



CENTRAL TEXAS REGIONAL
MOBILITY AUTHORITY

December 14, 2022
AGENDA ITEM #12

Discuss and consider approving Work Authorization No. 5 with Electronic Transaction Consultants, LLC (ETC) for the design and installation of the toll system and other infrastructure required to support the 183A Phase III Project

Strategic Plan Relevance:	Innovation, Service and Stewardship
Department:	Operations
Contact:	Greg Mack, Director of Information Technology
Associated Costs:	NTE \$ 2,449,612.35 (includes 10% contingency)
Funding Source:	Not Applicable
Action Requested:	Consider and act on draft resolution

Project Description/Background: Electronic Toll Consultants, LLC was awarded the 2021 RFP for Electronic Toll Collection System (ETCS) Integration and Maintenance Services. The scope of their work in support of the Mobility Authority includes incremental replacement and maintenance of ETCS equipment on all existing Mobility Authority toll projects, as well as implementation and maintenance of systems on new Mobility Authority projects.

Action Requested: Work Authorization (WA) #05 supports the installation of toll equipment on the 183A Phase III Project (“183A Ph. III”) and associated project documentation updates. The 183A Phase III project (“183A Ph. III”) will extend the 183A Toll Road 6.6-miles northward from Hero Way to north of SH 29 in Liberty Hill. The project will consist of the construction of four (4) tolled lanes (two in each direction) located primarily within the existing median of the US 183 corridor, with an adjacent shared use path from Hero Way to Seward Junction Loop. Construction for the 183A Ph. III project commenced in spring 2021 and is anticipated to be completed in the fall of 2024.

The Toll Collection System for the Project will be all electronic toll collection. The Project (183A Ph. III) limits extend from Hero Way to north of SH 29 in Liberty Hill. The Project length is approximately 6.6 miles. The Project consists of ten (10) toll sites that provide open road tolling for both the northbound and southbound lanes and shoulders. A two (2) gantry solution will be provided for all tolling locations.

The total cost for the 183A Phase III toll collection system is \$2,449,612.35. The breakdown for this cost is as follows:

183A Phase III Toll Collection Installation Services Cost Information

System Procurement, Installation and Testing Services	\$ 1,213,209.79
Project Management and Testing Services	1,013,710.52
SUBTOTAL - Installation Services	\$ 2,226,920.31
Project Contingency (10%)	222,692.03
GRAND TOTAL	\$ 2,449,612.35

Previous Actions: In December 2022, the Mobility Authority Board approved the amended and restated contract with Electronic Transaction Consultants, LLC for electronic toll collection integration and maintenance services. The initial term of the agreement is six (6) years with an option for two (2) successive two (2) year renewal terms, subject to the approval of the Mobility Authority’s Board of Directors. The total cost for the agreement is not to exceed \$79,720,455. The value covers all toll collection system installation and maintenance services for new projects as well as existing projects as they are replaced.

In February 2022, the Executive Director approved WA #2 for design support on the 183A Phase III project in an amount not to exceed \$215,648.27.

Financing: 183A Phase III construction financing

Staff Recommendation: Staff recommends the Board approve Work Authorization #5 with Electronic Transaction Consultants, LLC (ETC) for the design and installation of the toll system and other infrastructure required to support the 183A Phase III Project.

Backup provided: ETC Work Authorization #5
Presentation
Draft Resolution

**GENERAL MEETING OF THE BOARD OF DIRECTORS
OF THE
CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY**

RESOLUTION NO. 22-0XX

**APPROVING WORK AUTHORIZATION NO. 5 WITH
ELECTRONIC TRANSACTION CONSULTANTS, LLC FOR DESIGN AND INSTALLATION
SERVICES RELATED TO THE 183A PHASE III PROJECT ELECTRONIC TOLL
COLLECTION SYSTEM**

WHEREAS, by Resolution No. 22-0XX, dated December 14, 2022, the Board of Directors approved an Amended and Restated Agreement for Roadside Toll Collection System Installation and Maintenance Services with Electronic Transaction Consultants, LLC (ETC); and

WHEREAS, in the spring of 2021 the Mobility Authority began construction of the 183A Phase III Project which will extend the 183A Toll Road 6.6-miles northward from Hero Way to north of SH 29 in Liberty Hill and will consist of four (4) tolled lanes (two in each direction) located primarily within the existing median of the US 183 corridor, with an adjacent shared use path from Hero Way to Seward Junction Loop; and

WHEREAS, the Mobility Authority requires services necessary to design and install roadway and civil infrastructure enabling operations of the proposed Electronic Toll Collection System (ETCS) and supporting Intelligent Transportation System (ITS) elements for the 183A Phase III Project; and

WHEREAS, the Executive Director and ETC have negotiated draft Work Authorization No. 5 in an amount not to exceed \$2,449,612.35 for services related to the 183A Phase III Project necessary for the design and installation the ETCS and supporting ITS elements; and

WHEREAS, the Executive Director recommends approving Work Authorization No. 5 in the form or substantially the same form as attached hereto as Exhibit A.

NOW THEREFORE, BE IT RESOLVED that the Board of Directors hereby approves Work Authorization No. 5 in an amount not to exceed \$2,449,612.35 with Electronic Transaction Consultants, LLC for services related to the 183A Phase III Project necessary to design and install roadway and civil infrastructure, enabling operations of the proposed Electronic Toll Collection System (ETCS) and supporting Intelligent Transportation System (ITS) elements in the form or substantially the same form attached hereto as Exhibit A.

Adopted by the Board of Directors of the Central Texas Regional Mobility Authority on the 14th day of December 2022.

Submitted and reviewed by:

Approved:

James M. Bass
Executive Director

Robert W. Jenkins, Jr.
Chairman, Board of Directors

Exhibit A



CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

WORK AUTHORIZATION

WORK AUTHORIZATION NO. 05 TOLL SYSTEM IMPLEMENTATION – PHASE II and PHASE III

ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATION AND MAINTENANCE SERVICES

THIS WORK AUTHORIZATION (WA) is made this 14th day of December, 2022 pursuant to the terms and conditions of the Agreement for Roadside Toll Collection System Installation and Maintenance Services, to the amended Contract for Toll System Implementation, dated the 14th day of December, 2022 (the “Contract”) entered into by and between the Central Texas Regional Mobility Authority (the “Mobility Authority” or “CTRMA”), and Electronic Transaction Consultants, LLC (the “TSI,” also referred to in attachments to this WA No. 05 as the “System Integrator” or “SI”). WA No. 05 will include the implementation of toll equipment on the 183A Phase III Project (“183A Ph. III”) and associated project documentation updates.

PART I. The TSI shall perform system development, implementation, installation, testing and integration services generally described in the Scope of Work attached hereto as **Attachment A and the Contract**. The TSI’s duties and responsibilities are further detailed in: (1) Project Layouts/Schematics included as **Attachment B**, and (2) the Project Responsibility Matrix included as **Attachment C**

PART II. The maximum amount payable under this WA No. 05 is \$2,449,612.35 including ten percent project contingency. This amount is based generally upon the estimated fees documented in **Attachment D**.

