



CENTRAL TEXAS REGIONAL
MOBILITY AUTHORITY

December 14, 2022
AGENDA ITEM #11

Discuss and consider approving Work Authorization No. 4 with Electronic Transaction Consultants, LLC (ETC) for the design and installation of the toll system and other infrastructure required to support the 183N Mobility Project

Strategic Plan Relevance: Innovation, Service and Stewardship

Department: Operations

Contact: Tracie Brown, Director of Operations

Associated Costs: NTE \$4,469,871.38 (*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) #4 will include the replacement of toll equipment on the 183 North Mobility Project (“183N”) and associated project documentation updates. The 183N Express Lane implementation project will construct four (4) express lanes (two in each direction) and widen the existing US 183 as required to bring the total number of general purpose (GP) lanes to four (4) in each direction. The Project will also include the construction of direct connector (DC) ramps providing access between the new express lanes on US 183 and the existing express lanes on MoPac Expressway. Intelligent Transportation Systems (ITS) infrastructure to support toll collection of the express lanes in addition to traffic management and incident response will also be included in the Project.

The toll collection system for the project will be all electronic toll collection (ETC). The 183N project limits extend from SH45 North / RM 620 to State Loop 1 (MoPac Expressway). The project length is approximately nine (9) miles. The project consists of five (5) 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 183N Mobility Project’s toll collection system is \$4,469,871.38. The breakdown for this cost is as follows:

183N Mobility Project Toll Collection Installation Services Cost Information

System Procurement, Installation and Testing Services	\$ 3,007,667.35
Project Management and Testing Services	1,055,858.08
SUBTOTAL - Installation Services	\$ 4,063,519.43
Project Contingency (10%)	406,351.94
GRAND TOTAL	\$ 4,469,871.38

Previous Actions & Brief History of the Program/Project: 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 #1 for design support services on the 183N Mobility Project. The total amount not to exceed for this work was \$287,971.93.

Financing: 183N construction financing

Action requested/Staff Recommendation: Staff recommends the Board approve Work Authorization #4 with Electronic Transaction Consultants, LLC (ETC) for the design and installation of the toll system and other infrastructure required to support the 183N Mobility Project.

Backup provided: Work Authorization
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. 4 WITH
ELECTRONIC TRANSACTION CONSULTANTS, LLC FOR DESIGN AND INSTALLATION
SERVICES RELATED TO THE 183 NORTH MOBILITY 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, the Mobility Authority began construction of the 183 North Mobility Project which includes four (4) express lanes (two in each direction) and widen the existing US 183 as required to bring the total number of general purpose (GP) lanes to four (4) in each direction including the construction of direct connector (DC) ramps providing access between the new express lanes on US 183 and the existing express lanes on MoPac Expressway; 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 183 North Mobility Project; and

WHEREAS, the Executive Director and ETC have negotiated draft Work Authorization No. 4 in an amount not to exceed \$4,469,871.38 for services related to the 183 North Mobility Project necessary for the design and installation the ETCS and supporting ITS elements; and

WHEREAS, the Executive Director recommends approving Work Authorization No. 4 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. 4 in an amount not to exceed \$4,469,871.38 with Electronic Transaction Consultants, LLC for services related to the 183 North Mobility Project necessary for the design and installation of roadway and civil infrastructure, enabling operation 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. 04 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. 04 as the “System Integrator” or “SI”). WA No. 04 will include the implementation of toll equipment on the 183N Mobility Project (“183N”) 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**. 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. 04 is \$4,469,871.38 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. 04 shall be made in accordance with the Contract.

PART IV. This WA No. 04 shall become effective on the date both parties have signed this WA No. 04. This WA No. 04 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. 04 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. 04 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. 04 will include the replacement of toll equipment on the 183N and associated project documentation updates.

183N will consist of the construction of four (4) express lanes (two in each direction) and widening of the existing US 183 as required to bring the total number of general purpose (GP) lanes to four (4) in each direction. The Project will also include the construction of direct connector (DC) ramps providing access between the new express lanes on US 183 and the existing express lanes on MoPac Expressway. Intelligent Transportation Systems (ITS) infrastructure to support toll collection of the express lanes in addition to traffic management and incident response, a new shared-use pathway, new sidewalks, cross-street connections for bicyclists and pedestrians along US 183, and other improvements will also be included in the Project.

A1.02. Summary Scope of Work

The Scope of Work for WA No. 04 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 183N and design, testing, installation, and integration of the ETCS on 183N.

