2			$ -	$ -	$ -
8. Triangle Expressway - Plaza 1					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 1			$ -	$ -	$ -

Sheet 2-5 Backup
Facility Server by Location Cost Schedule

Lane Types & Item Description	Quantity per Toll Zone	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)
9. Morrisville Parkway Interchange - Plaza 5					
Total Facility Server - Plaza 5					
10. Complete 540 - Plaza 10					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 10			$ -	$ -	$ -
11. Complete 540 - Plaza 11					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 11			$ -	$ -	$ -
12. Complete 540 - Plaza 12					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 12			$ -	$ -	$ -
13. Complete 540 - Plaza 13					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 13			$ -	$ -	$ -
14. Complete 540 - Plaza 14					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 14			$ -	$ -	$ -
15. Complete 540 - Plaza 15					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server - Plaza 15			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.

Sheet 3
Roadway Support System Cost
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Cost ($)	Cost ($)	Cost ($)
			Triangle Expressway (including Morrisville Parkway Interchange)	Complete 540 (Incremental Cost)	Total
1	System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered	LS	$ -	$ -	$ -
2	Communications Equipment	LS	$ -	$ -	$ -
3	Zone Controller Software Costs	LS	$ -	$ -	$ -
4	Software (GUI, Back-end), Host System, MOMS, DVAS and License	LS	$ -	$ -	$ -
5	Design Documentation	LS	$ -	$ -	$ -
6	User, Maintenance, and Project Documentation	LS	$ -	$ -	$ -
7	Training (manuals, materials and delivery)	LS	$ -	$ -	$ -
8	Factory Acceptance Test	LS	$ -	$ -	$ -
9	Onsite Installation Test	LS	$ -	$ -	$ -
10	Installation and Commissioning Test	LS	$ -	$ -	$ -
11	System Operational and Acceptance Test	LS	$ -	$ -	$ -
12	Third Party Warranty and Licenses	LS	$ -	$ -	$ -
13	Initial Spare Parts and Equipment - one tolling location up to six lanes	LS	$ -	$ -	$ -
14	Business Continuity Solution	LS	$ -	$ -	$ -
15	Insurance and Bonding	LS	$ -	$ -	$ -
16	Project Management	LS	$ -	$ -	$ -
17	Engineering and Design	LS	$ -	$ -	$ -
18	Transition Costs	LS	$ -	$ -	$ -
	Total Roadway Support System Costs		$ -	$ -	$ -

Sheet 3-1 Backup
Triangle Expressway: Roadway Support System Cost Schedule

Description of Items	# Unit	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)
Triangle Expressway (including Morrisville Parkway Interchange)					
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN Hardware and Installation	0	$ -	$ -	$ -	$ -
MAN Hardware and Installation	0	$ -	$ -	$ -	$ -
WAN Hardware and Installation	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Zone Controller Software Costs					
Zone Controller Software Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
4 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
OCR/ALPR Software	0	$ -	$ -	$ -	$ -
Access Control Software	0	$ -	$ -	$ -	$ -
Critical Environmental Monitoring System	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
5 Design Documentation					
Business Rules Document	0	$ -	$ -	$ -	$ -
System Requirements Document	0	$ -	$ -	$ -	$ -
Lane Design Document	0	$ -	$ -	$ -	$ -
System Design Document	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
6 User, Maintenance, and Project Documentation					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance and Project Documentation			$ -	$ -	$ -

Sheet 3-1 Backup
Triangle Expressway: Roadway Support System Cost Schedule

Description of Items	# Unit	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)
7 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -
8 Factory Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Factory Acceptance Test			$ -	$ -	$ -
9 Onsite Installation Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Onsite First Installation Test			$ -	$ -	$ -
10 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
11 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
12 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
13 Initial Spare Parts and Equipment - one tolling location up to six lanes					
Roadside System Spares (From Sheet 3-4)			$ -		$ -
Roadway Support System Spares (From Sheet 3-4)			$ -		$ -
Total Initial Spare Parts and Equipment			$ -		$ -

Sheet 3-1 Backup
Triangle Expressway: Roadway Support System Cost Schedule

Description of Items	# Unit	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)
14 Business Continuity Solution					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Business Continuity Solution			$ -	$ -	$ -
15 Insurance and Bonding					
Insurance	0	$ -	$ -	$ -	$ -
Bid Bond	0	$ -	$ -	$ -	$ -
Payment and Performance Bond	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -
16 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
17 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
18 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total Roadway Support-Host System Costs Triangle Expressway			$ -	$ -	$ -
Labor Check (from Sheet 3-1a, cell F50) should equal cell F178				$ -	

Sheet 3-1a Backup
Triangle Expressway: Roadway Support System
Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Loaded Hourly Billing Rates by Task		
			Triangle Expressway (including Morrisville Parkway Interchange)		
			Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		Database Administrator	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 3-2 Backup
Complete 540: Roadway Support System Cost Schedule

	Description of Items	# Unit	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)
	Complete 540 (Incremental Cost)					
1	System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
	Host Servers - equipment, purchase, install, configure and test					
	Storage Works					
	Back-up Library					
	Other Third-party Software	0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
	Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2	Communications Equipment					
	Switches	0	$ -	$ -	$ -	$ -
	LAN Hardware and Installation	0	$ -	$ -	$ -	$ -
	MAN Hardware and Installation	0	$ -	$ -	$ -	$ -
	WAN Hardware and Installation	0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
	Total Communications Equipment			$ -	$ -	$ -
3	Zone Controller Software Costs					
	Zone Controller Software Licenses	0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
	Total Zone Controller Software Costs			$ -	$ -	$ -
4	Software (GUI, Back-end), Host System, MOMS, DVAS and License					
	Host Software	0	$ -	$ -	$ -	$ -
	MOMS	0	$ -	$ -	$ -	$ -
	DVAS	0	$ -	$ -	$ -	$ -
	OCR/ALPR Software	0	$ -	$ -	$ -	$ -
	Access Control Software	0	$ -	$ -	$ -	$ -
	Critical Environmental Monitoring System	0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
	Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
5	Design Documentation					
	Business Rules Document	0	$ -	$ -	$ -	$ -
	System Requirements Document	0	$ -	$ -	$ -	$ -
	Lane Design Document	0	$ -	$ -	$ -	$ -
	System Design Document	0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
	Total Design Documentation			$ -	$ -	$ -
6	User, Maintenance, and Project Documentation					
	Documents/Manuals	0	$ -	$ -	$ -	$ -
	Maintenance Manual	0	$ -	$ -	$ -	$ -
	Installation Manual	0	$ -	$ -	$ -	$ -
	Project Plans	0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
		0	$ -	$ -	$ -	$ -
	Total User, Maintenance and Project Documentation			$ -	$ -	$ -

Sheet 3-2 Backup
Complete 540: Roadway Support System Cost Schedule

Description of Items	# Unit	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)
7 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -
8 Factory Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Factory Acceptance Test			$ -	$ -	$ -
9 Onsite Installation Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Onsite First Installation Test			$ -	$ -	$ -
10 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
11 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
12 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
13 Initial Spare Parts and Equipment - one tolling location up to six lanes					
Roadside System Spares (From Sheet 3-4)			$ -		$ -
Roadway Support System Spares (From Sheet 3-4)			$ -		$ -
Total Initial Spare Parts and Equipment			$ -		$ -

Sheet 3-2 Backup
Complete 540: Roadway Support System Cost Schedule

Description of Items	# Unit	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)
14 Business Continuity Solution					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Business Continuity Solution			$ -	$ -	$ -
15 Insurance and Bonding					
Insurance	0	$ -	$ -	$ -	$ -
Bid Bond	0	$ -	$ -	$ -	$ -
Payment and Performance Bond	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -
16 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
17 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
18 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total Roadway Support-Host System Costs Complete 540			$ -	$ -	$ -
Labor Check (from Sheet 3-3a, cell F50) should equal cell F178				$ -	

Sheet 3-2a Backup
Complete 540: Roadway Support System
Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Loaded Hourly Billing Rates by Task		
			Complete 540 (Incremental Cost)		
			Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		Database Administrator	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 3-3 Backup
Roadside System and Roadway Support System Initial Spare Parts and Equipment Cost

Spare Parts Description	Total Quantity	Unit ($)	Total Unit ($)	Total Quantity	Unit ($)	Total Unit ($)	
Roadside System	Triangle Expressway (one tolling location up to six lanes)			Complete 540 (one tolling location up to six lanes)			
1. Redundant Toll Zone Controller and In-lane Electronics[1]							
Servers	0	$ -	$ -	0	$ -	$ -	
Hard drive	0	$ -	$ -	0	$ -	$ -	
Serial Controllers	0	$ -	$ -	0	$ -	$ -	
Power Supply	0	$ -	$ -	0	$ -	$ -	
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -			$ -	
2. AVI System							
AVI Reader Modules	0	$ -	$ -	0	$ -	$ -	see note 1
AVI Antennas	0	$ -	$ -	0	$ -	$ -	see note 1
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
Total AVI System			$ -			$ -	
3. AVDC System							
Primary AVDC Sensor	0	$ -	$ -	0	$ -	$ -	
AVDC Detector Cards	0	$ -	$ -	0	$ -	$ -	
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
Total AVC System			$ -			$ -	
4. ICPS							
Front Cameras	0	$ -	$ -	0	$ -	$ -	
Rear Cameras	0	$ -	$ -	0	$ -	$ -	
Illuminators	0	$ -	$ -	0	$ -	$ -	
Servers	0	$ -	$ -	0	$ -	$ -	
Hard drive	0	$ -	$ -	0	$ -	$ -	
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
Total ICPS			$ -			$ -	
5. Mobile Enforcement Equipment							
Transaction Status Indicator (TSI)	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
Total Mobile Enforcement Equipment			$ -			$ -	
6. Communications Equipment							
Switches	0	$ -	$ -	0	$ -	$ -	
Power Supply	0	$ -	$ -	0	$ -	$ -	
Router	0	$ -	$ -	0	$ -	$ -	
GBICs	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
	0	$ -	$ -	0	$ -	$ -	
Total Communications Equipment			$ -			$ -	

Sheet 3-3 Backup
Roadside System and Roadway Support System Initial Spare Parts and Equipment Cost

Spare Parts Description	Total Quantity	Unit ($)	Total Unit ($)	Total Quantity	Unit ($)	Total Unit ($)
7. Equipment Cabinets/Enclosures and Racks						
Equipment Cabinets/Enclosure	0	$ -	$ -	0	$ -	$ -
Equipment Racks	0	$ -	$ -	0	$ -	$ -
Cabinet HVAC	0	$ -	$ -	0	$ -	$ -
UPS	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
Total Equipment Racks			$ -			$ -
8. DVAS						
Cameras	0	$ -	$ -	0	$ -	$ -
Servers	0	$ -	$ -	0	$ -	$ -
Hard Drive Storage	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
Total DVAS			$ -			$ -
9. Access Control and Security Monitoring System						
Card Readers	0	$ -	$ -	0	$ -	$ -
Cards	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
Total Access Control and Security Monitoring System			$ -			$ -
10. Facility Server						
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
Total Facility Server			$ -			$ -
11. UPS						
Batteries	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -
Inverter	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
Total UPS			$ -			$ -
Roadside System Initial Spare Parts and Equipment			$ -			$ -

Sheet 3-3 Backup
Roadside System and Roadway Support System Initial Spare Parts and Equipment Cost

Spare Parts Description	Total Quantity	Unit ($)	Total Unit ($)	Total Quantity	Unit ($)	Total Unit ($)
Roadway Support System	Triangle Expressway (one tolling location up to six lanes)			Complete 540 (one tolling location up to six lanes)		
1. System Hardware						
Servers	0	$ -	$ -	0	$ -	$ -
Hard drive	0	$ -	$ -	0	$ -	$ -
Miscellaneous	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
Total System Hardware			$ -			$ -
2. Communications Equipment						
LAN Equipment	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -
Total Communications Equipment			$ -			$ -
Roadway Support System Initial Spare Parts and Equipment			$ -			$ -
Total Roadside and Roadway Support System Initial Spare Parts and Equipment			$ -			$ -

Note 1: Unit cost for AVI Readers and Antennas will be zero dollars as they are provided by NCTA from the AVI Contract.