PART III. Payment to the TSI for the services established under this WA No. 05 shall be made in accordance with the Contract.

PART IV. This WA No. 05 shall become effective on the date both parties have signed this WA No. 05. This WA No. 05 will terminate upon the Mobility Authority’s final acceptance of the work described herein as determined by CTRMA or upon payment of the maximum amount payable in Phase II and Phase III, whichever date is first, unless extended as provided by the Contract. The work shall be performed in accordance with the Project Schedule and Milestones as set forth in **Attachment E**.

PART V. This WA No. 05 does not waive any of the parties’ responsibilities and obligations provided under the Contract, as such responsibilities and obligations under the Contract remain in full force and effect.



IN WITNESS WHEREOF, this Work Authorization No. 05 is executed in duplicate counterparts and hereby accepted and acknowledged below.

CTRMA DEPARTMENT DIRECTOR (*Requesting Work Authorization*)

Signature

Date

Typed/Printed Name and Title

CTRMA LEGAL (*Noting Legal Sufficiency*)

Signature

Date

Typed/Printed Name and Title

CTRMA FINANCE (*Noting Funds Availability*)

Signature

Date

Typed/Printed Name and Title

THE TSI (Electronic Transaction Consultants, LLC)

Signature

Date

Typed/Printed Name and Title

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

Executed for and approved by the Central Texas Regional Mobility Authority for the purpose and effect of activating and/or carrying out the orders, established policies or work programs heretofore approved and authorized by the Texas Transportation Commission.

Signature

Date

James Bass, Executive Director

Typed/Printed Name and Title

LIST OF ATTACHMENTS

Attachment A	Work Authorization Scope of Work
Attachment B	Project Layout/Schematics
Attachment C	Project Responsibility Matrix
Attachment D	System Integrator Price Sheet and Budget
Attachment E	Project Schedule & Milestone Payments
Attachment F	Master Project Schedule and Milestones
Attachment G	Project Liquidated Damages/Penalties/Incentives

ATTACHMENT A

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY TOLL SYSTEM IMPLEMENTATION – PHASE II and Phase III

ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATION AND MAINTENANCE SERVICES

WORK AUTHORIZATION SCOPE OF WORK

A1.0 GENERAL

A1.01. Background

Electronic Transaction Consultants, LLC was awarded the 2021 RFP for Electronic Toll Collection System (ETCS) Integration and Maintenance Services. The scope of their work in support of the Mobility Authority includes replacement of ETCS equipment on all existing Mobility Authority toll projects, as well as implementation of new systems on new Mobility Authority projects in the Austin, Texas area. WA No. 05 will include the replacement of toll equipment on 183A Ph. III and associated project documentation updates.

183A Ph. III will extend the 183A Toll Road 6.6-miles northward from Hero Way to north of SH 29 in Liberty Hill. The project will consist of the construction of four (4) tolled lanes (two in each direction) located primarily within the existing median of the US 183 corridor, with an adjacent shared use path from Hero Way to Seward Junction Loop. Construction for the 183A Ph. III project commenced in spring 2021 and is anticipated to be completed in the fall of 2024.

A1.02. Summary Scope of Work

The Scope of Work for WA No. 05 includes all efforts related to Phase II and Phase III of the ETCS Project as described in the Contract. Phase II and Phase III consists of updating all Program-level documentation specific to 183A Ph. III and design, testing, installation, and integration of the ETCS on 183A Ph. III.

A2.0 – GENERAL DESCRIPTION – 183A PH. III INFRASTRUCTURE

The Toll Collection System for the Project will be all electronic toll collection (ETC). Phase II of the Project (183A Ph. III) limits extend from Hero Way to north of SH 29 in Liberty Hill. The Project consists of ten (10) toll sites that provide Open Road Tolling for both the northbound (NB) and southbound (SB) lanes and shoulders. A two (2) gantry solution will be provided for the site at the locations listed in Table 1 below.

Table 1: Gantry Locations and Lane Counts

Toll Zone No.	Approximate Station Location (CL 183A)	Location	Direction of Travel	Type	No. of Lanes	No. of Shoulders (8' or greater)	Comments
1	156+75	North of Trellis Blvd	NB	Ramp	1	1	- One (1) 8' shoulder - One (1) 4' shoulder
2	156+60	North of Trellis Blvd	SB	Ramp	1	1	- One (1) 8' shoulder - One (1) 4' shoulder
3	175+00	North of Larkspur Park Blvd	NB	Mainlane	2	1	- One (1) 10' shoulder - One (1) 6' shoulder
4	175+00	North of Larkspur Park Blvd	SB	Mainlane	2	1	- One (1) 10' shoulder - One (1) 6' shoulder
5	199+00	North of Talon Grasp Tr	NB	Ramp	1	1	- One (1) 8' shoulder - One (1) 4' shoulder
6	198+00	North of Talon Grasp Tr	SB	Ramp	1	1	- One (1) 8' shoulder - One (1) 4' shoulder
7	322+00	South of San Gabriel Pkwy	NB	Ramp	1	0	- One (1) 6' shoulder - One (1) 4' shoulder
8	324+10	South of San Gabriel Pkwy	SB	Ramp	1	0	- Two (2) 4' shoulder
9	335+00	North of Hero Way	NB	Mainlane	2	1	- One (1) 10' shoulder - One (1) 6' shoulder
10	335+00	North of Hero Way	SB	Mainlane	2	1	- One (1) 10' shoulder - One (1) 6' shoulder

A3.0 GENERAL REQUIREMENTS - TOLL COLLECTION SYSTEM

A3.01 General Requirements – 183A Ph. III Toll Collection System

The Scope of Work for WA No. 05 includes implementation of an ETCS for Phase II and Phase III that includes roadside functionality (Automatic Vehicle Identification (AVI), Automatic Vehicle Classification and Detection (AVC/D), Violation Enforcement System (VES), Digital Video Audit System (DVAS)), fiber optic communications, network communication equipment, power systems, and lighting and grounding protection. All field devices will be integrated with the central management software via communication with the Traffic Incident Management Center (TIMC).

The SI shall be responsible for all aspects of system design, testing, procurement, installation/implementation, integration, and training required to support the toll collection system. The ETCS will integrate with the Mobility Authority’s Data Platform System (DPS), which connects to the Mobility Authority’s Pay by Mail system and the Central US Interoperability (CUSIOP) Hub.

The Mobility Authority’s ETCS, which is being designed and implemented through individual and separate work authorizations for each toll road facility, will replace the legacy ETCS that has been implemented on the 183A Toll Road, 290 Toll Road, 71 Toll Lane, 45SW Toll Road, 183 South Toll Road, and the MoPac Express Lane, as well as integrate to the DPS and TIMC. It is required that the ETCS be interoperable with the other CUSIOP agencies through the CUSIOP Hub.