A2.0 – GENERAL DESCRIPTION – 183N INFRASTRUCTURE

The Toll Collection System for 183N will be all electronic toll collection (ETC). Phase II of the Project (183N) limits extend from SH45 North / RM 620 to State Loop 1 (MoPac Expressway). The Project length is approximately nine (9) miles. The Project consists of five (5) 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

Gantry No.	Approximate Station Location	Location	Direction of Travel	No. of Lanes	No. of Shoulders (8' or greater)	Comments (Note that typical section may be different if the location of the gantry is revised.)
1	820+00	South of Lakeline Mall Dr.	SB	1	1	- One (1) 11' express lane - One (1) 10' shoulder
	820+00	South of Lakeline Mall Dr.	NB	1	1	- One (1) 11' express lane - One (1) 10' shoulder
2	7+00	South of McNeil Dr	SB	2	0	- Two (2) 11' express lane - One (1) 4' shoulder
	7+00	South of McNeil Dr	NB	2	0	- Two (2) 11' express lane - One (1) 4' shoulder
3	212+50	South of Capital of Texas Highway/360	SB	1	1	- One (1) 12' express lane - One (1) 10' shoulder
	212+50	South of Capital of Texas Highway/360	NB	1	1	- One (1) 14' express lane - One (1) 10' shoulder
4	212+50	Direct Connectors to/from Mopac	SB	1	1	- One (1) 14' express lane - One (1) 8' shoulder - One (1) 4' shoulder
	212+50	Direct Connectors to/from Mopac	NB	1	1	- One (1) 14' express lane - One (1) 8' shoulder - One (1) 4' shoulder
5	209+00	MoPac	SB	1	1	- One (1) 12' express lane - One (1) 10' shoulder
	209+00	MoPac	NB	1	1	- One (1) 12' express lane - One (1) 10' shoulder

A3.0 GENERAL REQUIREMENTS - TOLL COLLECTION SYSTEM

A3.01 General Requirements – 183N Toll Collection System

The Scope of Work for WA No. 04 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)), Variable Toll Message Sign (VTMS) components, Closed-Circuit Television (CCTV) and traffic speed, volume and density detection equipment, 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 183N toll collection system. The Toll Facility Host (TFH) for this WA No. 04 includes trip building and dynamic pricing functionality. 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), CCTV 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.
- A dynamic pricing engine/system that calculates and provides toll rates based on traffic conditions in the express lanes and GP lanes.
- 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

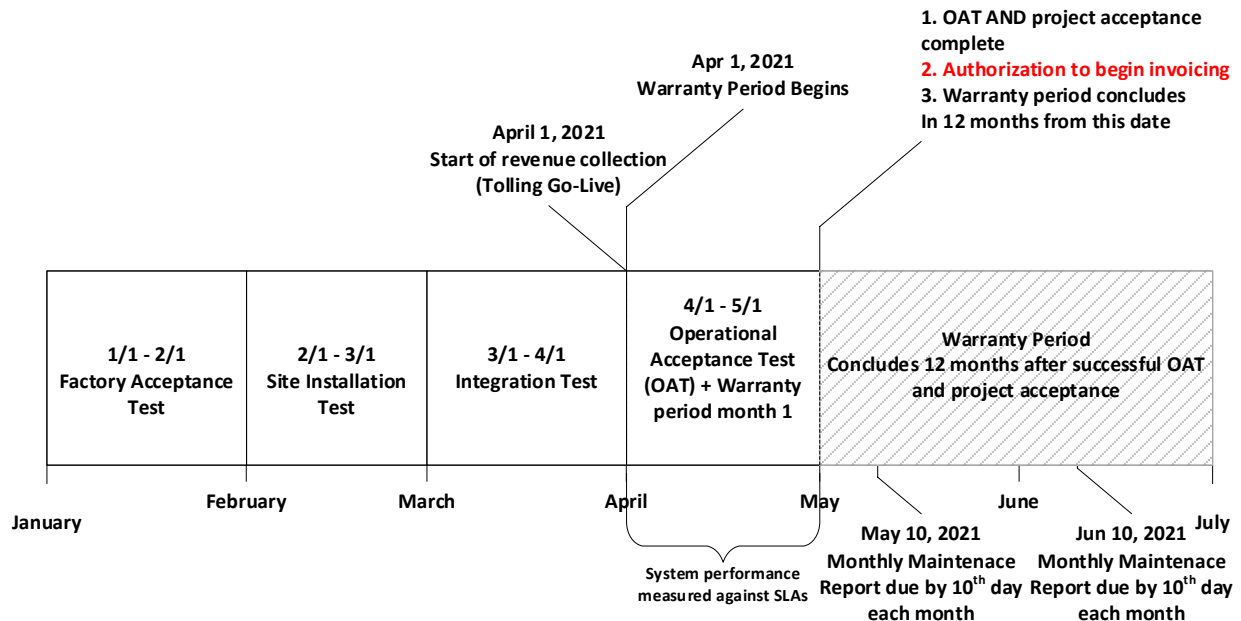
on the roadside, including all systems, and required operations staff.