Sheet 4
Base Contract and Optional Extensions
Roadside System Hardware Maintenance and Software Support Services Cost
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Annual Cost ($)	Annual Cost ($)	Annual Cost ($)	Total Annual Cost ($)
	Base Contract Maintenance Costs	Triangle Expressway	Morrisville Parkway Interchange	Complete 540	
1	Year 1 of Maintenance	$ -	$ -		$ -
2	Year 2 of Maintenance	$ -	$ -		$ -
3	Year 3 of Maintenance	$ -	$ -		$ -
4	Year 4 of Maintenance	$ -	$ -	$ -	$ -
5	Year 5 of Maintenance	$ -	$ -	$ -	$ -
	Total Roadside System Hardware Maintenance and Software Support Services Base Contract Cost (Maintenance Years 1 - 5)	$ -	$ -	$ -	$ -
	Optional Extension 1 Costs				
6	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	$ -
7	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	$ -
8	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	$ -
	Total Extension 1 Cost	$ -	$ -	$ -	$ -
	Optional Extension 2 Costs				
9	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	$ -
10	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	$ -
11	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	$ -
	Total Extension 2 Cost	$ -	$ -	$ -	$ -
	Total Base and Optional Roadside System Hardware Maintenance and Software Support Services	$ -	$ -	$ -	$ -

Sheet 4-1 Backup
Base Contract and Optional Extensions
Roadside System Hardware Maintenance and Software Support Services Schedule
(Summary Only - No Proposer Input Required)

Description of Items	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
Base Contract Maintenance Costs	Triangle Expressway				Morrisville Parkway Interchange				Complete 540			
Total Year 1 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -				
Total Year 2 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -				
Total Year 3 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -				
Total Year 4 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -	$ -	12	12	$ -
Total Year 5 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -	$ -	12	12	$ -
Optional Extension 1 Costs												
Total Extension 1 Year 1 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -	$ -	12	12	$ -
Total Extension 1 Year 2 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -	$ -	12	12	$ -
Total Extension 1 Year 3 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -	$ -	12	12	$ -
Optional Extension 2 Costs												
Total Extension 2 Year 1 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -	$ -	12	12	$ -
Total Extension 2 Year 2 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -	$ -	12	12	$ -
Total Extension 2 Year 3 Roadside System Hardware Maintenance and Software Support Services	$ -	20	12	$ -	$ -	2	12	$ -	$ -	12	12	$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. Adjustments will made to the monthly Maintenance Cost based on actual CPI (Labor) for each year of the Contract Term.

Sheet 4-2 Backup
Base Contract and Optional Extensions
Triangle Expressway Roadside System Hardware Maintenance and Software Support Services -
Labor and Other Direct Cost Items by Month

Description of Items	Monthly Total ($) Per Zone
Base Contract Maintenance Costs	Triangle Expressway
Year 1 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 1	$ -
Year 2 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 2	$ -
Year 3 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 3	$ -
Year 4 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 4	$ -
Year 5 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 5	$ -

Sheet 4-2 Backup
Base Contract and Optional Extensions
Triangle Expressway Roadside System Hardware Maintenance and Software Support Services -
Labor and Other Direct Cost Items by Month

Description of Items	Monthly Total ($) Per Zone
Optional Extension 1 Costs	
Extension 1 Year 1 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 1	$ -
Extension 1 Year 2 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 2	$ -
Extension 1 Year 3 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 3	$ -

Sheet 4-2 Backup
Base Contract and Optional Extensions
Triangle Expressway Roadside System Hardware Maintenance and Software Support Services -
Labor and Other Direct Cost Items by Month

Description of Items	Monthly Total ($) Per Zone
Optional Extension 2 Costs	
Extension 2 Year 1 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 2 Year 1	$ -
Extension 2 Year 2 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 2 Year 2	$ -
Extension 2 Year 3 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 2 Year 3	$ -

Sheet 4-2a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification		Escalation % (Over Previous Year)	0.0%		Escalation % (Over Previous Year)	2.0%	
				Loaded Hourly Billing Rates Year 1 of Maintenance			Loaded Hourly Billing Rates Year 2 of Maintenance		
Triangle Expressway			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-2a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Year 3 of Maintenance			Loaded Hourly Billing Rates Year 4 of Maintenance		
Triangle Expressway			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-2a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)		3.0%	Optional Extension 1 Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Year 5 of Maintenance			Loaded Hourly Billing Rates Extension Year 1 of Maintenance		
Triangle Expressway			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-2a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Optional Extension 1 Escalation % (Over Previous Year)		3.0%	Optional Extension 1 Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 2 of Maintenance			Loaded Hourly Billing Rates Extension Year 3 of Maintenance		
Triangle Expressway			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-2a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Optional Extension 2 Escalation % (Over Previous Year)	3.0%	Optional Extension 2 Escalation % (Over Previous Year)	3.0%
			Loaded Hourly Billing Rates Extension Year 1 of Maintenance		Loaded Hourly Billing Rates Extension Year 2 of Maintenance	
Triangle Expressway			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-2a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 3 of Maintenance		
Triangle Expressway			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		CADD Technician	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -
14		Installation Technician	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-3 Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Roadside System Hardware Maintenance
and Software Support Services -
Labor and Other Direct Cost Items by Month

Description of Items	Monthly Total ($) Per Zone
Base Contract Maintenance Costs	Morrisville Parkway Interchange
Year 1 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 1	$ -
Year 2 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 2	$ -
Year 3 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 3	$ -
Year 4 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 4	$ -
Year 5 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 5	$ -

Sheet 4-3 Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Roadside System Hardware Maintenance
and Software Support Services -
Labor and Other Direct Cost Items by Month

Description of Items	Monthly Total ($) Per Zone
Optional Extension 1 Costs	
Extension 1 Year 1 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 1	$ -
Extension 1 Year 2 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 2	$ -
Extension 1 Year 3 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 3	$ -

Sheet 4-3 Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Roadside System Hardware Maintenance
and Software Support Services -
Labor and Other Direct Cost Items by Month

Description of Items	Monthly Total ($) Per Zone
Optional Extension 2 Costs	
Extension 2 Year 1 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 2 Year 1	$ -
Extension 2 Year 2 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 2 Year 2	$ -
Extension 2 Year 3 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 2 Year 3	$ -

Sheet 4-3a Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification		Escalation % (Over Previous Year)	0.0%		Escalation % (Over Previous Year)	2.0%	
				Loaded Hourly Billing Rates Year 1 of Maintenance			Loaded Hourly Billing Rates Year 2 of Maintenance		
Morrisville Parkway Interchange			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-3a Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)	3.0%		Escalation % (Over Previous Year)	3.0%	
			Loaded Hourly Billing Rates Year 3 of Maintenance			Loaded Hourly Billing Rates Year 4 of Maintenance		
Morrisville Parkway Interchange			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-3a Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)	3.0%		Escalation % (Over Previous Year)	3.0%	
			Loaded Hourly Billing Rates Year 5 of Maintenance			Loaded Hourly Billing Rates Extension Year 1 of Maintenance		
Morrisville Parkway Interchange			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-3a Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 2 of Maintenance			Loaded Hourly Billing Rates Extension Year 3 of Maintenance		
Morrisville Parkway Interchange			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-3a Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Optional Extension 2 Escalation % (Over Previous Year)	3.0%	Optional Extension 2 Escalation % (Over Previous Year)	3.0%
			Loaded Hourly Billing Rates Extension Year 1 of Maintenance		Loaded Hourly Billing Rates Extension Year 2 of Maintenance	
Morrisville Parkway Interchange			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-3a Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Roadside System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Optional Extension 2 Escalation % (Over Previous Year)	3.0%
			Loaded Hourly Billing Rates Extension Year 3 of Maintenance	
Morrisville Parkway Interchange			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		CADD Technician	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -
14		Installation Technician	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-4 Backup
Base Contract and Optional Extensions
Complete 540 Roadside System Hardware Maintenance and Software Support Services -
Labor and Other Direct Cost Items by Month

Description of Items	Monthly Total ($) Per Zone
Base Contract Maintenance Costs	Complete 540
Year 1 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 1	$ -
Year 2 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 2	$ -
Year 3 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 3	$ -
Year 4 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 4	$ -
Year 5 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 5	$ -

Sheet 4-4 Backup
Base Contract and Optional Extensions
Complete 540 Roadside System Hardware Maintenance and Software Support Services -
Labor and Other Direct Cost Items by Month

Description of Items	Monthly Total ($) Per Zone
Optional Extension 1 Costs	
Extension 1 Year 1 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 1	$ -
Extension 1 Year 2 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 2	$ -
Extension 1 Year 3 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 3	$ -

Sheet 4-4 Backup
Base Contract and Optional Extensions
Complete 540 Roadside System Hardware Maintenance and Software Support Services -
Labor and Other Direct Cost Items by Month

Description of Items	Monthly Total ($) Per Zone
Optional Extension 2 Costs	
Extension 2 Year 1 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 2 Year 1	$ -
Extension 2 Year 2 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 2 Year 2	$ -
Extension 2 Year 3 of Maintenance - Monthly Roadside Hardware Maintenance and Software Support Services	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 2 Year 3	$ -

Sheet 4-4a Backup
Base Contract and Optional Extensions
Complete 540 Roadside System Hardware Maintenance and Software Support Services -
Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification		Escalation % (Over Previous Year)	0.0%		Escalation % (Over Previous Year)	2.0%	
				Loaded Hourly Billing Rates Year 1 of Maintenance			Loaded Hourly Billing Rates Year 2 of Maintenance		
Complete 540			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost								

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-4a Backup
Base Contract and Optional Extensions
Complete 540 Roadside System Hardware Maintenance and Software Suppor
Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Year 3 of Maintenance			Loaded Hourly Billing Rates Year 4 of Maintenance		
Complete 540			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost							$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-4a Backup
Base Contract and Optional Extensions
Complete 540 Roadside System Hardware Maintenance and Software Suppor
Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)	3.0%	Optional Extension 1: Escalation % (Over Previous Year)	3.0%
			Loaded Hourly Billing Rates Year 5 of Maintenance		Loaded Hourly Billing Rates Extension Year 1 of Maintenance	
Complete 540			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-4a Backup
Base Contract and Optional Extensions
Complete 540 Roadside System Hardware Maintenance and Software Suppor
Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 2 of Maintenance			Loaded Hourly Billing Rates Extension Year 3 of Maintenance		
Complete 540			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-4a Backup
Base Contract and Optional Extensions
Complete 540 Roadside System Hardware Maintenance and Software Suppor
Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 1 of Maintenance			Loaded Hourly Billing Rates Extension Year 2 of Maintenance		
Complete 540			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		CADD Technician	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
14		Installation Technician	$ -	0	$ -	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-4a Backup
Base Contract and Optional Extensions
Complete 540 Roadside System Hardware Maintenance and Software Suppor
Staff and Position Classifications with Rates

Optional Extension 2

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 3 of Maintenance		
Complete 540			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadside System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		CADD Technician	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Electrician Helper	$ -	0	$ -
12		Hardware Engineer/Lead	$ -	0	$ -
13		Installation Supervisor	$ -	0	$ -
14		Installation Technician	$ -	0	$ -
15		Licensed Electrical Engineer	$ -	0	$ -
16		Licensed Electrician	$ -	0	$ -
17		Maintenance Manager	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5
Base Contract and Optional Extensions
Roadway Support System Maintenance and Software Support Services Cost
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Monthly Cost ($)	Annual Cost ($)	Monthly Cost ($)	Annual Cost ($)	Total Annual Cost ($)
	Base Contract Maintenance Costs	Triangle Expressway (including Morrisville Parkway Interchange)		Complete 540		
1	Year 1 of Maintenance	$ -	$ -			$ -
2	Year 2 of Maintenance	$ -	$ -			$ -
3	Year 3 of Maintenance	$ -	$ -			$ -
4	Year 4 of Maintenance	$ -	$ -	$ -	$ -	$ -
5	Year 5 of Maintenance	$ -	$ -	$ -	$ -	$ -
	Total Roadway Support System Maintenance and Software Support Services Base Contract Cost (Maintenance Years 1-5)		$ -		$ -	$ -
	Optional Extension 1 Costs					
6	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	$ -	$ -
7	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	$ -	$ -
8	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	$ -	$ -
	Total Extension 1 Cost		$ -		$ -	$ -
	Optional Extension 2 Costs					
9	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	$ -	$ -
10	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	$ -	$ -
11	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	$ -	$ -
	Total Extension 2 Cost		$ -		$ -	$ -
	Total Base and Optional Roadway Support System Maintenance and Software Support Services		$ -		$ -	$ -

Sheet 5-1 Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month

Description of Items	# Units	Unit ($)	Total Unit ($)	Labor ($)	Total Monthly Cost ($)	Labor Check E * # months	Labor Check From Sheet 5-1a
Base Contract	Triangle Expressway (including Morrisville Parkway Interchange)						
Year 1 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 1 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Year 2 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 2 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Year 3 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 3 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -

Sheet 5-1 Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month

Description of Items	# Units	Unit ($)	Total Unit ($)	Labor ($)	Total Monthly Cost ($)	Labor Check E * # months	Labor Check From Sheet 5-1a
Year 4 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 4 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Year 5 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 5 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Optional Extension Costs							
Extension 1 Costs							
Extension 1 Year 1 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 1 Year 1 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -

Sheet 5-1 Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month

Description of Items	# Units	Unit ($)	Total Unit ($)	Labor ($)	Total Monthly Cost ($)	Labor Check E * # months	Labor Check From Sheet 5-1a
Extension 1 Year 2 Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 1 Year 2 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Extension 1 Year 3 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 1 Year 3 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Extension 2 Costs							
Extension 2 Year 1 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 2 Year 1 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -

Sheet 5-1 Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month

Description of Items	# Units	Unit ($)	Total Unit ($)	Labor ($)	Total Monthly Cost ($)	Labor Check E * # months	Labor Check From Sheet 5-1a
Extension 2 Year 2 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 2 Year 2 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Extension 2 Year 3 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 2 Year 3 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -

Sheet 5-1a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification		Escalation % (Over Previous Year)	0.0%		Escalation % (Over Previous Year)	2.0%	
				Loaded Hourly Billing Rates Year 1 of Maintenance			Loaded Hourly Billing Rates Year 2 of Maintenance		
Triangle Expressway (including Morrisville Parkway Interchange)			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-1a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)	3.0%		Escalation % (Over Previous Year)	3.0%	
			Loaded Hourly Billing Rates Year 3 of Maintenance			Loaded Hourly Billing Rates Year 4 of Maintenance		
Triangle Expressway (including Morrisville Parkway Interchange)			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-1a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)		3.0%	Optional Extension 1 Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Year 5 of Maintenance			Loaded Hourly Billing Rates Extension Year 1 of Maintenance		
Triangle Expressway (including Morrisville Parkway Interchange)			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-1a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Optional Extension 1 Escalation % (Over Previous Year)		3.0%	Optional Extension 1 Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 2 of Maintenance			Loaded Hourly Billing Rates Extension Year 3 of Maintenance		
Triangle Expressway (including Morrisville Parkway Interchange)			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-1a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Optional Extension 2 Escalation % (Over Previous Year)		3.0%	Optional Extension 2 Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 1 of Maintenance			Loaded Hourly Billing Rates Extension Year 2 of Maintenance		
Triangle Expressway (including Morrisville Parkway Interchange)			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-1a Backup
Base Contract and Optional Extensions
Triangle Expressway Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)	3.0%	
			Loaded Hourly Billing Rates Extension Year 3 of Maintenance		
Triangle Expressway (including Morrisville Parkway Interchange)			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		Database Administrator	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-2 Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month

Description of Items	# Units	Unit ($)	Total Unit ($)	Labor ($)	Total Monthly Cost ($)	Labor Check E * # months	Labor Check From Sheet 5-2a
Base Contract	Complete 540						
Year 1 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 1 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Year 2 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 2 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Year 3 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 3 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -

Sheet 5-2 Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month

Description of Items	# Units	Unit ($)	Total Unit ($)	Labor ($)	Total Monthly Cost ($)	Labor Check E * # months	Labor Check From Sheet 5-2a
Year 4 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 4 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Year 5 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Year 5 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Optional Extension Costs							
Extension 1 Costs							
Extension 1 Year 1 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 1 Year 1 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -

Sheet 5-2 Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month

Description of Items	# Units	Unit ($)	Total Unit ($)	Labor ($)	Total Monthly Cost ($)	Labor Check E * # months	Labor Check From Sheet 5-2a
Extension 1 Year 2 Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 1 Year 2 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Extension 1 Year 3 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 1 Year 3 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Extension 2 Costs							
Extension 2 Year 1 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 2 Year 1 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -

Sheet 5-2 Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Labor and Other Direct Cost Items by Month

Description of Items	# Units	Unit ($)	Total Unit ($)	Labor ($)	Total Monthly Cost ($)	Labor Check E * # months	Labor Check From Sheet 5-2a
Extension 2 Year 2 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 2 Year 2 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -
Extension 2 Year 3 of Maintenance: Monthly Roadway Support System Maintenance and Software Support Services							
Management/Supervision	0	$ -	$ -	$ -	$ -		
Software Management	0	$ -	$ -	$ -	$ -		
System and Database Admin	0	$ -	$ -	$ -	$ -		
System Monitoring	0	$ -	$ -	$ -	$ -		
Upgrades	0	$ -	$ -	$ -	$ -		
Materials	0	$ -	$ -	$ -	$ -		
Equipment	0	$ -	$ -	$ -	$ -		
Network Management and ISP Fees	0	$ -	$ -	$ -	$ -		
	0	$ -	$ -	$ -	$ -		
Total Extension 2 Year 3 Monthly Roadway Support System Maintenance and Software Support Services			$ -	$ -	$ -	$ -	$ -

Sheet 5-2a Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification		Escalation % (Over Previous Year)	0.0%		Escalation % (Over Previous Year)	2.0%	
				Loaded Hourly Billing Rates Year 1 of Maintenance			Loaded Hourly Billing Rates Year 2 of Maintenance		
Complete 540			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost								

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-2a Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Year 3 of Maintenance			Loaded Hourly Billing Rates Year 4 of Maintenance		
Complete 540			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost							$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-2a Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)	3.0%		Optional Extension 1 Escalation % (Over Previous Year)	3.0%	
			Loaded Hourly Billing Rates Year 5 of Maintenance			Loaded Hourly Billing Rates Extension Year 1 of Maintenance		
Complete 540			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-2a Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 2 of Maintenance			Loaded Hourly Billing Rates Extension Year 3 of Maintenance		
Complete 540			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-2a Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			Loaded Hourly Billing Rates Extension Year 1 of Maintenance			Loaded Hourly Billing Rates Extension Year 2 of Maintenance		
Complete 540			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -	$ -	0	$ -
5		Installation Manager	$ -	0	$ -	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -	$ -	0	$ -
8		Test Manager	$ -	0	$ -	$ -	0	$ -
9		Database Administrator	$ -	0	$ -	$ -	0	$ -
10		Database Analyst	$ -	0	$ -	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-2a Backup
Base Contract and Optional Extensions
Complete 540 Roadway Support System Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	Staff Names	Position/Classification	Escalation % (Over Previous Year)	3.0%	
			Loaded Hourly Billing Rates Extension Year 3 of Maintenance		
Complete 540			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical Manager, Roadway Support System	$ -	0	$ -
5		Installation Manager	$ -	0	$ -
6		Maintenance Manager	$ -	0	$ -
7		Quality Assurance Manager	$ -	0	$ -
8		Test Manager	$ -	0	$ -
9		Database Administrator	$ -	0	$ -
10		Database Analyst	$ -	0	$ -
11		Finance Manager (Design/Implementation)	$ -	0	$ -
12		Finance Manager (Operations)	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Maintenance Manager	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6
Base Contract and Optional Extensions
Intelligent Transportation System (ITS) Maintenance Cost
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Annual Cost ($)	Annual Cost ($)	Annual Cost ($)	Total Annual Cost ($)
	Base Contract Maintenance Costs	Triangle Expressway	Morrisville Parkway Interchange	Complete 540	
1	Year 1 of Maintenance	$ -	$ -		$ -
2	Year 2 of Maintenance	$ -	$ -		$ -
3	Year 3 of Maintenance	$ -	$ -		$ -
4	Year 4 of Maintenance	$ -	$ -	$ -	$ -
5	Year 5 of Maintenance	$ -	$ -	$ -	$ -
	Total ITS Maintenance Base Contract Cost (Maintenance Years 1 - 5)	$ -	$ -	$ -	$ -
	Optional Extension 1 Costs				
6	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	$ -
7	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	$ -
8	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	$ -
	Total Extension 1 Cost	$ -	$ -	$ -	$ -
	Optional Extension 2 Costs				
9	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	$ -
10	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	$ -
11	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	$ -
	Total Extension 2 Cost	$ -	$ -	$ -	$ -
	Total Base and Optional ITS Maintenance	$ -	$ -	$ -	$ -

Sheet 6-1 Backup
Base Contract and Optional Extensions
Triangle Expressway, Morrisville Parkway Interchange and Complete 540
Intelligent Transportation System (ITS) Maintenance
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($)	Number of Months	Annual Cost ($)	Total Monthly Cost ($)	Number of Months	Annual Cost ($)	Total Monthly Cost ($)	Number of Months	Annual Cost ($)
Base Contract Maintenance Costs	Triangle Expressway			Morrisville Parkway Interchange			Complete 540		
Total Year 1 ITS Maintenance	$ -	12	$ -	$ -	12	$ -			
Total Year 2 ITS Maintenance	$ -	12	$ -	$ -	12	$ -			
Total Year 3 ITS Maintenance	$ -	12	$ -	$ -	12	$ -			
Total Year 4 ITS Maintenance	$ -	12	$ -	$ -	12	$ -	$ -	12	$ -
Total Year 5 ITS Maintenance	$ -	12	$ -	$ -	12	$ -	$ -	12	$ -
Optional Extension 1 Costs									
Total Extension 1 Year 1 ITS Maintenance	$ -	12	$ -	$ -	12	$ -	$ -	12	$ -
Total Extension 1 Year 2 ITS Maintenance	$ -	12	$ -	$ -	12	$ -	$ -	12	$ -
Total Extension 1 Year 3 ITS Maintenance	$ -	12	$ -	$ -	12	$ -	$ -	12	$ -
Optional Extension 2 Costs									
Total Extension 2 Year 1 ITS Maintenance	$ -	12	$ -	$ -	12	$ -	$ -	12	$ -
Total Extension 2 Year 2 ITS Maintenance	$ -	12	$ -	$ -	12	$ -	$ -	12	$ -
Total Extension 2 Year 3 ITS Maintenance	$ -	12	$ -	$ -	12	$ -	$ -	12	$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Triangle Expressway ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Base Contract Maintenance Costs	Triangle Expressway			
Year 1 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Year 1				$ -
Year 2 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Year 2				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Triangle Expressway ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Year 3 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Year 3				$ -
Year 4 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Year 4				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Triangle Expressway ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Year 5 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Year 5				$ -
Optional Extension 1 Costs				
Extension 1 Year 1 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Extension 1 Year 1				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Triangle Expressway ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Extension 1 Year 2 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Extension 1 Year 2				$ -
Extension 1 Year 3 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Extension 1 Year 3				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Triangle Expressway ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Optional Extension 2 Costs				
Extension 2 Year 1 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Extension 2 Year 1				$ -
Extension 2 Year 2 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Extension 2 Year 2				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Triangle Expressway ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Extension 2 Year 3 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly	EA	4	$ -	$ -
2. CCTV Camera assembly with Lowering Device	EA	17	$ -	$ -
3. Full-size color front-access DMS assembly	EA	10	$ -	$ -
4. Roadway Weather Information System	EA	1	$ -	$ -
5. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	22	$ -	$ -
6. Ramp Microwave Radar Detection Station (1 sensor per site) (1) (2)	EA	49	$ -	$ -
7. Trunkline Fiber (2x72f) and splice enclosures	MI	20.0	$ -	$ -
8. Trunkline Fiber (1x24f) and splice enclosures	MI	2.7	$ -	$ -
9. Trunkline Fiber (2x24f) and splice enclosures	MI	1.5	$ -	$ -
10. Trunkline Conduit (2x2") and junction boxes	MI	3.7	$ -	$ -
11. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
12. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	5.0	$ -	$ -
13. Drop Conduit (2x2") and junction boxes	MI	5.0	$ -	$ -
14. Electrical service meter bases (combination panels)	EA	96	$ -	$ -
15. TMS 100Mbs Ethernet Edge Switch (3)	EA	76	$ -	$ -
16. Electronic Wrong-Way sign	EA	12	$ -	$ -
17. Dell ITS host at STOC	EA	1	$ -	$ -
18. TMS/RTCS Workstations at STOC (with 2x24" monitors ea.)	EA	4	$ -	$ -
19. TMS/RTCS Workstations at Transp. Bldg. (with 2x50" monitors ea.)	EA	2	$ -	$ -
20. TMS/RTCS Workstations at CSC (with 2x24" monitors ea.)	EA	1	$ -	$ -
21. TMS Laptop	EA	1	$ -	$ -
22. STOC Printer/Copier and consumables	EA	1	$ -	$ -
23. Pelco Joysticks	EA	4	$ -	$ -
24. Video Wall - 67" Mitsubishi DLP Monitor	EA	30	$ -	$ -
25. Video Wall - Activu display servers, control server and software	EA	1	$ -	$ -
Total Monthly Extension 2 Year 3				$ -