A4.0 EQUIPMENT, INSTALLATION, AND TRANSITION

A4.01. Gantries and Roadside Equipment for ETCS

The SI shall provide, install, and test all equipment, systems, subsystems, documentation, and components to comply with the requirements of Phase II and Phase III of the Contract for the following:

- Roadside systems, subsystems, and infrastructure to support AVI, AVC/D, VES (cameras), DVAS (cameras), , zone controllers, equipment monitoring, diagnostic systems, configuration, software, all related/required components and sensors, validation of roadway infrastructure, including modification of infrastructure (if required), and development of installation drawings and installation plan.
- Appropriate applications to support daily operations of CTRMA’s facilities.
- Processing, tracking, and storing all transactions generated by roadside tolling equipment.
- Complete image processing to provide license plate information from images captured on the roadside, including all systems, and required operations staff.
- Project management including Project schedules, Project meeting organization (including agendas and notes), Project level documentation, requirements workshops,

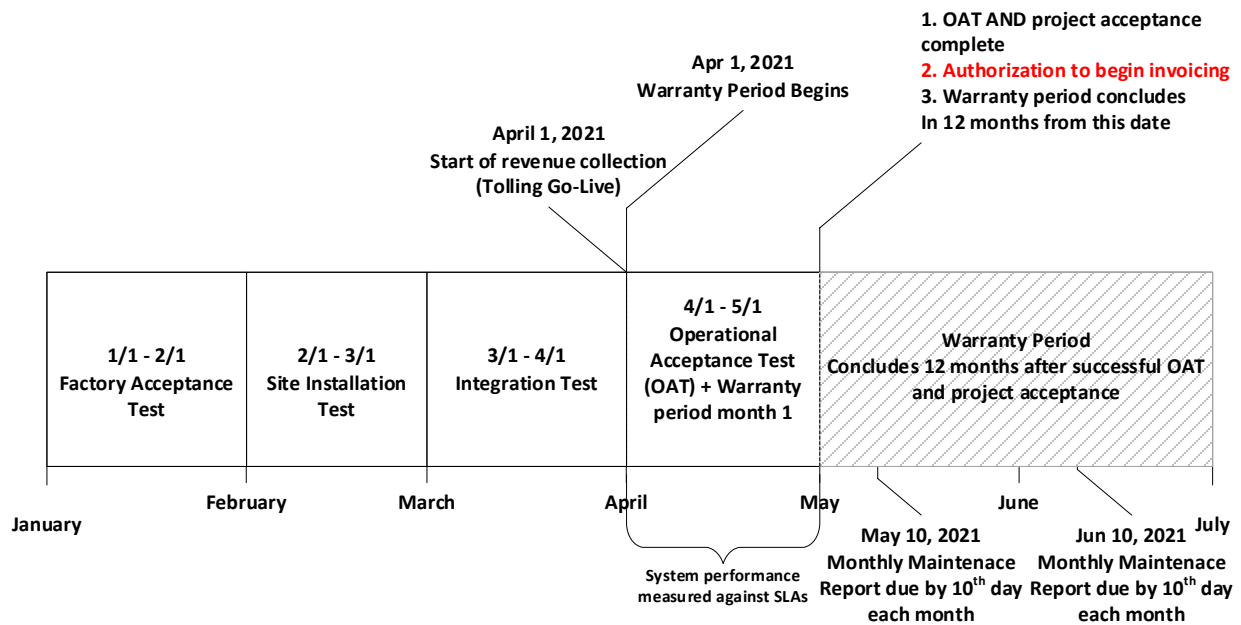
quality assurance and control programs, risk management, and coordination with CTRMA and their designated staff, consultants, partners, and vendors. All documentation is to be submitted to CTRMA for review and approval based on a mutually agreed upon, approved schedule.

- The warranty period concludes 12 months after CTRMA approval of the Operational Acceptance Test (OAT) and project acceptance. An example of the warranty period is presented below in Figure 1 which illustrates the required sequence of each milestone. Additional examples are provided in Section 2.13.6 of Appendix A of the Contract.

The SI shall be given full project acceptance and authorization to initiate maintenance invoicing for the ETCS, either a newly installed or transitioned facility, upon the completion and the CTRMA approval of the OAT for that project/facility, closure of all punch-list items, completion, and submission of all required documents, including as-builts and updates to manuals and meeting of other conditions as specified in the Contract. Work performed prior to authorization to initiate maintenance invoicing is not considered maintenance, even though the project may be open to revenue collection.

Note: Figure 1 represents the completion of OAT and full project acceptance thirty (30) days after go-live.

Figure 1: Example Warranty Period



- Procurement and receipt of all ETCS hardware and coordination with the Mobility Authority for equipment validation and asset tag application.
- Security of all procured and paid for TCS hardware until installed. CTRMA shall receive a full manufacturer’s warranty on all procured hardware equipment during the Warranty Period.

- Development of user manuals and training for SI-provided systems, software, and reports.
- Network administration of all ETCS communications equipment, software, cables, connections, configurations necessary to operate the ETCS.
- Transition plan and approach for the transition of system elements and facilities from the existing SI's solution to the new ETCS, particularly focused on business continuity and mitigation of revenue loss.
- Training program designed to educate CTRMA-designated personnel in the operation, use, and maintenance of the ETCS.
- ETCS Project documentation including the Requirements Traceability Matrix, Interface Control Documents (ICDs), System Detailed Design, Disaster Recovery, and Backup, Recovery and Data Archive plan.
- System testing plan/script and documentation including Master Test Plan, Test Reports, Factory Acceptance Testing, Site Installation Testing, Integration Testing, and Operational Acceptance Testing.
- Succession plan to define the SI's approach in supporting the transition of their responsibilities under this contract to CTRMA and/or another entity whenever this contract terminates.

More detailed requirements for these systems and subsystems are described in Sections 2.4, 2.5, 2.6, 2.9, 2.11, 2.12, 2.13, 2.14, 2.15, 2.17, 2.18, 2.19 of Appendix A of the Contract.

A5.0 PROJECT COORDINATION, MANAGEMENT AND COMMUNICATION

The SI shall be responsible for all required coordination efforts and touchpoints with CTRMA and Project stakeholders throughout the term of the Project, including building and maintaining relationships and direct lines of communication between the Mobility Authority and other Project stakeholders as identified by the Mobility Authority.