- 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 TSI 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 ETCS 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, 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. 04, 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. 04, 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-2: Responsibility Matrix for CTRMA and System Integrator (SI)

Primary Responsibility: P	Support Responsibility: S		Coordination Responsibility Only: C			No Responsibility: N	
Element/Task/Component/ Sub-system	DB Contractor (DB)			System Integrator (SI)			Comments Other Responsibility/Information
	Design	Procure	Install/ Construct	Design	Procure	Install / Construct	
GENERAL REQUIREMENTS							
Schedule	P	P	P	S	C	S	DB shall accommodate and incorporate the SI scheduled activities into the DB 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 monthly schedule must be distributed and incorporate any SI updates or changes.
Request for Early Opening	P	P	P	S	S	S	The SI must be able to match schedule request for early opening. SI must be allowed early unencumbered access in order to meet early opening request.
Design Package – Installation and Electrical Design and Plans	P	P	P	C	N	C	DB to incorporate all toll and ITS requirements and specifications into all versions of the Structural and Electrical Design Packages. SI to provide DB approval of packages prior to issuance of Released For Construction (RFC) plans. DB will coordinate installation activities with SI.
Grading	P	P	P	C	N	C	DB to incorporate SI requirements with respect to grading into toll and ITS system design. DB to place infrastructure with ease of maintenance access and installation as a priority.
Drainage	P	P	P	C	N	C	No culverts or pipes under toll zones.

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

Utilities/Electrical Services	P	P	P	S	C	C	SI to provide specific requirements for the Toll and/or Mobility Authority ITS Systems. DB to incorporate into the ITS and toll facilities design, and construct power, utilities interface, and all power infrastructure. DB to provide power to the Toll System pad and Mobility Authority ITS locations as required by the SI. SI to terminate power to toll and ITS sites owned by the Mobility Authority.
Traffic Control/Safe work zone	P	P	P	S	N	C	SI to provide DB detailed lane closure requirements, schedule for installation and testing of tolling and Mobility Authority ITS equipment. DB to provide traffic control devices, and safe working conditions for SI during installation and testing of all toll and Mobility Authority ITS equipment.
Field Office requirements	P	P	P	C	N	C	DB shall coordinate with the SI on space requirements for design and construction personnel.
Signing	P	P	P	C	N	S	All toll signing must be coordinated with and approved by the Mobility Authority. If toll price signs utilize changeable electronic signs, the DB will provide the static sign and the SI will provide the electronic insert (e.g. LED panels) and wireways needed to integrate the system. DB shall be responsible for coordinating with the SI to allow SI to install LED panels and wire ways on static signs while on the ground, at the roadside location, prior to mounting signs onto sign gantry/truss.
Striping	P	P	P	S	N	C	DB to coordinate with SI to identify final striping within the toll zone for the SI's loop (and/or other sensors/equipment) installations.
Lighting	P	P	P	S	C	S	Roadway and toll location lighting provided by DB. SI to provide lighting requirements in vicinity of toll locations and locations of other Toll System equipment. DB to confirm that lighting does not obstruct toll related signing or impede the Toll System.
Landscaping	P	P	P	C	N	N	

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

Fencing/Guardrail/Bollards/Concrete Barrier	P	P	P	S	C	C	SI to provide specific requirements for the toll pad placement, access and security fencing and/or barriers around toll and ITS equipment. DB to provide fencing and/or barriers at all toll pads per SI requirements. DB to install the appropriate barrier to protect toll pad equipment from traffic per SI requirements. DB to incorporate design requirements into design packages. DB to coordinate with SI to review and approve all versions of design packages.
Locations and Layouts	P	P	P	S	C	C	SI to provide requirements for specific lane and facility layouts. DB to incorporate into Design Packages. DB to coordinate with SI to review all versions of design packages. SI to review and approve locations for the toll and ITS systems owned by the Mobility Authority. The DB will coordinate with SI during infrastructure installation activity.
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 requirements for below ground conduits for the loops), junction boxes, and power needs for the toll and ITS systems owned by the Mobility Authority. DB to incorporate into structural design, including electrical grounding, bonding, and power conductors. DB to provide and install gantry/truss for toll systems, gantry/truss foundations, junction boxes, cable trays/conduits/wireways, pull strings and bell ends for all conduits up to one foot above pole foundations and for conduits going up gantry columns. The DB will require SI to sign off on below-ground conduit stub outs pertaining to all toll and ITS facilities prior to finalizing toll zone pavement, toll equipment pads and foundations related to ITS installation.
Equipment Mounts on Brackets/Frames	S	N	C	P	P	P	SI to procure and install equipment for the toll and ITS systems owned by the Mobility Authority, and related cable and wiring, including communications from roadside cabinets to the equipment mounted on the gantries. SI to provide requirements for all brackets and frames needed to attach SI procured equipment to DB provided truss. SI to provide requirements for toll hanger, and the orientation of hangers mounted to Gantries. DB to furnish and install all toll hangers per SI requirements.