Note 1: Contractor not responsible for damage to metal poles; Contractor not responsible for damage to cabinets from Force Majeure or vehicular accidents

Sheet 6-2 Backup
Base Contract and Optional Extensions
Morrisville Parkway ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Base Contract Maintenance Costs	Morrisville Parkway Interchange			
Year 1 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Year 1				$ -
Year 2 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Year 2				$ -
Year 3 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Year 3				$ -
Year 4 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Year 4				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Morrisville Parkway ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Year 5 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Year 5				$ -
Optional Extension 1 Costs				
Extension 1 Year 1 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Extension 1 Year 1				$ -
Extension 1 Year 2 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Extension 1 Year 2				$ -
Extension 1 Year 3 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Extension 1 Year 3				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Morrisville Parkway ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Optional Extension 2 Costs				
Extension 2 Year 1 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Extension 2 Year 1				$ -
Extension 2 Year 2 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Extension 2 Year 2				$ -
Extension 2 Year 3 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	1	$ -	$ -
2. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	4	$ -	$ -
3. Drop Conduit (4x3") and junction boxes	MI	0.32	$ -	$ -
4. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	0.42	$ -	$ -
5. Drop Conduit (2x2") and junction boxes	MI	0.24	$ -	$ -
6. TMC 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	2	$ -	$ -
7. Electrical service meter bases (combination panels)	EA	1	$ -	$ -
Total Monthly Extension 2 Year 3				$ -

Note 1: Contractor not responsible for damage to metal poles; Contractor not responsible for damage to cabinets from Force Majeure or vehicular accidents

Sheet 6-2 Backup
Base Contract and Optional Extensions
Complete 540 ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Base Contract Maintenance Costs	Complete 540			
Year 1 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Year 1				$ -
Year 2 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Year 2				$ -
Year 3 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Year 3				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Complete 540 ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Year 4 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Year 4				$ -
Year 5 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Year 5				$ -
Optional Extension 1 Costs				
Extension 1 Year 1 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Extension 1 Year 1				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Complete 540 ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Extension 1 Year 2 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Extension 1 Year 2				$ -
Extension 1 Year 3 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Extension 1 Year 3				$ -
Optional Extension 2 Costs				
Extension 2 Year 1 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Extension 2 Year 1				$ -

Sheet 6-2 Backup
Base Contract and Optional Extensions
Complete 540 ITS Maintenance Cost Schedule Per Device
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($)
Extension 2 Year 2 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Extension 2 Year 2				$ -
Extension 2 Year 3 of Maintenance - Monthly ITS Maintenance				
Program Management/Administration	LS			$ -
1. CCTV Camera assembly with Lowering Device	EA	25	$ -	$ -
2. Full-size color front-access DMS assembly	EA	9	$ -	$ -
3. Roadway Weather Information System	EA	1	$ -	$ -
4. Mainline Microwave Radar Detection Station (1 sensor per direction) (1)	EA	12	$ -	$ -
5. Ramp Microwave Radar Detection Station (1 sensor per site) (1)	EA	30	$ -	$ -
6. Trunkline Fiber (2x144f) and splice enclosures	MI	20.0	$ -	$ -
7. Trunkline Conduit (4x2") and junction boxes	MI	20.0	$ -	$ -
8. Drop Fiber (6f or 12f) and splice enclosures/termination panels	MI	6.0	$ -	$ -
9. Drop Conduit (2x2") and junction boxes	MI	6.0	$ -	$ -
10. Electrical service meter bases (combination panels)	EA	50	$ -	$ -
11. TMS 100Mbs/1Gbs Ethernet Edge Switch (2)	EA	46	$ -	$ -
Total Monthly Extension 2 Year 3				$ -

Note 1: Contractor not responsible for damage to metal poles; Contractor not responsible for damage to cabinets from Force Majeure or vehicular accidents

Sheet 7
Base Contract and Optional Extensions
Toll Facilities Maintenance Cost
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Annual Cost ($)	Annual Cost ($)	Annual Cost ($)	Total Annual Cost ($)
	Base Contract Maintenance Costs	Triangle Expressway	Morrisville Parkway Interchange	Complete 540	
1	Year 1 of Maintenance	$ -	$ -		$ -
2	Year 2 of Maintenance	$ -	$ -		$ -
3	Year 3 of Maintenance	$ -	$ -		$ -
4	Year 4 of Maintenance	$ -	$ -	$ -	$ -
5	Year 5 of Maintenance	$ -	$ -	$ -	$ -
	Total Toll Facilities Maintenance Base Contract Cost (Maintenance Years 1 - 5)	$ -	$ -	$ -	$ -
	Optional Extension 1 Costs				
6	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	$ -
7	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	$ -
8	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	$ -
	Total Extension 1 Cost	$ -	$ -	$ -	$ -
	Optional Extension 2 Costs				
9	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	$ -
10	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	$ -
11	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	$ -
	Total Extension 2 Cost	$ -	$ -	$ -	$ -
	Total Base and Optional Toll Facilities Maintenance	$ -	$ -	$ -	$ -

Sheet 7-1 Backup
Base Contract and Optional Extensions
Triangle Expressway, Morrisville Parkway Interchange and Complete 540 Toll Facilities Maintenance Cost
(Summary Only - No Proposer Input Required)

Description of Items	Total Monthly Cost ($) Per Tolling Location	# of Tolling Locations	Number of Months	Annual Cost ($)	Total Monthly Cost ($) Per Tolling Location	# of Tolling Locations	Number of Months	Annual Cost ($)	Total Monthly Cost ($) Per Tolling Location	# of Tolling Locations	Number of Months	Annual Cost ($)
Base Contract Maintenance Costs	Triangle Expressway				Morrisville Parkway Interchange				Complete 540			
Total Year 1 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -				
Total Year 2 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -				
Total Year 3 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -				
Total Year 4 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -	$ -	6	12	$ -
Total Year 5 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -	$ -	6	12	$ -
Optional Extension 1 Costs												
Total Extension 1 Year 1 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -	$ -	6	12	$ -
Total Extension 1 Year 2 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -	$ -	6	12	$ -
Total Extension 1 Year 3 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -	$ -	6	12	$ -
Optional Extension 2 Costs												
Total Extension 2 Year 1 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -	$ -	6	12	$ -
Total Extension 2 Year 2 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -	$ -	6	12	$ -
Total Extension 2 Year 3 Toll Facilities Maintenance	$ -	8	12	$ -	$ -	1	12	$ -	$ -	6	12	$ -

Note 1: CPI Composite of 2% - 3% used for evaluation purposes. Adjustments will made to the monthly Maintenance Cost based on actual CPI (Labor) for each year of the Contract Term.

Sheet 7-2 Backup
Base Contract and Optional Extensions
Triangle Expressway Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Base Contract Maintenance Costs	Triangle Expressway			
Year 1 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 1				$ -
Year 2 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 2				$ -
Year 3 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 3				$ -

Sheet 7-2 Backup
Base Contract and Optional Extensions
Triangle Expressway Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Year 4 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 4				$ -
Year 5 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 5				$ -

Sheet 7-2 Backup
Base Contract and Optional Extensions
Triangle Expressway Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Optional Extension 1 Costs				
Extension 1 Year 1 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 1 Year 1				$ -
Extension 1 Year 2 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 1 Year 2				$ -
Extension 1 Year 3 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 1 Year 3				$ -

Sheet 7-2 Backup
Base Contract and Optional Extensions
Triangle Expressway Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Optional Extension 2 Costs				
Extension 2 Year 1 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 2 Year 1				$ -
Extension 2 Year 2 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 2 Year 2				$ -
Extension 2 Year 3 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 2 Year 3				$ -

Sheet 7-3 Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Base Contract Maintenance Costs	Morrisville Parkway Interchange			
Year 1 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 1				$ -
Year 2 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 2				$ -
Year 3 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 3				$ -

Sheet 7-3 Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Year 4 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 4				$ -
Year 5 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 5				$ -

Sheet 7-3 Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Optional Extension 1 Costs				
Extension 1 Year 1 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 1 Year 1				$ -
Extension 1 Year 2 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 1 Year 2				$ -
Extension 1 Year 3 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 1 Year 3				$ -

Sheet 7-3 Backup
Base Contract and Optional Extensions
Morrisville Parkway Interchange Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Optional Extension 2 Costs				
Extension 2 Year 1 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 2 Year 1				$ -
Extension 2 Year 2 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 2 Year 2				$ -
Extension 2 Year 3 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 2 Year 3				$ -

Sheet 7-4 Backup
Base Contract and Optional Extensions
Complete 540 Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Base Contract Maintenance Costs	Complete 540			
Year 1 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 1				$ -
Year 2 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 2				$ -
Year 3 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 3				$ -

Sheet 7-4 Backup
Base Contract and Optional Extensions
Complete 540 Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Year 4 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 4				$ -
Year 5 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Year 5				$ -

Sheet 7-4 Backup
Base Contract and Optional Extensions
Complete 540 Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Optional Extension 1 Costs				
Extension 1 Year 1 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 1 Year 1				$ -
Extension 1 Year 2 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 1 Year 2				$ -
Extension 1 Year 3 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 1 Year 3				$ -

Sheet 7-4 Backup
Base Contract and Optional Extensions
Complete 540 Toll Facilities Maintenance
Labor and Other Direct Cost Items by Month

Description of Items	Unit	Quantity Per Project	Unit ($)	Monthly Total ($) Per Tolling Location
Optional Extension 2 Costs				
Extension 2 Year 1 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 2 Year 1				$ -
Extension 2 Year 2 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 2 Year 2				$ -
Extension 2 Year 3 of Maintenance - Monthly Toll Facilities Maintenance				
Program Management/Administration	LS			$ -
Air Conditioning Equipment	EA	1	$ -	$ -
Electrical Components	EA	1	$ -	$ -
Fire and Carbon Monoxide Alarms, and Fire Extinguishers	EA	1	$ -	$ -
Standby Generators	EA	1	$ -	$ -
Security Components	EA	1	$ -	$ -
Toll Facilities Vaults	EA	1	$ -	$ -
Pressure Cleaning	EA	1	$ -	$ -
Pest Control	EA	1	$ -	$ -
Grounding and Ground System Testing	EA	1	$ -	$ -
Fiber Optic Network (FON) / Utility Locating	EA	1	$ -	$ -
Maintenance of Traffic (MOT)	LS	1	$ -	$ -
Propane Fuel Services	EA	1	$ -	$ -
Total Monthly Extension 2 Year 3				$ -

Sheet 8
Base Contract and Optional Extensions
Transaction Processing Operations Cost
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Annual Cost ($)	Annual Cost ($)	Annual Cost ($)	Annual Cost ($)	Total Annual Cost ($)
	Base Contract	Triangle Expressway AVI Transaction Processing Costs	Complete 540 AVI Transaction Processing Costs	Triangle Expressway Image-based Transaction Processing Costs	Complete 540 Image-based Transaction Processing Costs	
1	Year 1 of Operations	$ -		$ -		$ -
2	Year 2 of Operations	$ -		$ -		$ -
3	Year 3 of Operations	$ -		$ -		$ -
4	Year 4 of Operations	$ -	$ -	$ -	$ -	$ -
5	Year 5 of Operations	$ -	$ -	$ -	$ -	$ -
	Total Transaction Processing Operations Base Contract Cost (Operations Years 1 - 5)	$ -	$ -	$ -	$ -	$ -
	Optional Extension 1 Costs					
6	Extension 1 - Year 1 of Operations	$ -	$ -	$ -	$ -	$ -
7	Extension 1 - Year 2 of Operations	$ -	$ -	$ -	$ -	$ -
8	Extension 1 - Year 3 of Operations	$ -	$ -	$ -	$ -	$ -
	Total Extension 1 Cost	$ -	$ -	$ -	$ -	$ -
	Optional Extension 2 Costs					
9	Extension 2 - Year 1 of Operations	$ -	$ -	$ -	$ -	$ -
10	Extension 2 - Year 2 of Operations	$ -	$ -	$ -	$ -	$ -
11	Extension 2 - Year 3 of Operations	$ -	$ -	$ -	$ -	$ -
	Total Extension 2 Cost	$ -	$ -	$ -	$ -	$ -
	Total Base and Optional Transaction Processing Operations Cost	$ -	$ -	$ -	$ -	$ -

Sheet 8-1 Backup
Base Contract and Optional Extensions
Triangle Expressway AVI Transaction Processing Costs
Including all Labor and Other Direct Cost Items per Transaction