Anticipated SI coordination efforts, touchpoints, and responsibilities throughout the Project, include, but are not limited to:

- Project kick-off meeting
- Project progress meetings as required
- Comment resolution meetings to review all submissions, workshops to validate system requirements, design approach and design, product demonstrations, report formats, test plans and scripts, and other issues requiring coordination between CTRMA and the SI.
- Ad-hoc design review meetings
- Design/development demonstrations
- Installation meetings

- Coordination with Kapsch and CTRMA regarding transition of roadways and the transition of maintenance from Kapsch to ETC
- Test script execution and demonstrations
- Coordination with other system providers that integrate to CTRMA's existing ETCS
- OAT readiness meeting and all other testing readiness meetings
- Development of various documents and tools to communicate Project status, installation requirements, or other critical aspects of the Project, including but not limited to:
 - Requirements Traceability Matrix
 - Installation plans and drawings
 - Schedule
- Communicating requirements needed from Mobility Authority and Project stakeholders for system testing

A6.0 TOLL FACILITIES RESPONSIBILITY MATRIX

The delineation of Project responsibilities between the SI and the Mobility Authority is presented in ATTACHMENT C Project Responsibility Matrix.

A7.0 INSTALLATION PERFORMANCE AND PAYMENT BOND

Prior to the beginning of any work designated in this WA No. 05, the TSI shall provide, and continuously maintain in place for the benefit of CTRMA, an installation performance bond and payment bond in the form of Appendix J of the Contract as stipulated in Article 7 of the Contract.

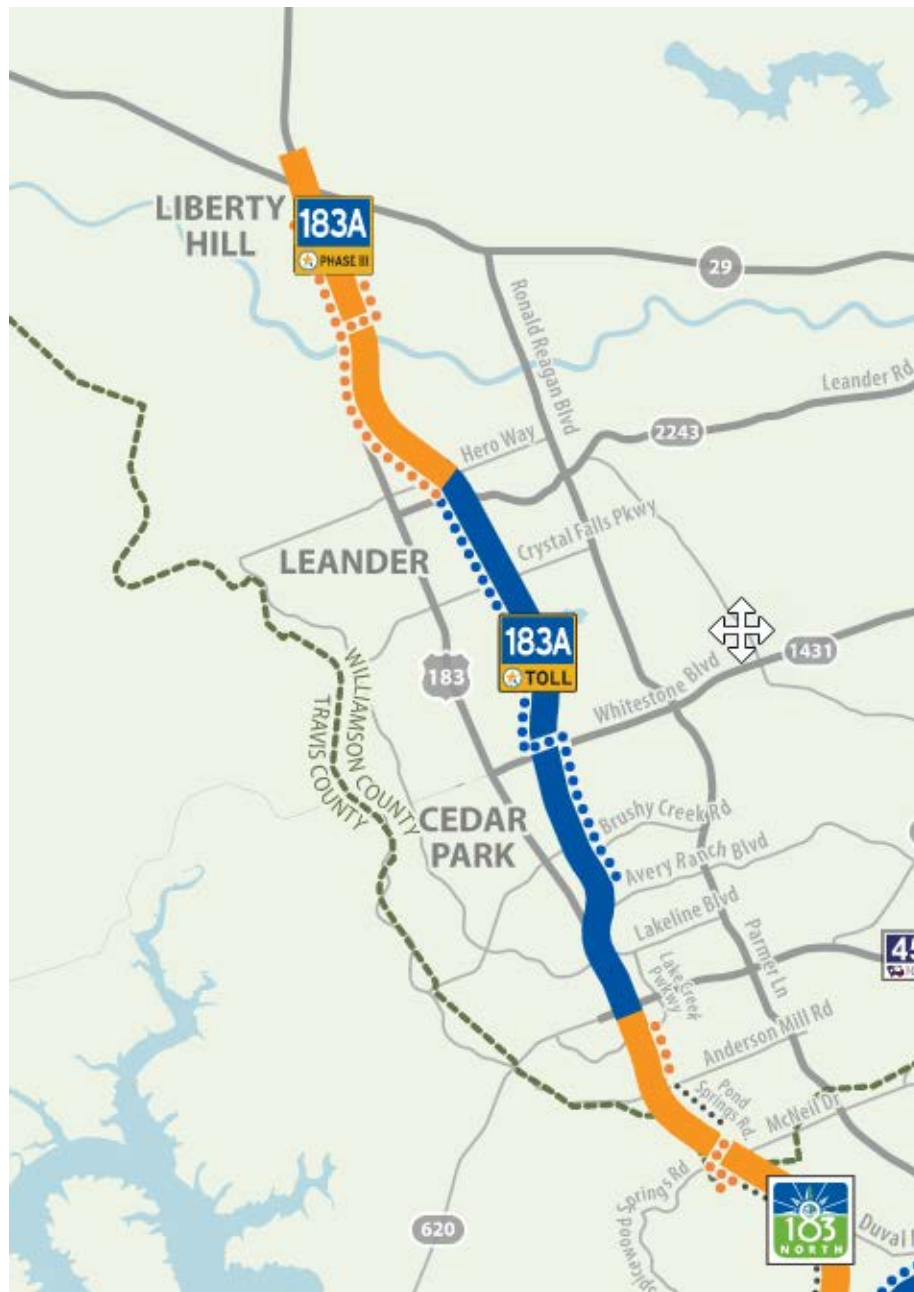
A8.0 INSURANCE

Prior to the beginning of any work designated in this WA No. 05, the TSI shall obtain and furnish Certificates of Insurance (COI) as stipulated in Article 19 of the Contract.

[END OF SECTION]

ATTACHMENT B

Project Layout ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATION AND MAINTENANCE SERVICES



ATTACHMENT C

Project Responsibility Matrix ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATION AND MAINTENANCE SERVICES

Table C-1: Responsibility Matrix for Design Build Contractor (DB) and System Integrator (SI)

Responsibility Assignment Legend							
Primary Responsibility: P	Support Responsibility: S		Coordination Responsibility Only: C			No Responsibility: N	
Element/Task/Component/ Sub-system	Designer/Contractor			Systems Integrator (SI)			Comments Other Responsibility/Information
	Design	Procure	Install/ Construct	Design	Procure	Install/ Construct	
GENERAL REQUIREMENTS							
Schedule	P	P	P	S	S	S	Contractor must accommodate and incorporate the SI scheduled activities into the Contractor schedule. All schedule changes or updates which impact the SI tasks must be agreed to by the SI prior to submittal to the Mobility Authority. A weekly schedule must be distributed and incorporate any SI updates or changes.
Request for Early Opening	P	P	P	S	S	S	SI must be able to match schedule request for early opening to conform to requirements in construction contract documents.
Design Package – Installation and Electrical Design and Plans	P	P	P	C	N	C	Designer to incorporate all SI requirements and specifications into Structural and Electrical Design Packages. SI to provide approval prior to issuance of Released For Construction (RFC) plans.
Grading	P	P	P	C	N	C	
Drainage	P	P	P	C	N	C	No culverts or pipes under tolling zones.
Utilities/Electrical Services	P	P	P	S	C	C	SI to provide specific power requirements for the Toll System. Designer to incorporate into toll facilities design. Contractor to construct power utilities interface, and all power infrastructure. Contractor to provide power to the Toll System pad and ITS locations.
Traffic Control/Safe work zone	P	P	P	S	N	C	SI to provide Contractor detailed lane closure requirements and schedule for installation and testing.
Signing	P	P	P	C	N	N	All toll signing must be coordinated with and approved by the Mobility Authority. If toll price signs utilize changeable electronic signs, the Contractor will provide the static sign and the SI will provide the electronic insert.
Striping	P	P	P	S	N	C	SI to coordinate striping with pavement loop locations.
Lighting	P	P	P	S	C	S	Roadway and toll location lighting designed by Designer and Provided by contractor. SI to provide lighting requirements in vicinity of toll locations