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

Equipment Brackets/Frames on Gantries	P	P	P	S	N	C	DB is to provide and install all toll hangers/brackets/frames on DB provided toll gantry/truss needed to attach all SI procured equipment. SI to provide locations for installation to the DB. DB to coordinate with SI to review hanger
Variable Toll Message Sign (VTMS) camera infrastructure (foundations (if needed), conduits, grounding, camera poles, and electrical services)	P	P	P	S	C	C	SI to provide requirements for camera mounts, conduits, junction boxes, power and data wiring and cables. SI shall also specify the locations of the VTMS controllers and cameras. SI to also provide requirements for placement with respect to maintenance access. DB to incorporate design requirements into Design Packages. DB to coordinate with SI to review all versions of design packages. SI to review and approve VTMS camera locations and infrastructure. DB to provide and install sign truss, truss foundations, poles, junction boxes, conduits, conduit pull strings, bell ends for all conduits, power circuit and power cable to the SI's cabinet.
VTMS cameras installation	S	N	C	P	P	P	SI to procure, install and terminate all cabinets and cameras, including all wiring except for the primary branch power circuit to the site's cabinet. SI shall also be responsible for testing VTMS camera systems.
Traffic Detection System (TDS) and Closed Circuit Television (CCTV) Camera installations	S	C	S	P	P	P	SI to procure, install and terminate all cabinets and traffic detection sensors, including all wiring except for the primary branch power circuit to the site's cabinet. SI shall also be responsible for testing TDS and CCTV systems.
TDS and CCTV Camera infrastructure: (Pole/Post-Mounts, supports, wiring and	P	P	P	C	C	S	SI to provide requirements for placement with respect to maintenance access. DB to incorporate design requirements into Design Packages. DB to coordinate with SI to review all versions of design packages. SI to review and approve TDS and CCTV locations and infrastructure.

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

Dynamic Message Sign (DMS) infrastructure: (foundations, conduits, grounding, DMS support structure, and electrical services)	P	P	P	S	C	C	SI to provide requirements for DMS dimensions (including single line DMS), mounts, conduits, support structure, power and data wiring, and cables. SI to provide requirements for placement with respect to maintenance access, power requirements, and weight of anticipated equipment for structural design purposes. DB to incorporate design requirements into Design Packages. DB to coordinate with SI to review all versions of design packages. SI to review and approve DMS locations and infrastructure. DB to provide and install support structure and foundations, conduits, junction boxes, vertical mounting supports, and power cables to the sign's main breaker.
DMS installation	S	N	S	P	P	P	SI to procure, install and terminate DMS (including single line DMS "bricks"), including all communication to the DMS. SI to terminate power circuit to the sign. SI shall also be responsible for testing DMS systems.
Automated lane closure gate system infrastructure: (foundation requirements, grounding, conduits, mounting/support structure, poles, and electrical services (as needed/required))	P	P	P	S	C	C	SI to provide requirements for gate system, including placement of each automated lane closure gate, mounting requirements/support structure, power and communication wiring, poles, foundations, conduits, junction boxes, power and data wiring, and cables. SI shall also specify the locations of the gate system, and placement with respect to maintenance access. DB to incorporate design requirements into Design Packages. DB to coordinate with SI to review all versions of design packages. SI to review and approve gate system locations and infrastructure. DB to provide and install foundations, junction boxes, conduits, conduit pull strings, bell ends for all conduits, power circuit and power cable to the SI's cabinet. DB shall also provide and install gate system equipment, including but not limited to: cabinets, poles, gate arms, etc.
Automated lane closure gate system installation (e.g. dedicated short-range communications)	S	C	C	P	P	P	SI to install, configure and test equipment (e.g. hardware, software, etc.) and systems needed to operate the gate system. SI to terminate all wiring (power and communications) except for the primary