Description of Items	Sample Monthly Units	Unit ($)	Total Monthly Cost ($)	Total Annual Cost ($)
Base Contract AVI Transaction Processing Costs	Triangle Expressway			
Year 1 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	2,771,417	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000		$ -		
Level 3 - 3,500,001 - 4,000,000		$ -		
Level 4 - > 4,000,000		$ -		
Total Monthly/Annual Year 1	2,771,417		$ -	$ -
Year 2 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	2,975,083	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000		$ -		
Level 3 - 3,500,001 - 4,000,000		$ -		
Level 4 - > 4,000,000		$ -		
Total Monthly/Annual Year 2	2,975,083		$ -	$ -
Year 3 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	3,000,000	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000	136,417	$ -	$ -	$ -
Level 3 - 3,500,001 - 4,000,000		$ -		
Level 4 - > 4,000,000		$ -		
Total Monthly/Annual Year 3	3,136,417		$ -	$ -
Year 4 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	3,000,000	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000	283,500	$ -	$ -	$ -
Level 3 - 3,500,001 - 4,000,000		$ -		
Level 4 - > 4,000,000		$ -		
Total Monthly/Annual Year 4	3,283,500		$ -	$ -
Year 5 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	3,000,000	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000	423,833	$ -	$ -	$ -
Level 3 - 3,500,001 - 4,000,000		$ -		
Level 4 - > 4,000,000		$ -		
Total Monthly/Annual Year 5	3,423,833		$ -	$ -
Optional Extension 1 Costs				
Extension 1 Year 1 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	3,000,000	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000	500,000	$ -	$ -	$ -
Level 3 - 3,500,001 - 4,000,000	65,583	$ -	$ -	$ -
Level 4 - > 4,000,000		$ -		
Total Extension 1 Monthly/Annual Year 1	3,565,583		$ -	$ -
Extension 1 Year 2 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	3,000,000	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000	500,000	$ -	$ -	$ -
Level 3 - 3,500,001 - 4,000,000	293,526	$ -	$ -	$ -
Level 4 - > 4,000,000		$ -		
Total Extension 1 Monthly/Annual Year 2	3,793,526		$ -	$ -
Extension 1 Year 3 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	3,000,000	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000	500,000	$ -	$ -	$ -
Level 3 - 3,500,001 - 4,000,000	500,000	$ -	$ -	$ -
Level 4 - > 4,000,000	17,686	$ -	$ -	$ -
Total Extension 1 Monthly/Annual Year 3	4,017,686		$ -	$ -

Sheet 8-1 Backup
Base Contract and Optional Extensions
Triangle Expressway AVI Transaction Processing Costs
Including all Labor and Other Direct Cost Items per Transaction

Description of Items	Sample Monthly Units	Unit ($)	Total Monthly Cost ($)	Total Annual Cost ($)
Optional Extension 2 Costs				
Extension 2 Year 1 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	3,000,000	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000	500,000	$ -	$ -	$ -
Level 3 - 3,500,001 - 4,000,000	500,000	$ -	$ -	$ -
Level 4 - > 4,000,000	198,580	$ -	$ -	$ -
Total Extension 2 Monthly/Annual Year 1	4,198,580		$ -	$ -
Extension 2 Year 2 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	3,000,000	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000	500,000	$ -	$ -	$ -
Level 3 - 3,500,001 - 4,000,000	500,000	$ -	$ -	$ -
Level 4 - > 4,000,000	387,796	$ -	$ -	$ -
Total Extension 2 Monthly/Annual Year 2	4,387,796		$ -	$ -
Extension 2 Year 3 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 3,000,000	3,000,000	$ -	$ -	$ -
Level 2 - 3,000,001 - 3,500,000	500,000	$ -	$ -	$ -
Level 3 - 3,500,001 - 4,000,000	500,000	$ -	$ -	$ -
Level 4 - > 4,000,000	585,472	$ -	$ -	$ -
Total Extension 2 Monthly/Annual Year 3	4,585,472		$ -	$ -

Sheet 8-2 Backup
Base Contract and Optional Extensions
Complete 540 AVI Transaction Processing Costs
Including all Labor and Other Direct Cost Items per Transaction

Description of Items	Sample Monthly Units	Unit ($)	Total Monthly Cost ($)	Total Annual Cost ($)
Base Contract AVI Transaction Processing Costs	Complete 540			
Year 1 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000				
Level 2 - 1,000,001 - 2,000,000				
Level 3 - 2,000,001 - 3,000,000				
Level 4 - > 3,000,000				
Total Monthly/Annual Year 1				
Year 2 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000				
Level 2 - 1,000,001 - 2,000,000				
Level 3 - 2,000,001 - 3,000,000				
Level 4 - > 3,000,000				
Total Monthly/Annual Year 2				
Year 3 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000				
Level 2 - 1,000,001 - 2,000,000				
Level 3 - 2,000,001 - 3,000,000				
Level 4 - > 3,000,000				
Total Monthly/Annual Year 3				
Year 4 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000	240,641	$ -	$ -	$ -
Level 2 - 1,000,001 - 2,000,000		$ -		
Level 3 - 2,000,001 - 3,000,000		$ -		
Level 4 - > 3,000,000		$ -		
Total Monthly/Annual Year 4	240,641		$ -	$ -
Year 5 - AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000	1,000,000	$ -	$ -	$ -
Level 2 - 1,000,001 - 2,000,000	519,314	$ -	$ -	$ -
Level 3 - 2,000,001 - 3,000,000		$ -		
Level 4 - > 3,000,000		$ -		
Total Monthly/Annual Year 5	1,519,314		$ -	$ -
Optional Extension 1 Costs				
Extension 1 Year 1 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000	1,000,000	$ -	$ -	$ -
Level 2 - 1,000,001 - 2,000,000	1,000,000	$ -	$ -	$ -
Level 3 - 2,000,001 - 3,000,000	10,920	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 1 Monthly/Annual Year 1	2,010,920		$ -	$ -
Extension 1 Year 2 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000	1,000,000	$ -	$ -	$ -
Level 2 - 1,000,001 - 2,000,000	1,000,000	$ -	$ -	$ -
Level 3 - 2,000,001 - 3,000,000	365,538	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 1 Monthly/Annual Year 2	2,365,538		$ -	$ -
Extension 1 Year 3 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000	1,000,000	$ -	$ -	$ -
Level 2 - 1,000,001 - 2,000,000	1,000,000	$ -	$ -	$ -
Level 3 - 2,000,001 - 3,000,000	574,444	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 1 Monthly/Annual Year 3	2,574,444		$ -	$ -

Sheet 8-2 Backup
Base Contract and Optional Extensions
Complete 540 AVI Transaction Processing Costs
Including all Labor and Other Direct Cost Items per Transaction

Description of Items	Sample Monthly Units	Unit ($)	Total Monthly Cost ($)	Total Annual Cost ($)
Optional Extension 2 Costs				
Extension 2 Year 1 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000	1,000,000	$ -	$ -	$ -
Level 2 - 1,000,001 - 2,000,000	1,000,000	$ -	$ -	$ -
Level 3 - 2,000,001 - 3,000,000	721,470	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 2 Monthly/Annual Year 1	2,721,470		$ -	$ -
Extension 2 Year 2 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000	1,000,000	$ -	$ -	$ -
Level 2 - 1,000,001 - 2,000,000	1,000,000	$ -	$ -	$ -
Level 3 - 2,000,001 - 3,000,000	855,645	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 2 Monthly/Annual Year 2	2,855,645		$ -	$ -
Extension 2 Year 3 AVI Transaction Processing Costs per Transaction				
Level 1 - 1 - 1,000,000	1,000,000	$ -	$ -	$ -
Level 2 - 1,000,001 - 2,000,000	1,000,000	$ -	$ -	$ -
Level 3 - 2,000,001 - 3,000,000	944,214	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 2 Monthly/Annual Year 3	2,944,214		$ -	$ -

Sheet 8-3 Backup
Base Contract and Optional Extensions
Triangle Expressway Image-based Transaction Processing Costs
Including all Labor and Other Direct Cost Items per Image-based Transaction

Description of Items	Sample Monthly Units	Unit ($)	Total Monthly Cost ($)	Total Annual Cost ($)
Base Contract Image-based Transaction Processing Costs	Triangle Expressway			
Year 1 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	1,927,500	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000		$ -		
Level 3 - 2,500,001 - 3,000,000		$ -		
Level 4 - > 3,000,000		$ -		
Total Monthly/Annual Year 1	1,927,500		$ -	$ -
Year 2 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	56,167	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000		$ -		
Level 4 - > 3,000,000		$ -		
Total Monthly/Annual Year 2	2,056,167		$ -	$ -
Year 3 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	133,750	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000		$ -		
Level 4 - > 3,000,000		$ -		
Total Monthly/Annual Year 3	2,133,750		$ -	$ -
Year 4 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	198,083	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000		$ -		
Level 4 - > 3,000,000		$ -		
Total Monthly/Annual Year 4	2,198,083		$ -	$ -
Year 5 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	255,583	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000		$ -		
Level 4 - > 3,000,000		$ -		
Total Monthly/Annual Year 5	2,255,583		$ -	$ -
Optional Extension 1 Costs				
Extension 1 Year 1 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	312,083	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000		$ -		
Level 4 - > 3,000,000		$ -		
Total Extension 1 Monthly/Annual Year 1	2,312,083		$ -	$ -
Extension 1 Year 2 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	422,152	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000		$ -		
Level 4 - > 3,000,000		$ -		
Total Extension 1 Monthly/Annual Year 2	2,422,152		$ -	$ -
Extension 1 Year 3 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	500,000	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000	35,314	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 1 Monthly/Annual Year 3	2,535,314		$ -	$ -

Sheet 8-3 Backup
Base Contract and Optional Extensions
Triangle Expressway Image-based Transaction Processing Costs
Including all Labor and Other Direct Cost Items per Image-based Transaction

Description of Items	Sample Monthly Units	Unit ($)	Total Monthly Cost ($)	Total Annual Cost ($)
Optional Extension 2 Costs				
Extension 2 Year 1 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	500,000	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000	127,640	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 2 Monthly/Annual Year 1	2,627,640		$ -	$ -
Extension 2 Year 2 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	500,000	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000	223,298	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 2 Monthly/Annual Year 2	2,723,298		$ -	$ -
Extension 2 Year 3 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 2,000,000	2,000,000	$ -	$ -	$ -
Level 2 - 2,000,001 - 2,500,000	500,000	$ -	$ -	$ -
Level 3 - 2,500,001 - 3,000,000	322,430	$ -	$ -	$ -
Level 4 - > 3,000,000		$ -		
Total Extension 2 Monthly/Annual Year 3	2,822,430		$ -	$ -

Sheet 8-4 Backup
Base Contract and Optional Extensions
Complete 540 Image-based Transaction Processing Costs
Including all Labor and Other Direct Cost Items per Image-based Transaction

Description of Items	Sample Monthly Units	Unit ($)	Total Monthly Cost ($)	Total Annual Cost ($)
Base Contract Image-based Transaction Processing Costs	Complete 540			
Year 1 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000				
Level 2 - 500,001 - 1,000,000				
Level 3 - 1,000,001 - 2,000,000				
Level 4 - > 2,000,000				
Total Monthly/Annual Year 1				
Year 2 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000				
Level 2 - 500,001 - 1,000,000				
Level 3 - 1,000,001 - 2,000,000				
Level 4 - > 2,000,000				
Total Monthly/Annual Year 2				
Year 3 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000				
Level 2 - 500,001 - 1,000,000				
Level 3 - 1,000,001 - 2,000,000				
Level 4 - > 2,000,000				
Total Monthly/Annual Year 3				
Year 4 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000	158,848	$ -	$ -	$ -
Level 2 - 500,001 - 1,000,000		$ -		
Level 3 - 1,000,001 - 2,000,000		$ -		
Level 4 - > 2,000,000		$ -		
Total Monthly/Annual Year 4	158,848		$ -	$ -
Year 5 - Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000	500,000	$ -	$ -	$ -
Level 2 - 500,001 - 1,000,000	459,769	$ -	$ -	$ -
Level 3 - 1,000,001 - 2,000,000		$ -		
Level 4 - > 2,000,000		$ -		
Total Monthly/Annual Year 5	959,769		$ -	$ -
Optional Extension 1 Costs				
Extension 1 Year 1 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000	500,000	$ -	$ -	$ -
Level 2 - 500,001 - 1,000,000	500,000	$ -	$ -	$ -
Level 3 - 1,000,001 - 2,000,000	255,860	$ -	$ -	$ -
Level 4 - > 2,000,000		$ -		
Total Extension 1 Monthly/Annual Year 1	1,255,860		$ -	$ -
Extension 1 Year 2 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000	500,000	$ -	$ -	$ -
Level 2 - 500,001 - 1,000,000	500,000	$ -	$ -	$ -
Level 3 - 1,000,001 - 2,000,000	460,702	$ -	$ -	$ -
Level 4 - > 2,000,000		$ -		
Total Extension 1 Monthly/Annual Year 2	1,460,702		$ -	$ -
Extension 1 Year 3 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000	500,000	$ -	$ -	$ -
Level 2 - 500,001 - 1,000,000	500,000	$ -	$ -	$ -
Level 3 - 1,000,001 - 2,000,000	571,653	$ -	$ -	$ -
Level 4 - > 2,000,000		$ -		
Total Extension 1 Monthly/Annual Year 3	1,571,653		$ -	$ -