Table C-1: Responsibility Matrix for Design Build Contractor (DB) and System Integrator (SI)

							and locations of other Toll System equipment. Designer to confirm that lighting does not obstruct toll related signing or impede the Toll System.
Landscaping	P	P	P	C	N	N	
Fencing/Guardrail/Bollards/Concrete Barrier	P	P	P	S	C	C	SI to provide requirements for specific equipment clearances for Toll System. Designer to incorporate into roadway design. SI to confirm that design plans meet requirements.
TOLL SYSTEM: LOCATIONS, LAYOUTS, STRUCTURES, MOUNTS/BRACKETS							
Locations and Layouts	P	P	P	S	C	C	SI to provide specific locations for the Toll System, SI to provide requirements for specific lane and facility layouts. Designer to incorporate into Design Packages. SI to review and approve.
Gantries/Foundation/Trusses/Junction boxes/Conduits/Grounding	P	P	P	S	C	S	SI to provide requirements for conduits (for SI installed power and communications cables, including specific requirement for below ground conduits for the loops), junction boxes, and power needs for the Toll System. Designer to incorporate into structural design, including electrical grounding, bonding. Contractor to provide and install junction boxes and conduit pull strings and bell ends for all conduits including conduits going up gantry columns. SI to provide and install conduit in gantry truss. The Contractor will require SI to sign off on belowground conduits for the loops prior to installation of special pavement structure.
Equipment Mounts on Equipment Brackets/Frames	S	N	C	P	P	P	SI to procure and install all Toll System equipment, and related cable & wiring, including communications from roadside cabinets to the equipment mounted on the gantries. SI to provide requirements for all brackets to designer and frames needed to attach SI procured equipment. SI to furnish and install necessary brackets as per requirements.

Table C-1: Responsibility Matrix for Design Build Contractor (DB) and System Integrator (SI)

Equipment Brackets/Frames on Gantries	P	P	P	S	N	C	Contractor to provide and install all brackets and frames needed to attach all SI procured equipment. SI to provide locations for installation to the designer. SI to provide requirements for hanger and orientation of hanger mount to gantries.
Pavement structure, including special nonferrous zones and conduit stub-outs for in-pavement sensors/loops	P	P	P	S	N	C	SI to provide requirements for special pavement structure at toll gantry areas. SI shall coordinate joint spacing to avoid conflicts with loop placement and sign off on riser locations before concrete pour. Designer to assure ferrous objects (i.e. rebar, grates, pipes, etc.) are not in toll revenue collection detection system(s) zone of influence. Contractor to locate loop risers after pavement is poured.
EQUIPMENT CABINETS							
Toll Equipment Cabinets	C	N	S	P	P	P	SI to provide size and number of cabinets needed for Toll System. Designer shall incorporate location into site grading and drainage. SI to procure and install environmentally controlled cabinets. The environmentally controlled enclosures provided by SI must comply with the America Society of Heating, Refrigeration, and Air Conditioning Engineers: Thermal Guidelines for Data Processing Environments. Contractor to provide traffic control devices and safe working conditions for SI during installation of all toll equipment.
Toll Equipment Cabinets Site (TEC) and Roadside Equipment Cabinet Base Slabs	P	P	P	S	N	C	SI to provide requirements for specific equipment weight and anchorages for cabinets to the Designer. Designer to incorporate into Roadway Design. Contractor to install slabs with conduit plumbing.
Facility Security and Security Communications at Toll System locations	C	N	C	P	P	P	SI to provide security communications for all toll system equipment. Designer to incorporate into the Roadway Design. Contractor to provide physical security fence as required by SI around TEC/generators and auxiliary fuel tanks.
TOLL SUB-SYSTEMS							

Table C-1: Responsibility Matrix for Design Build Contractor (DB) and System Integrator (SI)

Automatic Vehicle Identification (AVI) Antennas and Readers	N	N	S	P	P	P	SI to provide AVI System Mounts, Wiring and Cables. SI will perform all AVI system installation and terminations, and to make the connections to the electronics in the cabinets.
Automatic Vehicle Classification and Detection (AVC) and (AVD)	N	N	S	P	P	P	SI to connect and terminate AVC and/or AVD System mounted on the gantries and/or installed in the pavement to the electronics in the cabinets.
In-Pavement Sensors/Loops	N	N	S	P	P	P	SI to saw cut pavement, procure, install, and seal pavement sensors with approved sealant. Designer to assure ferrous objects (i.e. rebar, grates, etc.) are not in toll collection detection system(s) zone of influence. Contractor to assure longitudinal and Transverse pavement joints in the non-ferrous pavement section in the Toll Zone do not conflict with SI conduit stub-up array in pavement section.
Video Capture Sub-System (VCS/VES) Cameras, Illumination, Sensors and Servers	N	N	S	P	P	P	SI to provide, install, terminate all Video Capture Sub-System (VCS/VES) equipment.
In-Lane Processing Servers and Electronics	N	N	N	P	P	P	SI to provide, install, connect, and terminate all electronics in the cabinet and assures proper communications to the devices on the gantry and/or in the pavement.
POWER DISTRIBUTION SUB-SYSTEM							
Metered power service at each location	P	P	P	C	N	C	SI to provide power requirements and special requirements for construction of utilities near each Toll System. Designer should incorporate requirements into roadway design. Contractor to provide and install necessary conductors, ducts & junction/pull boxes, bell ends/pull strings and disconnect switch/fuse at the meter.
Power service at each toll location	C	N	C	P	P	P	The SI shall provide and install all other wiring, switches, surge protection/suppression, etc. for power from the meter for the Toll System equipment. SI will terminate all power wiring for all branch circuits off the Service Panel to the Toll Site.