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

(DSRC), Bluetooth and/or Wi-F) installations							
RSU infrastructure: (Pole/Post-Mounts, supports, wiring and cables)	P	P	P	C	C	S	SI to provide requirements for placement with respect to maintenance access. DB to incorporate design requirements into Design Packages. DB to coordinate with SI to review all versions of design packages. SI to review and approve RSU locations and infrastructure. DB to provide and install poles, pole foundations, junction boxes, conduits, conduits pull strings, bell ends for all conduits, power circuit and power cable to the SI's cabinet.
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 structures at toll and ITS locations. DB to incorporate design requirements into Design Packages. DB to coordinate with SI to review all versions of design packages. SI shall coordinate joint spacing to avoid conflicts with loop placement, and sign off on riser locations before concrete pour. DB to assure ferrous objects (i.e. rebar, grates, pipes, etc.) are not in the toll system's zone of influence. DB 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 Mobility Authority Toll and ITS systems. DB shall incorporate location into site grading and drainage design. SI to procure and install environmentally controlled cabinets for ITS and toll systems owned by the Mobility Authority. The environmentally controlled enclosures provided by SI must comply with the America Society of Heating, Refrigeration, and Air Conditioning Engineers: Thermal Guidelines for Data

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

Toll Equipment Cabinet 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 all cabinets, generators, and auxiliary fuel tanks to the DB for all toll and ITS locations. DB to incorporate into design packages, and coordinate with the SI for review and approval. DB to coordinate with SI to verify conduit installations prior to concrete pours at all locations.
Security Communications at Toll System locations	C	N	C	P	P	P	SI to provide security communications for all toll and ITS system equipment.
TOLL SUB-SYSTEMS							
Automatic Vehicle Identification (AVI) Antennas and Readers	N	N	S	P	P	P	SI to procure and install AVI antennas and readers, 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 install, connect and terminate AVC and/or AVD systems mounted on the gantries and/or installed in the pavement to the electronics in the cabinets.
In-Pavement Sensors	N	N	S	P	P	P	SI shall procure, install (e.g. saw cut pavement) and seal pavement sensors with approved sealant. DB to assure ferrous objects (i.e. rebar, grates, etc.) are not in the toll system's zone of influence. DB 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. DB to coordinate with SI to validate striping with pavement loop locations. DB to coordinate with SI and provide the SI with traffic control and access to toll zones for loop (and/or other sensors/equipment) installations prior to any final overlay paving (e.g. PFC).

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

Video Capture Sub-System (VCS/VES) Cameras, Illumination, Sensors and Servers	N	N	S	P	P	P	SI to provide and install Video Capture Sub- System (VCS/VES) cameras, illumination enclosures, mounts, camera wiring and cables. SI to connect and terminate VCS/VES cameras, illumination, sensors and servers. SI to make the connections to the electronics in the cabinets.
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 assure proper communications to the devices on the gantry and/or in the pavement.
VTMS Message Panels and Controllers	N	N	S	P	P	P	SI to provide, install, connect, and terminate VTMS message LED panels and controllers, including wireways, communication wiring and power wiring from the VTMS to the controllers in the cabinet. SI to provide VTMS LED panel sizes to the DB to be incorporated into the large guide sign design. DB shall be responsible for coordinating with the SI to allow SI to install LED panels and wire ways on static signs while signs are on the ground, at the roadside location, prior to mounting signs onto sign gantry/truss.
POWER DISTRIBUTION SUB-SYSTEM							
Metered power service at each toll and ITS location	P	P	P	C	N	C	DB is responsible for metered power service for all toll and ITS locations. DB to procure and install electric service poles, and coordinate activation of power service with service provider. DB to provide all branch circuit breakers, and terminate all branch circuits at the service panel. DB to provide and install necessary conductors, ducts and junction/pull boxes, bell ends/pull strings and disconnect switch/fuse at the meter.