Sheet 8-4 Backup
Base Contract and Optional Extensions
Complete 540 Image-based Transaction Processing Costs
Including all Labor and Other Direct Cost Items per Image-based Transaction

Description of Items	Sample Monthly Units	Unit ($)	Total Monthly Cost ($)	Total Annual Cost ($)
Optional Extension 2 Costs				
Extension 2 Year 1 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000	500,000	$ -	$ -	$ -
Level 2 - 500,001 - 1,000,000	500,000	$ -	$ -	$ -
Level 3 - 1,000,001 - 2,000,000	642,228	$ -	$ -	$ -
Level 4 - > 2,000,000		$ -		
Total Extension 2 Monthly/Annual Year 1	1,642,228		$ -	$ -
Extension 2 Year 2 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000	500,000	$ -	$ -	$ -
Level 2 - 500,001 - 1,000,000	500,000	$ -	$ -	$ -
Level 3 - 1,000,001 - 2,000,000	706,853	$ -	$ -	$ -
Level 4 - > 2,000,000		$ -		
Total Extension 2 Monthly/Annual Year 2	1,706,853		$ -	$ -
Extension 2 Year 3 Image-based Transaction Processing Costs per Transaction				
Level 1 - 1 - 500,000	500,000	$ -	$ -	$ -
Level 2 - 500,001 - 1,000,000	500,000	$ -	$ -	$ -
Level 3 - 1,000,001 - 2,000,000	746,267	$ -	$ -	$ -
Level 4 - > 2,000,000		$ -		
Total Extension 2 Monthly/Annual Year 3	1,746,267		$ -	$ -

Sheet 9

Future Roadside AET Zone System Implementation and Maintenance Cost
(Informational Purposes Only - No Proposer Input Required)

Item #	Description of Items	Per Zone Roadside Cost ($)	Year 1 Per Zone Maintenance Cost ($)
	Future Roadside System Cost (by Zone Type)		
1	Future Zone Type 1 - AET: 4 travel + 2 shoulders	$ -	$ -
2	Future Zone Type 2 - AET: 3 travel + 2 shoulders	$ -	$ -
3	Future Zone Type 3 - AET: 2 travel + 2 shoulders	$ -	$ -
4	Future Zone Type 4 - AET: 2 travel + 1 shoulder	$ -	$ -
5	Future Zone Type 5 - AET: 1 travel + 2 shoulders	$ -	$ -
6	Future Zone Type 6 - AET: 1 travel + 1 shoulder	$ -	$ -
7	Future Zone Type 7 - AET: 1 Fat 18' travel + 2 shoulders	$ -	$ -
8	Facility Server (assumed to be the same as base contract)		

Sheet 9-1 Backup
Future Zone Types Roadside System Cost Schedule Per Zone

Description of Items	Quantity Per Toll Zone	Unit ($)	Total Item Cost ($)	
	2018 Values			
Future Zone Type 1 - AET: 4 travel + 2 shoulders			-	
1. Redundant Toll Zone Controller and In-lane Electronics	0	$ -	$ -	
2. AVI System (Do not include cost for AVI Reader Modules or Antennas)	0	$ -	$ -	See note 6
3. AVDC System	0	$ -	$ -	
4. ICPS	0	$ -	$ -	
5. Communications Equipment	0	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks	0	$ -	$ -	
7. DVAS	0	$ -	$ -	
8. Commissioning Test	0	$ -	$ -	
Total			$ -	
Future Zone Type 2 - AET: 3 travel + 2 shoulders			-	
1. Redundant Toll Zone Controller and In-lane Electronics	0	$ -	$ -	
2. AVI System (Do not include cost for AVI Reader Modules or Antennas)	0	$ -	$ -	See note 6
3. AVDC System	0	$ -	$ -	
4. ICPS	0	$ -	$ -	
5. Communications Equipment	0	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks	0	$ -	$ -	
7. DVAS	0	$ -	$ -	
8. Commissioning Test	0	$ -	$ -	
Total			$ -	
Future Zone Type 3 - AET: 2 travel + 2 shoulders			-	
1. Redundant Toll Zone Controller and In-lane Electronics	0	$ -	$ -	
2. AVI System (Do not include cost for AVI Reader Modules or Antennas)	0	$ -	$ -	See note 6
3. AVDC System	0	$ -	$ -	
4. ICPS	0	$ -	$ -	
5. Communications Equipment	0	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks	0	$ -	$ -	
7. DVAS	0	$ -	$ -	
8. Commissioning Test	0	$ -	$ -	
Total			$ -	
Future Zone Type 4 - AET: 2 travel + 1 shoulder			-	
1. Redundant Toll Zone Controller and In-lane Electronics	0	$ -	$ -	
2. AVI System (Do not include cost for AVI Reader Modules or Antennas)	0	$ -	$ -	See note 6
3. AVDC System	0	$ -	$ -	
4. ICPS	0	$ -	$ -	
5. Communications Equipment	0	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks	0	$ -	$ -	
7. DVAS	0	$ -	$ -	
8. Commissioning Test	0	$ -	$ -	
Total			$ -	
Future Zone Type 5 - AET: 1 travel + 2 shoulders			-	
1. Redundant Toll Zone Controller and In-lane Electronics	0	$ -	$ -	
2. AVI System (Do not include cost for AVI Reader Modules or Antennas)	0	$ -	$ -	See note 6
3. AVDC System	0	$ -	$ -	
4. ICPS	0	$ -	$ -	
5. Communications Equipment	0	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks	0	$ -	$ -	
7. DVAS	0	$ -	$ -	
8. Commissioning Test	0	$ -	$ -	
Total			$ -	
Future Zone Type 6 - AET: 1 travel + 1 shoulder			-	
1. Redundant Toll Zone Controller and In-lane Electronics	0	$ -	$ -	
2. AVI System (Do not include cost for AVI Reader Modules or Antennas)	0	$ -	$ -	See note 6
3. AVDC System	0	$ -	$ -	
4. ICPS	0	$ -	$ -	
5. Communications Equipment	0	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks	0	$ -	$ -	
7. DVAS	0	$ -	$ -	
8. Commissioning Test	0	$ -	$ -	
Total			$ -	
Future Zone Type 7 - AET: 1 Fat 18' travel + 2 shoulders			-	
1. Redundant Toll Zone Controller and In-lane Electronics	0	$ -	$ -	
2. AVI System (Do not include cost for AVI Reader Modules or Antennas)	0	$ -	$ -	See note 6
3. AVDC System	0	$ -	$ -	
4. ICPS	0	$ -	$ -	
5. Communications Equipment	0	$ -	$ -	
6. Equipment Cabinets/Enclosures and Racks	0	$ -	$ -	
7. DVAS	0	$ -	$ -	
8. Commissioning Test	0	$ -	$ -	
Total			$ -	

Note 1: All hardware/software provided under this Contract should be included in these costs.

Note 2: All roadways are current Year Cost.

Note 3: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.

Note 4: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in the Scope of Work.

Note 5: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in the Scope of Work.

Note 6: Unit cost for AVI Readers and Antennas will be zero dollars as they are provided by NCTA from the AVI Contract.

Note 7: Assume all shoulder lanes shall be equipped with rear-only Image Capture & Processing Systems (ICPS), and sensors to trigger the cameras and detect and frame the vehicle traveling on the shoulder, as required to meet performance requirements.

Sheet 9-2 Backup
Future Roadside System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month Per Zone Type

Description of Items	Monthly Total ($) Per Zone Type
Future Maintenance Costs - Year 1	2018 Values
Future Zone Type 1 - AET: 4 travel + 2 shoulders	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Toll Facility Maintenance	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 1	$ -
Future Zone Type 2 - AET: 3 travel + 2 shoulders	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Toll Facility Maintenance	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 2	$ -
Future Zone Type 3 - AET: 2 travel + 2 shoulders	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Toll Facility Maintenance	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 3	$ -
Future Zone Type 4 - AET: 2 travel + 1 shoulder	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Toll Facility Maintenance	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 4	$ -
Future Zone Type 5 - AET: 1 travel + 2 shoulders	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Toll Facility Maintenance	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Year 5	$ -
Future Zone Type 6 - AET: 1 travel + 1 shoulder	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Toll Facility Maintenance	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 1	$ -
Future Zone Type 7 - AET: 1 Fat 18' travel + 2 shoulders	
Labor	$ -
MOT	$ -
Material, Tools and Occupancy	$ -
Spares Replacement	$ -
Toll Facility Maintenance	$ -
Other	$ -
Maintenance Payment of Performance Bond (X%)	$ -
Total Monthly Extension 1 Year 2	$ -

Sheet 10-1
Estimated Lost Revenue

	Weekdays (Monday 12 AM - Saturday 12 AM)						Weekends (Saturday 12 AM - Monday 12 AM)						Totals	
	Hourly (6 AM - 8 PM)			Hourly (8 PM - 6 AM)			Hourly (7 AM - 7 PM)			Hourly (7 PM - 7 AM)				
Toll Zone	Hours	Rate ($/hr)	Est. Revenue	Hours	Rate ($/hr)	Est. Revenue	Hours	Rate ($/hr)	Est. Revenue	Hours	Rate ($/hr)	Est. Revenue	Hours	Est. Revenue
T1	0.00	$ 100.00	$ -	0.00	$ 20.00	$ -	0.00	$ 50.00	$ -	0.00	$ 20.00	$ -	0.00	$ -
T2	0.00	$ 100.00	$ -	0.00	$ 20.00	$ -	0.00	$ 40.00	$ -	0.00	$ 20.00	$ -	0.00	$ -
T5	0.00	$ 760.00	$ -	0.00	$ 80.00	$ -	0.00	$ 420.00	$ -	0.00	$ 110.00	$ -	0.00	$ -
T6	0.00	$ 750.00	$ -	0.00	$ 100.00	$ -	0.00	$ 360.00	$ -	0.00	$ 120.00	$ -	0.00	$ -
T9	0.00	$ 220.00	$ -	0.00	$ 10.00	$ -	0.00	$ 30.00	$ -	0.00	$ 20.00	$ -	0.00	$ -
T10	0.00	$ 300.00	$ -	0.00	$ 20.00	$ -	0.00	$ 30.00	$ -	0.00	$ 10.00	$ -	0.00	$ -
T13	0.00	$ 1,090.00	$ -	0.00	$ 170.00	$ -	0.00	$ 590.00	$ -	0.00	$ 190.00	$ -	0.00	$ -
T14	0.00	$ 1,070.00	$ -	0.00	$ 130.00	$ -	0.00	$ 590.00	$ -	0.00	$ 160.00	$ -	0.00	$ -
T17	0.00	$ 1,490.00	$ -	0.00	$ 160.00	$ -	0.00	$ 740.00	$ -	0.00	$ 180.00	$ -	0.00	$ -
T18	0.00	$ 1,550.00	$ -	0.00	$ 200.00	$ -	0.00	$ 740.00	$ -	0.00	$ 220.00	$ -	0.00	$ -
T21	0.00	$ 260.00	$ -	0.00	$ 30.00	$ -	0.00	$ 150.00	$ -	0.00	$ 40.00	$ -	0.00	$ -
T22	0.00	$ 270.00	$ -	0.00	$ 40.00	$ -	0.00	$ 140.00	$ -	0.00	$ 40.00	$ -	0.00	$ -
T25	0.00	$ 1,570.00	$ -	0.00	$ 170.00	$ -	0.00	$ 900.00	$ -	0.00	$ 200.00	$ -	0.00	$ -
T26	0.00	$ 1,540.00	$ -	0.00	$ 220.00	$ -	0.00	$ 850.00	$ -	0.00	$ 250.00	$ -	0.00	$ -
T29	0.00	$ 50.00	$ -	0.00	$ 10.00	$ -	0.00	$ 30.00	$ -	0.00	$ 10.00	$ -	0.00	$ -
T30	0.00	$ 50.00	$ -	0.00	$ 10.00	$ -	0.00	$ 30.00	$ -	0.00	$ 10.00	$ -	0.00	$ -
T31	0.00	$ 30.00	$ -	0.00	$ 10.00	$ -	0.00	$ 20.00	$ -	0.00	$ 10.00	$ -	0.00	$ -
T32	0.00	$ 40.00	$ -	0.00	$ 10.00	$ -	0.00	$ 20.00	$ -	0.00	$ 10.00	$ -	0.00	$ -
T33	0.00	$ 280.00	$ -	0.00	$ 30.00	$ -	0.00	$ 150.00	$ -	0.00	$ 40.00	$ -	0.00	$ -
T34	0.00	$ 250.00	$ -	0.00	$ 40.00	$ -	0.00	$ 150.00	$ -	0.00	$ 50.00	$ -	0.00	$ -
Total	0.00			0.00			0.00			0.00			**0.00**	**$ -**