Table C-1: Responsibility Matrix for Design Build Contractor (DB) and System Integrator (SI)

Generators & Automatic Transfer Switches (ATS)	S	N	C	P	P	P	SI to provide generators, ATS, generator cabinets, wiring, connect and terminate all power at the Toll System sites.
Generator Power Source is Natural Gas	P	P	P	S	N	C	If natural gas is available, the Designer shall incorporate the gas lines into the roadway design. Contractor shall provide and install gas lines for incorporation into generator systems. SI to coordinate and provide generator requirements including location for gas feed including location of gas cut-off valve adjacent to Toll Pad. SI to install feed from generator to cut-off valve.
Generator Power Source is propane or diesel	S	S	S	P	P	P	The SI shall provide and install the propane/diesel tank for the generator if natural gas is not a viable option for the project. If propane is used, contractor will provide pad and conduit feed from the pad to the cut-off valve. Feeder line cut-off valve to be no further than 10' from the toll pad.
Uninterruptible Power Supplies (UPS)	S	N	C	P	P	P	SI to provide and install Uninterruptible Power Supply Systems (UPS) in the cabinets. UPS will be required for the Toll System,
Lightning Protection & Grounding	P	P	P	S	C	C	SI to provide specific requirements for equipment lightning protection and grounding. Designer should incorporate into plans. Contractor to furnish and install required lightning protection and grounding.
COMMUNICATIONS SUB-SYSTEMS							
Conduits/Ducts & Junction/Pull Boxes/Outlets	P	P	P	S	C	S	SI to provide specific Communications design requirements including location of long-radius sweep conduit bends. Designer to incorporate into the roadway design and contractor to install including conduits, junction boxes and bell ends with pull strings. The Contractor shall verify that all duct banks and conduits are clear/proofed and have pull strings prior to the beginning of the Toll System installation.

Table C-1: Responsibility Matrix for Design Build Contractor (DB) and System Integrator (SI)

Fiber Optic cabling in conduits for Toll System	S	S	S	P	P	P	SI to provide fiber requirements for Toll System. Designer to incorporate into design of backbone and laterals. SI to furnish and install along the corridor from communication
Toll Hardware in Cabinets	C	N	C	P	P	P	SI to provide and install all toll hardware within the cabinets. Equipment must be installed in a clean and organized manner and must not be affected by
Routers	C	N	C	P	P	P	SI to provide, install and configure the routers for connection from hub locations to the Mobility
Hubs	N	N	C	P	P	P	If applicable.
Switches	N	N	C	P	P	P	SI to provide, install and configure the switches for connection from hub locations to the Mobility
Firewalls	N	N	C	P	P	P	SI to provide, install and configure the necessary firewall for the toll system
Patch/Distribution Panels	N	N	C	P	P	P	SI to provide and install all the necessary patch and distribution panels to provide Fault Tolerant Single Mode Fiber Optic IP-Based Communication
Corridor Communications System	S	N	C	P	P	P	SI to provide Fault Tolerant Single Mode Fiber Optic IP-Based Communication System for Toll Revenue Collection Systems.
Corridor Communications Conduits	P	P	P	C	N	S	Designer to design for any branch off existing duct bank system including conduit, ground boxes and terminations. Contractor to furnish and install.
Corridor to Traffic Management Center(TMC)	N	N	N	P	P	P	SI to provide Fault Tolerant IP-Based Communication System to the TMC for Toll Revenue Collection Systems.
Data/Communications Service to each Tolling Location	N	P	P	P	P	P	SI to install any power and communications cable required to interface between the TEC and the service provider's POI. Contractor responsible for conduit, ground boxes and infrastructure terminations. Contractor is responsible for the conduit infrastructure to provide a raceway from the Toll Pad to the Service POI.
SYSTEMS SERVERS AND SPACE							
Toll Collection Systems Computer(s)	N	N	N	P	P	P	

Table C-1: Responsibility Matrix for Design Build Contractor (DB) and System Integrator (SI)

Support Equipment at CTRMA Offices	N	N	N	P	P	P	SI to provide data and power wiring schematics, equipment rack/cabinet requirement, and elevations, layouts, floor plans, air flow diagrams, and environmental controls load calculations, electrical power distribution, including grounding, bonding, lightning protection, panel boards, TVSS, circuit breakers conduit, conductors, j-boxes, receptacles.
Systems Servers & Workstations	N	N	C	P	P	P	SI to provide, install and configure all system servers and workstations required at the TMC to support the operations and management of the Project.
Federal Communication Commission License Preparation and Submission	C	N	N	P	P	P	SI to provide all information necessary to acquire FCC Licensing to the Mobility Authority.
DUCT BANK & INTELLIGENT TRANSPORTATION SYSTEMS (ITS) – TXDOT OWNED							
Duct Bank Adjustment & ITS relocations design	P	P	P	N	N	N	Designer is responsible for the design of any necessary ITS relocations including, foundations, conduits, electrical services, grounding circuits, and support structures. Contractor responsible for notifying designer of adjustments needed to any existing duct bank manholes and providing new junction/boxes and manholes if in conflict with the project. Coordination with TxDOT will be required. SI responsible for adjustments to 290E fiber.
Duct Bank Adjustments/new connections	P	P	P	S	N	C	Designer is responsible for designing all manhole adjustments and new manhole ties. Contractor responsible to furnish/install
Fiber optic cables	N	N	N	P	P	P	Any adjustments to existing 290E cables are SI responsibility.
Relocation of existing CCTV & DMS foundations, conduits, grounding, camera poles, and electrical services	P	P	P	C	N	C	Designer is responsible for designing the relocation of any existing CCTV and DMS structures and services impacted by the Project Design, including communications and power. Contractor shall be responsible for relocating aforementioned structures/services. Damaged or inoperable equipment shall be moved but not repaired. Coordinate with TxDOT in regards to proper storage of existing devices until time of reinstall.
Relocation of RVSD Stations	P	P	P	C	C	C	Contractor to coordinate with SI for relocation of CTRMA devices and infrastructure related to RVSD.

Table C-1: Responsibility Matrix for Design Build Contractor (DB) and System Integrator (SI)

Relocation of vehicle detector foundations, conduits, loops, grounding, vehicle detector support structures, and electrical services	P	P	P	C	N	C	Designer to coordinate with TxDOT regarding any existing vehicle detectors/loops within the pavement to determine if they will need to be replaced/relocated. The Contractor will replace/relocate detectors/loops unless TxDOT prefers to do the work. Any damaged detectors/loops that are to remain must be replaced by the Contractor. Coordinate with TxDOT in regard to proper storage of existing devices until time of reinstall.
DUCT BANK & INTELLIGENT TRANSPORTATION SYSTEMS (ITS) – PROPOSED							
Duct Bank	P	P	P	S	N	C	Designer responsible for the design of any new duct bank.
Conduit/Ducts & Junction/Pull Boxes/Outlets	P	P	P	S	C	S	
CCTV Poles and foundations	P	P	P	S	N	C	CCTV poles shop drawing to be reviewed by SI prior to release for fabrication. Design to provide all elements of lightning protection as noted in TxDOT CCTV Pole details. Drilled shafts for
RVSD Poles and foundations	P	P	P	S	N	C	RVSD poles shop drawing to be reviewed by SI prior to release for fabrication.
DMS Support Structures	P	P	P	S	N	C	DMS support structure shop drawings to be reviewed by SI prior to release for fabrication. Designer to provide all elements of lightning protection as noted in TxDOT
Fiber Optic Cable	N	N	S	P	P	P	
CCTV Cameras and control equipment	N	N	S	P	P	P	
RVSD and control equipment	N	N	S	P	P	P	
DMS and control equipment	N	N	S	P	P	P	
Metered power service at each location	P	P	P	C	N	C	ITS devices that cannot be pulled off a toll power panel (Generator Backup) will require a dedicated service drop. SI to provide a list of ITS devices which can be fed from proposed or existing toll power panels.