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

Metered power service at each location	C	N	C	P	P	P	SI to provide power requirements and special requirements for construction of utilities near each Toll and ITS System. DB to incorporate design requirements into Design Packages. DB to coordinate with SI to review all versions of design packages. SI shall provide and install all other wiring, switches, surge protection/suppression, etc. for power from the ATS at the toll pad for the Toll System equipment and other locations for ITS equipment. SI will terminate all power wiring for all branch circuits off the Service Panel to the Toll or ITS Site.
Generators and Automatic Transfer Switches (ATS)	S	N	C	P	P	P	SI to provide generators, ATS, generator cabinets, wiring, connect and terminate all power at roadside toll equipment locations.
Generator Power Source is Natural Gas	P	P	P	S	N	C	If natural gas is available, the DB shall provide, install and incorporate the gas lines into the roadway design. SI to coordinate and provide generator requirements including location for gas feed.
Generator Power Source is propane or diesel	S	S	S	P	P	P	If propane is used, DB will provide pad and conduit feed for propane fuel tank (10' minimum from generator). The SI shall provide and install the propane tank for the generator if natural gas is not a viable option for the project.
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 Systems, WWD systems, DMS, VTMS and VTMS Cameras. SI will install all necessary wiring for the UPS. TDS, automated gate systems and CCTV Cameras (non-VTMS Cameras) will not require a UPS.

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

Lightning Protection & Grounding	P	P	P	S	C	C	SI to provide specific requirements for Toll and ITS systems equipment lightning protection and grounding. DB to incorporate design requirements into Design Packages. DB to coordinate with SI to review all versions of design packages. DB to furnish and install required lightning protection and grounding.
COMMUNICATIONS SUB-SYSTEMS							
Conduits/Ducts and 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. DB to incorporate design requirements into Design Packages. DB to coordinate with SI to review all versions of design packages. DB to install conduits, junction boxes, bell ends with pull strings. The DB Contractor shall verify that all duct bank and conduits are clear/proofed and have pull strings available to the SI for installation of communications cables at least 30 days prior to the beginning of the toll system installation.
Fiber Optic cabling in conduits for Toll System and Toll-related ITS Elements	S	S	S	P	P	P	SI to provide fiber requirements for toll and ITS systems. DB to incorporate design requirements for duct back/conduit backbone and laterals into Design Packages. DB to coordinate with SI to review all versions of design packages. SI to furnish and install fiber along the corridor to toll and ITS cabinets for Mobility Authority equipment. SI shall be responsible for testing all SI-installed fiber after installation.

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

Toll Hardware in Cabinets and Computer Rack System	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 the environmental controls. The SI must provide and install the redundant environmental controls. SI to provide and install computer system racks to house the communication equipment including environmental controls.
Routers	C	N	C	P	P	P	SI to provide, install and configure the routers for connection from hub locations to the Mobility Authority's Traffic and Incident Management (TIM) Center.
Switches	N	N	C	P	P	P	SI to provide, install and configure the switches for connections from tolling and ITS locations to hub locations.
Firewalls	N	N	C	P	P	P	SI to provide, install and configure the necessary firewall for the toll system and ITS system. The toll and ITS systems shall be kept separate from each other and any other systems that utilize the TxDOT Hubs.
Patch/Distribution Panels	N	N	C	P	P	P	SI to provide and install all the necessary patch and distribution panels to provide a Fault Tolerant Single Mode Fiber Optic IP-Based Communication System.
Corridor Communications System	S	N	C	P	P	P	SI to provide Fault Tolerant Single Mode Fiber Optic IP-Based Communication System for toll systems.
Corridor Communications Conduits	P	P	P	C	N	S	DB to provide branch conduit to the TxDOT duct bank system, including all that is necessary to furnish and install conduit, ground boxes, and terminations
Corridor to Traffic and Incident Management (TIM) Center	N	N	N	P	P	P	SI to provide Fault Tolerant IP-Based Communication System to the TIM for toll and ITS systems.

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

Data/Communications Service to each Tolling Location	N	N	S	P	P	P	SI to provide system design plans indicating power and communications/data requirements. SI to install any power and communications cable required to interface between the toll cabinet and the communications service provider's POI. DB is responsible for the conduit infrastructure to provide a raceway from the toll pad to the service POI.
SYSTEMS SERVERS AND SPACE							
Systems Servers and Workstations	N	N	C	P	P	P	SI to provide, install and configure all system servers and workstations required at the TIM Center to support the operations and management of the Express Lanes.
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 AND MOBILITY AUTHORITY INTELLIGENT TRANSPORTATION SYSTEMS (ITS)							
New Duct bank	P	P	P	C	C	C	SI to provide requirements for new duct bank. DB to incorporate design requirements for duct back/conduit backbone and laterals into Design Packages. DB to coordinate with SI to review and approve all versions of design packages.
Fiber Installation	N	N	C	P	P	P	SI to provide, install and test the fiber for toll and ITS systems owned by the Mobility Authority.
Duct Bank Adjustment and IT relocations design	P	P	P	N	N	N	DB is responsible for the design, relocation and replacement of existing TxDOT-owned ITS including, foundations, conduits, electrical services, grounding circuits, and support structures. DB responsible for adjusting existing duct bank junction/ground boxes and providing new junction/ground boxes. Coordination with TxDOT will be required.