Sheet 11-1
Additional Services Rates (2018 Values)

Overhead including Burden	0.0000%
Profit	0.0000%
STAFF POSITION/CLASSIFICATION	LOADED HOURLY RATE
CADD Technician	$ -
Database Administrator	$ -
Database Analyst	$ -
Deputy Project Manager	$ -
Dynamic Pricing System Manager	$ -
Electrician Helper	$ -
Finance Manager (Design/Implementation)	$ -
Finance Manager (Operations)	$ -
Hardware Engineer/Lead	$ -
Installation Manager	$ -
Installation Supervisor	$ -
Installation Technician	$ -
Licensed Electrical Engineer	$ -
Licensed Electrician	$ -
Maintenance Manager	$ -
Maintenance Supervisor	$ -
Maintenance Technician	$ -
Network Administrator	$ -
Network Engineer	$ -
Operations Manager	$ -
Project Manager	$ -
Project Principal	$ -
Quality Assurance Manager	$ -
Senior Maintenance Technician	$ -
Software Architect	$ -
Software Development Engineer	$ -
Software Development Manager	$ -
Software Lead	$ -
Software Programmer I	$ -
Software Programmer II	$ -
Software Programmer III	$ -
System Administrator	$ -
System Analyst	$ -
Systems Engineer	$ -
Technical Manager, Roadside System	$ -
Technical Manager, Roadway Support System	$ -
Technical Writer	$ -
Test Manager	$ -
Training Manager	$ -
Transition Manager	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -

Note 1: CPI adjustments will be made to the Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 12

Intelligent Transportation System (ITS) Implementation Cost

Item Description	Quantity	Unit ($)	Total Unit ($)	Labor ($)	Total Cost ($)
Triangle Expressway ITS & NCTA Offices ITS Implementation					
1. Triangle Expressway ITS Equipment Refresh					
a) MVD Master Location with 1 sensor	44	$ -	$ -	$ -	$ -
b) MVD Master Location with 2 sensors	5	$ -	$ -	$ -	$ -
c) MVD Slave Location with 1 sensor	34	$ -	$ -	$ -	$ -
d) Shared CCTV Camera / MVD Master Location with 1 sensor	4	$ -	$ -	$ -	$ -
e) Shared CCTV Camera / MVD Master Location with 2 sensors	1	$ -	$ -	$ -	$ -
f) CCTV Camera-only Location	16	$ -	$ -	$ -	$ -
g) Roadway Weather Information System (RWIS)	1	$ -	$ -	$ -	$ -
Total Triangle Expressway ITS Equipment Refresh			$ -	$ -	$ -
2. NCTA Offices ITS Implementation					
a) ITS/RTCS Workstations at NCTA Main Offices (1 S. Wilmington St.)	2	$ -	$ -	$ -	$ -
b) ITS/RTCS Monitors at NCTA Main Offices (1 S. Wilmington St.)	2	$ -	$ -	$ -	$ -
c) ITS/RTCS Workstations at Customer Service Center	1	$ -	$ -	$ -	$ -
d) ITS/RTCS Monitors at Customer Service Center	2	$ -	$ -	$ -	$ -
e) ITS/RTCS Workstations at State Transportation Operations Center (STOC)	4	$ -	$ -	$ -	$ -
f) ITS/RTCS Monitors at State Transportation Operations Center (STOC)	8	$ -	$ -	$ -	$ -
Total NCTA Offices ITS Implementation			$ -	$ -	$ -
New ITS Implementation for Complete 540					
3. Complete 540 ITS Implementation					
a) MVD Master Location with 1 sensor	42	$ -	$ -	$ -	$ -
b) MVD Slave Location with 1 sensor	12	$ -	$ -	$ -	$ -
c) CCTV Camera-only Location	16	$ -	$ -	$ -	$ -
d) Roadway Weather Information System (RWIS)	1	$ -	$ -	$ -	$ -
Total Complete 540 ITS Implementation			$ -	$ -	$ -
New ITS Implementation for Morrisville Parkway Interchange					
4. Morrisville Parkway ITS Implementation					
a) MVD Slave Location with 1 sensor	4	$ -	$ -	$ -	$ -
b) CCTV Camera-only Location	1	$ -	$ -	$ -	$ -
c) Roadway Weather Information System (RWIS)	1	$ -	$ -	$ -	$ -
Total Morrisville Parkway Interchange ITS Implementation			$ -	$ -	$ -
Total			$ -	$ -	$ -

Exhibit B - Payment Schedule

A. Payments for Implementation Roadside Toll Collection System Design and Development					$ -			$ -
Payment Number	**Payment Milestone**	**Pay Items**	**% Paid**	**Cum % Paid**	**Triangle Expressway**	**% Paid**	**Cum % Paid**	**Complete 540**
A-1	Notice to Proceed	Notice to Proceed	5.00%	5.00%	$ -			
A-2	Roadside Toll System Development and Administration	Project Management Documents Approved (PMP, Project Schedule, QA Plan and SDP, SRD)	10.00%	15.00%	$ -			
A-3	Roadside Toll System Design	Business Rules and Design Documents Approved (BRD and SDDD)	10.00%	25.00%	$ -	6.00%	6.00%	$ -
A-4	Roadside Toll System Factory Acceptance Testing (FAT)	Test Documentation and Factory Acceptance Testing Approved	12.00%	37.00%	$ -	12.00%	18.00%	$ -
A-5	Roadside Toll System Onsite Installation Testing (OIT)	Installation Plan Approved, Test Documentation and Onsite Installation Testing Approved - First Site	12.00%	49.00%	$ -	12.00%	30.00%	$ -
A-6	Roadside Toll System Manuals and Training	Manuals Approved and Training Approved	4.00%	53.00%	$ -	2.00%	32.00%	$ -
A-7	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live						
A-7a	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 1	3.00%	56.00%	$ -			
A-7b	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 2	3.00%	59.00%	$ -			
A-7c	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 3	3.00%	62.00%	$ -			
A-7d	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 4	3.00%	65.00%	$ -			
A-7e	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 5	3.00%	68.00%	$ -			
A-7f	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 6	3.00%	71.00%	$ -			
A-7g	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 7	3.00%	74.00%	$ -			
A-7h	Roadside Toll System Commissioning - Triangle Expressway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 8	3.00%	77.00%	$ -			
A-7i	Roadside Toll System Commissioning - Morrisville Parkway	Installation and Commissioning Approved Ready for Go Live - Tolling Location 9	3.00%	80.00%	$ -			
A-8a	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 10				8.00%	40.00%	$ -
A-8b	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 11				8.00%	48.00%	$ -
A-8c	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 12				8.00%	56.00%	$ -
A-8d	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 13				8.00%	64.00%	$ -
A-8e	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 14				8.00%	72.00%	$ -
A-8f	Roadside Toll System Commissioning - Complete 540	Installation and Commissioning Approved Ready for Go Live - Tolling Location 15				8.00%	80.00%	$ -
A-9	Roadside Toll System Acceptance	Operational and Acceptance Test Approved, As-builts Approved and Implementation Phase Closed Out	20.00%	100.00%	$ -	20.00%	100.00%	$ -

Exhibit B - Payment Schedule

B. Payments Related to Hardware, Equipment and Off-the-Shelf Software				
Payment Number	**Payment Milestone**	**% Paid**	**Cum.% Paid**	
	Triangle Expressway			**$ -**
B-1	Ordering Verified Triangle Expressway	10.00%	10.00%	$ -
B-2	Purchased, Received and Verified Triangle Expressway	18.00%	28.00%	$ -
B-3	Installation Approved Triangle Expressway			
B-3a	Installation Approved Triangle Expressway - Tolling Location 1	8.00%	36.00%	$ -
B-3b	Installation Approved Triangle Expressway - Tolling Location 2	8.00%	44.00%	$ -
B-3c	Installation Approved Triangle Expressway - Tolling Location 3	8.00%	52.00%	$ -
B-3d	Installation Approved Triangle Expressway - Tolling Location 4	8.00%	60.00%	$ -
B-3e	Installation Approved Triangle Expressway - Tolling Location 5	8.00%	68.00%	$ -
B-3f	Installation Approved Triangle Expressway - Tolling Location 6	8.00%	76.00%	$ -
B-3g	Installation Approved Triangle Expressway - Tolling Location 7	8.00%	84.00%	$ -
B-3h	Installation Approved Triangle Expressway - Tolling Location 8	8.00%	92.00%	$ -
B-3i	Installation Approved Morrisville Parkway - Tolling Location 9	8.00%	100.00%	$ -
	Complete 540			**$ -**
B-4	Ordering Verified Complete 540	10.00%	10.00%	$ -
B-5	Purchased, Received and Verified Complete 540	18.00%	28.00%	$ -
B-6	Installation Approved Complete 540			
B-6a	Installation Approved Complete 540 - Tolling Location 10	12.00%	40.00%	$ -
B-6b	Installation Approved Complete 540 - Tolling Location 11	12.00%	52.00%	$ -
B-6c	Installation Approved Complete 540 - Tolling Location 12	12.00%	64.00%	$ -
B-6d	Installation Approved Complete 540 - Tolling Location 13	12.00%	76.00%	$ -
B-6e	Installation Approved Complete 540 - Tolling Location 14	12.00%	88.00%	$ -
B-6f	Installation Approved Complete 540 - Tolling Location 15	12.00%	100.00%	$ -

Exhibit B - Payment Schedule

C. Payments Related to ITS Implementation				
Payment Number	**Payment Milestone**	**% Paid**	**Cum.% Paid**	
	Triangle Expressway ITS & NCTA Offices ITS Implementation			**$ -**
C-1	Ordering Verified Triangle Expressway ITS & NCTA Offices ITS Implementation	10.00%	10.00%	$ -
C-2	Purchased, Received and Verified Triangle Expressway ITS & NCTA Offices ITS Implementation	50.00%	60.00%	$ -
C-3	Installation Approved Triangle Expressway ITS	35.00%	95.00%	$ -
C-4	Installation Approved NCTA Offices ITS Implementation	5.00%	100.00%	$ -
	New ITS Implementation for Complete 540			**$ -**
C-5	Ordering Verified Complete 540 ITS	10.00%	10.00%	$ -
C-6	Purchased, Received and Verified Complete 540 ITS	50.00%	60.00%	$ -
C-7	Installation Approved Complete 540 ITS	40.00%	100.00%	$ -
	New ITS Implementation for Morrisville Parkway Interchange			**$ -**
C-8	Ordering Verified Morrisville Parkway Interchange ITS	10.00%	10.00%	$ -
C-9	Purchased, Received and Verified Morrisville Parkway Interchange ITS	50.00%	60.00%	$ -
C-10	Installation Approved Morrisville Parkway Interchange ITS	40.00%	100.00%	$ -

Form D-8
Proposer Questions Form

(A Word version of the Proposer Questions Form is "paper clipped"
to this NCTA RTCS Exhibits file for ease of completion.)

Proposer Questions	**North Carolina Turnpike Authority (NCTA)**				
#	Page	Section	Section Description	Proposer Question	NCTA Response
1.					
2.					
3.					
4.					

Form D-9
Non-Collusion Forms

(Please complete a single form that is applicable to your firm structure. PDFs of each form are presented below. Fillable PDFs of the form are "paper clipped" to this NCTA RTCS Exhibits file for ease of completion.)

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION

CORPORATION

The prequalified bidder being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the prequalified bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the prequalified bidder intends to do the work with its own bonafide employees or subcontractors and will not bid for the benefit of another contractor.

By submitting this non-collusion affidavit, the Contractor is certifying his status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF PREQUALIFIED BIDDER

_____
Full name of Corporation

_____
Address as Prequalified

Attest _____ By _____
Secretary/Assistant Secretary
Select appropriate title

President/Vice President/Assistant Vice President
Select appropriate title

_____ _____
Print or type Signer's name Print or type Signer's name

CORPORATE SEAL

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the

_____ day of _____ 20__.

NOTARY SEAL

_____
Signature of Notary Public

of _____County

State of _____

My Commission Expires:_____

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

Conditions for certification:

1. The prequalified bidder shall provide immediate written notice to the Department if at any time the bidder learns that his certification was erroneous when he submitted his debarment certification or explanation filed with the Department, or has become erroneous because of changed circumstances.