Table C-2: Responsibility Matrix for CTRMA and System Integrator (SI)

Responsibility Assignment Legend							
Primary Responsibility: P	Support Responsibility: S		Coordination Responsibility Only: C			No Responsibility: N	
Element/Task/Component/ Sub-system	CTRMA			Systems Integrator (SI)			Comments Other Responsibility/Information
	Design	Procure	Install/ Construct	Design	Procure	Install / Construct	
GENERAL REQUIREMENTS							
Project Management and Documentation	C	N	N	P	P	P	SI responsible for developing all required documentation deliverables by the agreed upon schedule dates, building in time to allow the CTRMA adequate time to review and approve documents, and submitting them for CTRMA's review and approval. CTRMA to provide approval of documents prior to system design.
System Design Documents	S	N	N	P	P	P	SI responsible for developing all required documentation deliverables by the agreed upon schedule dates, building in time to allow the CTRMA adequate time to review and approve documents, and submitting them for CTRMA's review and approval. CTRMA to provide approval of design packages prior to system testing and implementation.
Schedule	S	N	N	P	P	P	The SI is responsible for developing a comprehensive project schedule capturing all work items and activities needed to fully implement the toll system. The SI shall be responsible for updating and distributing an updated schedule monthly (or upon a duration as directed by CTRMA) that incorporates any SI updates or changes from the last schedule update. The SI shall be responsible for coordinating with outside entities or other project stakeholders, as determined by the Mobility Authority, to incorporate third-party tasks into the SI's schedule that may impact delivery of the toll system

Table C-2: Responsibility Matrix for CTRMA and System Integrator (SI)

ELECTRONIC TOLL COLLECTION SYSTEM							
Determination of existing toll equipment, infrastructure, buildings, and communication reuse	C	C	C	P	P	P	Unless explicitly stated otherwise, the SI may reuse any or all equipment currently installed, subject to the limitations of the approved transition plan.
Toll Equipment	S	N	S	P	P	P	SI to provide all tolling equipment. If SI reusing existing toll equipment, SI shall certify existing equipment will meet all required SLAs. SI is responsible for all aspects of the design, development, testing and implementation of the toll equipment as described in the master contract and this WA No. 05.
Data Platform System (DPS)	S	N	S	P	P	P	SI to integrate with CTRMA's DPS for transmission and reconciliation of toll transactions and images, as described in the master contract, this WA No. 05 or third-party system design documents (i.e., ICDs)
Transition of Facilities	N	N	C	P	P	P	SI to submit a Transition Plan to CTRMA for review, comment, and approval before the start of any transition activities.
Testing	S	N	C	P	P	P	SI to conduct testing of the ETCS to validate functionality, availability, reliability, accuracy, and compliance to the requirements detailed in Appendix A of the Contract or changes to any requirements due to change orders or break/fix activities. The SI is responsible for documenting all test plans and procedures/scripts and submitting them for the Mobility Authority's review and approval prior to testing.
Training	S	N	C	P	P	P	SI to provide training designed to educate CTRMA-designated personnel in the operation, use, and maintenance of the ETCS. The SI is responsible for all training documents and materials as described in the master contract and submitting them for the Mobility Authority's review and approval prior to training.

ATTACHMENT D

System Integrator Price Sheet

ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATION AND MAINTENANCE SERVICES

SECTION / LINE		DESCRIPTION	WA 5 Quantity	WA 5 Price
B2	16	Open Road Toll Collection – Future Facilities/New Construction w/ In-Ground		
	18	One lane + one shoulder	4	
	19	Two lanes (no shoulder)	1	
B4	27	Plaza Server		
	28	Plaza Server	1	
B5	29	ORT Roadside Equipment Cabinet		
	30	Toll Zone	5	
B7	34	Communication and Conduit		
	35	Communications Subsystem (includes: network switches, patch panels, installation, connections, and integration between communications demarcation and roadside cabinets)	5	
	37	Copper/CAT-6 communication cable (additional footage up to 1 mile)	2000	
	39	PVC Conduit (2", trenched, additional footage up to 1 mile)	2000	
B8	40	Emergency Power and Back-up		
	41	Uninterruptible Power Supply	5	
	42	Emergency Generator (permanently installed)	5	
	44	Subtotal – System Procurement, Installation, and Testing (B1 - B8)		\$ 1,213,209.79
C	45	Project Management and Testing Services		
	46	Project Management	12	
	48	Project Documentation (Project-Level Standalone Documents)	1	
	49	Project Documentation (Program-Level Master Document Updates)	1	
	53	Configuration of Toll Facility Host (ORT Facilities)	1	
	55	Site Installation Test (ORT and Managed Lanes Facilities)	5	
	56	Integration Test (ORT Facilities)	5	
	58	Operational Acceptance Test (ORT Facilities)	5	
	60	Phase III Documentation	1	
	61	System As-Builts	1	
	62	Subtotal – Project Management and Testing Services		\$ 1,013,710.52
	63	Total – Installation Services (Sections A, B and C)		\$ 2,226,920.31
		10% Contingency		\$ 222,692.03
		Grand Total - Installation Services plus Contingency		\$ 2,449,612.35

ATTACHMENT E

Project Schedule & Milestone Payments ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATION AND MAINTENANCE SERVICES

Milestone Payment Schedule for Phase II - Includes each transitioned or new facility, project documentation, and program documentation updates			
ID	Payment Milestone	% Paid	Cumulative % Paid
B-1	Equipment Ordering, Installation, and Testing		
	- Purchased, Received and Verified	10%	10%
	- Start of installation activities	15%	25%
	- Installation activities complete	15%	40%
	- Site Installation Test completed and approved	20%	60%
	- Integration Test completed and approved	20%	80%
	- Operational Acceptance Test completed and approved	20%	100%
C. Project Management, Documentation and Testing Services Applies to Section C Project Management and Testing Services of Cost Proposal Form			
C-1	Project Management Documentation Approval		
	-Work Authorization (Project) Schedule	2.5%	2.5%
	- Project Risk Register		
	- Responsibility Matrix		
	- Updated Roles and Responsibilities		
- Communication Plan			
C-2	Design Documentation Update Approval		
	- Updated Requirements Traceability Matrix	5.0%	7.5%
	- Updated Master Test Plan		
	- Updated Interface Control Documents		
	- Updated System Detailed Design Documents		
	- Updated Reports Detailed Design Documents		
	- Updated Data Migration Plan (REMOVED FROM SCOPE OF WORK)		
	- Updated Disaster Recovery Plan		
- Updated Roadside System Flow Diagram			