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

Duct Bank Adjustments/new connections	P	P	P	S	N	C	DB is responsible for all adjustments and new junction/ground box ties.
Fiber optic cables	P	P	P	N	N	N	Any adjustments to and replacement of existing cables are DB responsibility. Testing of TxDOT-owned ITS is the DB's responsibility.
New or Replacement CCTV cameras, communications and equipment enclosures	P	P	P	S	N	C	DB to procure, install and terminate TxDOT-owned CCTV equipment, including cameras, camera controls, cables (power and communications), and connections compatible with TxDOT's Lonestar system. DB Contractor shall provide all the equipment necessary for TxDOT's control of all CCTV cameras. The method of control shall be in accordance with TxDOT Engineering Standard Sheets and TxDOT Standard Specifications. DB shall also be responsible for testing TxDOT-owned CCTV camera systems.
Relocation of existing CCTV and DMS foundations, conduits, grounding, camera poles, and electrical services	P	P	P	C	N	C	DB is responsible for relocating any existing CCTV and DMS structures and electrical services impacted by the Project Design, including communications and power. Damaged or inoperable equipment shall be removed, but not repaired. DB shall coordinate with TxDOT regarding proper storage of existing devices until time of reinstall.
Existing and new vehicle detector foundations, conduits, grounding, vehicle detector support structures, and electrical services	P	P	P	N	N	N	DB shall abandon any existing vehicle detectors/loops within the pavement within the Project limits.
Vehicle detectors, communications, and equipment enclosures	P	P	P	C	N	C	DB is responsible for the procurement, installation and placement of new vehicle detectors. DB to coordinate with TxDOT regarding the placement of the detectors. DB shall provide power and communications to the vehicle detection equipment. DB to incorporate design requirements for vehicle detectors into Design Packages. DB to coordinate with Mobility Authority and TxDOT to review all versions of design packages.

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

Maintenance of ITS During Construction	P	P	P	C	N	C	<p>DB responsible for maintaining, restoring and protecting any existing ITS functionality, including those owned by TxDOT or local Governmental Entities, on the Project until Final Acceptance except during system maintenance, crossovers, or other periods approved by the Mobility Authority. For existing ITS impacted by the Project, DB required to develop and submit an ITS Implementation Plan as a part of the Intermediate (65%) Design Submittal outlining the interim and final locations of all communications infrastructure and field devices on the Project. DB responsible for procuring, installing and testing temporary wireless radio connections to maintain communications links for all existing TxDOT-owned ITS during construction.</p> <p>During construction of the Project, DB responsible for the repair of each existing communication cable, downed communications link, or electrical conductor that is severed or otherwise rendered not usable within:</p> <ul style="list-style-type: none"> • 4 hours if a major/backbone/trunk line. • 8 hours if a minor/drop fiber line.
Communications Network	P	P	P	C	N	C	<p>For TxDOT communications infrastructure on the Project, DB is responsible for providing a communications network that has redundant routing capabilities. The communications network shall serve the highway ITS components along the highway Elements of the Project. Where necessary, as determined by TxDOT, DB shall provide ITS communications hubs/cabinets to support the communications network. DB shall provide all the equipment necessary for the TxDOT communications network.</p>
Testing relocated ITS equipment	P	P	P	C	N	C	<p>DB is responsible for all system testing (e.g. acceptance and end-to-end testing) for new, replacement or relocated TxDOT-owned ITS equipment along the corridor. DB is responsible for coordinating testing with the Mobility Authority to ensure that there will be no conflicts between the Mobility Authority, TxDOT, their affiliated contractors, and DB Contractor's staff. DB is responsible for maintenance of traffic and traffic control during system testing.</p>

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. 4.
Dynamic Pricing Engine (DPE)	S	N	N	P	P	P	The SI shall be responsible for the delivery and implementation of a DPE to support the dynamic calculation and display of toll rates through VTMS. The SI-provided DPE is responsible for the calculation and accuracy of the dynamic toll rates at a user-configurable interval using speed, volume, and density of the traffic.
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. 4 or third-party system design documents (i.e., ICD).
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

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

							and submitting them for the Mobility Authority's review and approval prior to training.
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ATTACHMENT D

System Integrator Price Sheet

ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATION AND MAINTENANCE SERVICES