2. The terms *covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal,* and *voluntarily excluded,* as used in this provision, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. A copy of the Federal Rules requiring this certification and detailing the definitions and coverages may be obtained from the Contract Officer of the Department.

3. The prequalified bidder agrees by submitting this form, that he will not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in NCDOT contracts, unless authorized by the Department.

4. For Federal Aid projects, the prequalified bidder further agrees that by submitting this form he will include the Federal-Aid Provision titled *Required Contract Provisions Federal-Aid Construction Contract (Form FHWA PR* 1273) provided by the Department, without subsequent modification, in all lower tier covered transactions.

5. The prequalified bidder may rely upon a certification of a participant in a lower tier covered transaction that he is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless he knows that the certification is erroneous. The bidder may decide the method and frequency by which he will determine the eligibility of his subcontractors.

6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this provision. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

7. Except as authorized in paragraph 6 herein, the Department may terminate any contract if the bidder knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available by the Federal Government.

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

The prequalified bidder certifies to the best of his knowledge and belief, that he and his principals:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property;

c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph b. of this certification; and

d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

e. Will submit a revised Debarment Certification immediately if his status changes and will show in his bid proposal an explanation for the change in status.

If the prequalified bidder cannot certify that he is not debarred, he shall provide an explanation with this submittal. An explanation will not necessarily result in denial of participation in a contract.

Failure to submit a non-collusion affidavit and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

☐ Check here if an explanation is attached to this certification.

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION

INDIVIDUAL DOING BUSINESS IN HIS OWN NAME

The prequalified bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the prequalified bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the prequalified bidder intends to do the work with its own bonafide employees or subcontractors and will not bid for the benefit of another contractor.

By submitting this non-collusion affidavit, the Contractor is certifying his status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF PREQUALIFIED BIDDER

Name of Prequalified Bidder _____
Print or type name

_____
Address as Prequalified

_____
Signature of Prequalified Bidder, Individually

_____
Print or type Signer's Name

_____
Signature of Witness

_____
Print or type Signer's name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the

NOTARY SEAL

_____ day of _____ 20__.

_____
Signature of Notary Public

of _____County

State of _____

My Commission Expires:_____

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

Conditions for certification:

1. The prequalified bidder shall provide immediate written notice to the Department if at any time the bidder learns that his certification was erroneous when he submitted his debarment certification or explanation filed with the Department, or has become erroneous because of changed circumstances.

2. The terms *covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal,* and *voluntarily excluded,* as used in this provision, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. A copy of the Federal Rules requiring this certification and detailing the definitions and coverages may be obtained from the Contract Officer of the Department.

3. The prequalified bidder agrees by submitting this form, that he will not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in NCDOT contracts, unless authorized by the Department.

4. For Federal Aid projects, the prequalified bidder further agrees that by submitting this form he will include the Federal-Aid Provision titled *Required Contract Provisions Federal-Aid Construction Contract (Form FHWA PR* 1273) provided by the Department, without subsequent modification, in all lower tier covered transactions.

5. The prequalified bidder may rely upon a certification of a participant in a lower tier covered transaction that he is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless he knows that the certification is erroneous. The bidder may decide the method and frequency by which he will determine the eligibility of his subcontractors.

6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this provision. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

7. Except as authorized in paragraph 6 herein, the Department may terminate any contract if the bidder knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available by the Federal Government.

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

The prequalified bidder certifies to the best of his knowledge and belief, that he and his principals:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property;

c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph b. of this certification; and

d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

e. Will submit a revised Debarment Certification immediately if his status changes and will show in his bid proposal an explanation for the change in status.

If the prequalified bidder cannot certify that he is not debarred, he shall provide an explanation with this submittal. An explanation will not necessarily result in denial of participation in a contract.

Failure to submit a non-collusion affidavit and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

☐ Check here if an explanation is attached to this certification.

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION

INDIVIDUAL DOING BUSINESS UNDER A FIRM NAME

The prequalified bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the prequalified bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the prequalified bidder intends to do the work with its own bonafide employees or subcontractors and will not bid for the benefit of another contractor.

By submitting this non-collusion affidavit, the Contractor is certifying his status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF PREQUALIFIED BIDDER

Name of Prequalified Bidder _____
Individual name

Trading and doing business as _____
Full name of Firm

_____
Address as Prequalified

_____ _____
Signature of Witness Signature of Prequalified Bidder, Individually

_____ _____
Print or type Signer's name Print or type Signer's name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the

NOTARY SEAL

_____ day of _____ 20__.

_____
Signature of Notary Public

of _____County

State of _____

My Commission Expires:_____

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

Conditions for certification:

1. The prequalified bidder shall provide immediate written notice to the Department if at any time the bidder learns that his certification was erroneous when he submitted his debarment certification or explanation filed with the Department, or has become erroneous because of changed circumstances.

2. The terms *covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal,* and *voluntarily excluded,* as used in this provision, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. A copy of the Federal Rules requiring this certification and detailing the definitions and coverages may be obtained from the Contract Officer of the Department.

3. The prequalified bidder agrees by submitting this form, that he will not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in NCDOT contracts, unless authorized by the Department.

4. For Federal Aid projects, the prequalified bidder further agrees that by submitting this form he will include the Federal-Aid Provision titled *Required Contract Provisions Federal-Aid Construction Contract (Form FHWA PR* 1273) provided by the Department, without subsequent modification, in all lower tier covered transactions.

5. The prequalified bidder may rely upon a certification of a participant in a lower tier covered transaction that he is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless he knows that the certification is erroneous. The bidder may decide the method and frequency by which he will determine the eligibility of his subcontractors.

6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this provision. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

7. Except as authorized in paragraph 6 herein, the Department may terminate any contract if the bidder knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available by the Federal Government.

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

The prequalified bidder certifies to the best of his knowledge and belief, that he and his principals:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property;

c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph b. of this certification; and

d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

e. Will submit a revised Debarment Certification immediately if his status changes and will show in his bid proposal an explanation for the change in status.

If the prequalified bidder cannot certify that he is not debarred, he shall provide an explanation with this submittal. An explanation will not necessarily result in denial of participation in a contract.

Failure to submit a non-collusion affidavit and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

☐ Check here if an explanation is attached to this certification.

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION

LIMITED LIABILITY COMPANY

The prequalified bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the prequalified bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the prequalified bidder intends to do the work with its own bonafide employees or subcontractors and will not bid for the benefit of another contractor.

By submitting this non-collusion affidavit, the Contractor is certifying his status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF PREQUALIFIED BIDDER

_____
Full Name of Firm

_____
Address as Prequalified

_____ Signature of Witness	_____ Signature of Member/Manager/Authorized Agent *Select appropriate title*
_____ Print or type Signer's name	_____ Print or type Signer's Name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the **NOTARY SEAL**

_____ day of _____ 20__.

_____
Signature of Notary Public

of _____County

State of _____

My Commission Expires:_____

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

Conditions for certification:

1. The prequalified bidder shall provide immediate written notice to the Department if at any time the bidder learns that his certification was erroneous when he submitted his debarment certification or explanation filed with the Department, or has become erroneous because of changed circumstances.

2. The terms *covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal,* and *voluntarily excluded,* as used in this provision, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. A copy of the Federal Rules requiring this certification and detailing the definitions and coverages may be obtained from the Contract Officer of the Department.

3. The prequalified bidder agrees by submitting this form, that he will not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in NCDOT contracts, unless authorized by the Department.

4. For Federal Aid projects, the prequalified bidder further agrees that by submitting this form he will include the Federal-Aid Provision titled *Required Contract Provisions Federal-Aid Construction Contract (Form FHWA PR* 1273) provided by the Department, without subsequent modification, in all lower tier covered transactions.

5. The prequalified bidder may rely upon a certification of a participant in a lower tier covered transaction that he is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless he knows that the certification is erroneous. The bidder may decide the method and frequency by which he will determine the eligibility of his subcontractors.

6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this provision. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

7. Except as authorized in paragraph 6 herein, the Department may terminate any contract if the bidder knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available by the Federal Government.

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

The prequalified bidder certifies to the best of his knowledge and belief, that he and his principals:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property;

c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph b. of this certification; and

d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

e. Will submit a revised Debarment Certification immediately if his status changes and will show in his bid proposal an explanation for the change in status.

If the prequalified bidder cannot certify that he is not debarred, he shall provide an explanation with this submittal. An explanation will not necessarily result in denial of participation in a contract.

Failure to submit a non-collusion affidavit and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

☐ Check here if an explanation is attached to this certification.

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION

PARTNERSHIP

The prequalified bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the prequalified bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the prequalified bidder intends to do the work with its own bonafide employees or subcontractors and will not bid for the benefit of another contractor.

By submitting this non-collusion affidavit, the Contractor is certifying his status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF PREQUALIFIED BIDDER

_____
Full Name of Partnership

_____
Address as Prequalified

_____ By _____
Signature of Witness Signature of Partner

_____ _____
Print or type Signer's name Print or type Signer's name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the **NOTARY SEAL**

_____ day of _____ 20__.

_____
Signature of Notary Public

of _____County

State of _____

My Commission Expires:_____

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

Conditions for certification:

1. The prequalified bidder shall provide immediate written notice to the Department if at any time the bidder learns that his certification was erroneous when he submitted his debarment certification or explanation filed with the Department, or has become erroneous because of changed circumstances.

2. The terms *covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal,* and *voluntarily excluded,* as used in this provision, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. A copy of the Federal Rules requiring this certification and detailing the definitions and coverages may be obtained from the Contract Officer of the Department.

3. The prequalified bidder agrees by submitting this form, that he will not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in NCDOT contracts, unless authorized by the Department.

4. For Federal Aid projects, the prequalified bidder further agrees that by submitting this form he will include the Federal-Aid Provision titled *Required Contract Provisions Federal-Aid Construction Contract (Form FHWA PR* 1273) provided by the Department, without subsequent modification, in all lower tier covered transactions.

5. The prequalified bidder may rely upon a certification of a participant in a lower tier covered transaction that he is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless he knows that the certification is erroneous. The bidder may decide the method and frequency by which he will determine the eligibility of his subcontractors.

6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this provision. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

7. Except as authorized in paragraph 6 herein, the Department may terminate any contract if the bidder knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available by the Federal Government.

Non-Collusion Affadavit, Debarment Certification, and Gift Ban Certification are required prior to bidding. Rev. 5-19-11
Submit to the Prequalification Office.

DEBARMENT CERTIFICATION

The prequalified bidder certifies to the best of his knowledge and belief, that he and his principals:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property;

c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph b. of this certification; and

d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

e. Will submit a revised Debarment Certification immediately if his status changes and will show in his bid proposal an explanation for the change in status.

If the prequalified bidder cannot certify that he is not debarred, he shall provide an explanation with this submittal. An explanation will not necessarily result in denial of participation in a contract.

Failure to submit a non-collusion affidavit and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

☐ Check here if an explanation is attached to this certification.

Form D-10
Surety Commitment Letter

CONSENT OF SURETY

TO: North Carolina Turnpike Authority

We have reviewed the proposal of _____
(Proposer)

_____
(Address)

for the Roadside Toll Collection System for which Proposals will be received on: _____
(Proposal Due Date)

and wish to advise that should this Proposal of the Proposer be accepted and the Contract awarded to, such Proposer, this company agrees to become the surety and provide the Payment and Performance Bonds required by the Contract for both the Implementation and Operations and Maintenance Phases. Such bonds will be in the amounts identified in the Price Proposal as referenced in the RFP Section I-4.1 Notification of Awards with terms of the bonds as also provided in that section.

We are duly authorized to do business in the State of North Carolina.

Surety Company/Address:

_____

_____

_____

_____
(Authorized Signature)

ATTEST:

_____

[Attach Power of Attorney]

(Corporate Seal, if any. If no seal, write "No Seal" across this place and sign.)

Form D-11
Acknowledgement of Receipt of Addenda

ACKNOWLEDGEMENT OF RECEIPT OF ADDENDA

The Proposer shall acknowledge receipt of each addendum to this Request for Proposal by completing this form and including same in the Technical Proposal.

Addenda	Date	By
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Failure to confirm receipt of addenda may result in rejection of the Proposer's Proposal.

Dated_____, 2018~~6~~

_____
Legal Name of Firm

By_____
Signature

_____
Title

NOTE: Attach additional pages as necessary