Milestone Payment Schedule for Phase II			
- Includes each transitioned or new facility, project documentation, and program documentation updates			
ID	Payment Milestone	% Paid	Cumulative % Paid
	- Updated Backup Recovery and Archive Plan		
Test and Go-Live Planning Documentation Approval			
C-3	- Test Plans and Procedures	5.0%	12.5%
	- Installation Plan (for each new facility)		
	- Transition Plan (for each transitioned facility)		
Test Results and As-Built Documentation			
C-4	Test Reports	5.0%	17.5%
	As-Built Drawings for each transitioned / new facility		
Training, Maintenance documentation and Manual Update Approval			
C-5	- Updated Training Plan and Materials	7.5%	25%
	- Updated Roadside System Flow Diagram		
	- Updated Manuals (to all applicable systems)		
	- Updated Maintenance Plan		
	- Updated Inventory (including spares)		
	- Updated Succession Plan		
C-7	Configuration of Toll Facility Host	15%	40%
C-8	Site Installation Test completed and approved	15%	55%
C-9	All toll sites commissioned	15%	70%
C-10	Training Completed / Go-Live (start of revenue collection)	15%	85%
C-11	Operational Acceptance Test completed and approved, and Final As-Built drawings representative of any changes made during test and acceptance.	15%	100%

Milestone Payment Schedule for Phase III		
ID	Payment Milestone	Cumulative % Paid
C. Final Documentation		
Applies to Section C Project Management and Testing Services of Cost Proposal Form		
C-60	Test Reports (Test Reports have been approved)	100%
	As-Built Drawings representative of any changes made during test and acceptance (As-Built Drawings from each Work Authorization have been approved)	
	Transition Plan (Verify the Program Transition Plan has been approved and updated as part of each Work Authorization)	
	Program Documentation updates (Verify the Program Documentation has been updated as part of each Work Authorization)	
	Network Diagram updates (Verify network diagrams have been updated with the as-is for those portions of the network that are within the SI scope of each work authorization.)	
	Inventory (including spares) (Verify the inventory has been provided to CTRMA.)	

ATTACHMENT F

Master Project Schedule and Milestones ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATION AND MAINTENANCE SERVICES

WA 5 183A PH III						
ID	WBS	Unique ID	Task Name	Duration	Start	Finish
0	0	0	183A PHIII WA 5	453 days	Tue 1/3/23	Fri 10/18/24
2	2	2	Milestones: Payment Schedule	421 days	Fri 2/17/23	Fri 10/18/24
3	2.1	3	B. Hardware Equipment Ordering and Installation	328 days	Mon 7/3/23	Fri 10/18/24
4	2.1.1	4	B-1: Equipment Purchased, Received and Verified	0 days	Mon 7/3/23	Mon 7/3/23
5	2.1.2	5	B-2: Start of Installation Activities	0 days	Mon 1/8/24	Mon 1/8/24
6	2.1.3	6	B-3: Installation Activities Completed	0 days	Tue 4/30/24	Tue 4/30/24
7	2.1.4	7	B-4: Site Installation Test Completed and Approved	0 days	Fri 7/5/24	Fri 7/5/24
8	2.1.5	8	B-5: Integration Test Completed and Approved	0 days	Fri 7/5/24	Fri 7/5/24
9	2.1.6	9	B-6: Operational acceptance Test Completed and Approved	0 days	Fri 10/18/24	Fri 10/18/24
10	2.2	10	C. Project Management, Documentation and Testing Services	421 days	Fri 2/17/23	Fri 10/18/24
11	2.2.1	11	C-1: Project Management Documentation Approval	0 days	Fri 2/17/23	Fri 2/17/23
12	2.2.2	12	C-2: Design Documentation Approval	0 days	Tue 4/18/23	Tue 4/18/23
13	2.2.3	13	C-3: Test and Go-Live Planning Documentation Approval	0 days	Fri 7/7/23	Fri 7/7/23
14	2.2.4	14	C-4: Test Results and As-Built Documentation	0 days	Fri 10/18/24	Fri 10/18/24
15	2.2.5	15	C-5: Training and Manual update Approval	0 days	Tue 6/27/23	Tue 6/27/23
16	2.2.6	17	C-7: Configuration of TFH	0 days	Tue 6/6/23	Tue 6/6/23
17	2.2.7	18	C-8: SIT Completed and Approved	0 days	Fri 7/5/24	Fri 7/5/24
18	2.2.8	19	C-9: All Toll Sites commissioned	0 days	Fri 7/5/24	Fri 7/5/24
19	2.2.9	20	C-10: Training Completed and Go-Live (Start of revenue collection)	0 days	Fri 7/5/24	Fri 7/5/24
20	2.2.10	21	C-11: OAT completed and approved, and Final As-Built Drawings representative of any changes made during test and acceptance	0 days	Fri 10/18/24	Fri 10/18/24
21	3	265	External Dependencies	148 days	Sat 6/3/23	Sat 1/6/24
22	3.1	267	Civil Contractor: Final Site Turnover	0 days	Sat 1/6/24	Sat 1/6/24
23	3.2	268	290 FAT Approval (per approved Baseline 290 schedule)	0 days	Tue 11/28/23	Tue 11/28/23
24	3.3	269	Supply Chain: receipt of last piece of equipment (BOM approval + number of months for longest lead equipment)	0 days	Sat 6/3/23	Sat 6/3/23
25	4	22	Milestones: Liquidated Damages	74 days	Fri 7/5/24	Fri 10/18/24
26	4.1	23	Approval of Site Installation Testing (SIT) at all sites included in this WA by 120 days from the date each site is turned over by Contractor	0 days	Fri 7/5/24	Fri 7/5/24
27	4.2	25	Approval of Operational Acceptance Testing (OAT)	0 days	Fri 10/18/24	Fri 10/18/24

ATTACHMENT G

Project Liquidated Damages/Penalties

Liquidated Damages for this WA No. 05

With this WA No. 05, it is agreed by the Parties that time is of the essence. In the event of a delay in completing milestones as set forth in the approved Project Schedule, subject to Mobility Authority-authorized extensions, the Mobility Authority will incur damage, and that it is or will be unfeasible to determine the actual amount of the damage resulting from such delay. As a result, the parties agree the Mobility Authority may impose liquidated damages, as described below, should the SI not meet required milestone dates set forth in the approved Project Schedule.

Note: For the purposes of this section, the use of the term "days" means "calendar days."

Key Project Milestone	Date Associated with LD (Last Approved Schedule)	Associated Liquidated Damages
Approval of Site Installation Testing at all sites included in this WA by 120 days from the date the final site is turned over by Contractor	Based on mutually agreed-upon Civil Contractor and SI final site turnover date + 120 days	<ul style="list-style-type: none"> • \$25,000 for missed milestone • \$5,000/day every day after missed milestone
Approval of Operational Acceptance Testing	Open to Tolling + 6 months (calendar days)	<ul style="list-style-type: none"> • \$1,000/day first 10 days • \$2,500/day next 20 days • \$5,000/day every day after 30th day