SECTION / LINE		DESCRIPTION	WA 4 Quantity	WA 4 Price
B2	16	Open Road Toll Collection – Future Facilities New Construction w/ In-Ground		
	18	One lane + one shoulder	8	
	20	Two lanes + one shoulder	2	
B4	27	Plaza Server		
	28	Plaza Server	1	
B5	29	ORT Roadside Equipment Cabinet		
	30	Toll Zone	5	
B6	31	Dynamic Pricing		
	32	Variable Toll Message Sign Components, associated CCTV, & Cabinet	6	
	33	Traffic Speed, Volume, and Density Detection Site w/Cabinet	60	
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)	1000	
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)		\$ 3,007,661.35
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	
	54	Configuration of Toll Facility Host (Managed Lanes Facilities)	1	
	55	Site Installation Test (ORT and Managed Lanes Facilities)	5	
	57	Integration Test (Managed Lanes Facilities)	5	
	59	Operational Acceptance Test (Managed Lanes Facilities)	5	
	60	Final Operational Acceptance Test (All Facilities)	1	
	61	System As-BUILTs	1	
	62	Subtotal – Project Management and Testing Services		\$ 1,055,858.08
	63	Total – Installation Services (Sections A, B and C)		\$ 4,063,519.43
		10% Contingency		\$ 406,351.94
		Grand Total - Installation Services plus Contingency		\$ 4,469,871.38

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. Hardware and Equipment Ordering and Installation Applies to Section B System Procurement and Installation of Cost Proposal Form			
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)		

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 Disaster Recovery Plan		
	- Updated Roadside System Flow Diagram		
	- Updated Backup Recovery and Archive Plan		
C-3	Test and Go-Live Planning Documentation Approval		
	- Test Plans and Procedures	5.0%	12.5%
	- Installation Plan (for each new facility)		
	- Transition Plan (for each transitioned facility)		
C-4	Test Results and As-Built Documentation		
	Test Reports	5.0%	17.5%
	As-Built Drawings for each transitioned / new facility		
C-5	Training, Maintenance documentation and Manual Update Approval		
	- 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 TSI 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

CTRMA WA 4 183N						
ID	WBS	Unique ID	Task Name	Duration	Start	Finish
0	0	0	CTRMA WA 4 183N Project Schedule	743 days	Tue 1/3/23	Fri 12/5/25
2	2	3	Milestones: Payment Schedule	711 days	Fri 2/17/23	Fri 12/5/25
3	2.1	4	B. Hardware Equipment Ordering and Installation	402 days	Thu 5/9/24	Fri 12/5/25
4	2.1.1	5	B-1: Equipment Purchased, Received and Verified	0 days	Thu 5/9/24	Thu 5/9/24
5	2.1.2	6	B-2: Start of Installation Activities	0 days	Tue 2/11/25	Tue 2/11/25
6	2.1.3	7	B-3: Installation Activities Completed	0 days	Mon 6/2/25	Mon 6/2/25
7	2.1.4	8	B-4: Site Installation Test Completed and Approved	0 days	Thu 8/7/25	Thu 8/7/25
8	2.1.5	9	B-5: Integration Test Completed and Approved	0 days	Thu 8/7/25	Thu 8/7/25
9	2.1.6	10	B-6: Operational acceptance Test Completed and Approved	0 days	Fri 12/5/25	Fri 12/5/25
10	2.2	11	C. Project Management, Documentation and Testing Services	711 days	Fri 2/17/23	Fri 12/5/25
11	2.2.1	12	C-1: Project Management Documentation Approved	0 days	Fri 2/17/23	Fri 2/17/23
12	2.2.2	13	C-2: Design Documentation Approved	0 days	Mon 10/30/23	Mon 10/30/23
13	2.2.3	14	C-3: Test and Go-Live Planning Documentation Approved	0 days	Wed 4/9/25	Wed 4/9/25
14	2.2.4	15	C-4: Test Results and As-Built Documentation	0 days	Fri 12/5/25	Fri 12/5/25
15	2.2.5	16	C-5: Training and Manual update Approved	0 days	Tue 7/16/24	Tue 7/16/24
16	2.2.6	18	C-7: Configuration of TFH	0 days	Sat 12/30/23	Sat 12/30/23
17	2.2.7	19	C-8: SIT Completed and Approved	0 days	Thu 8/7/25	Thu 8/7/25
18	2.2.8	20	C-9: All Toll Sites commissioned	0 days	Thu 8/7/25	Thu 8/7/25
19	2.2.9	21	C-10: Training Completed and Go-Live (Start of revenue collection)	0 days	Thu 8/7/25	Thu 8/7/25
20	2.2.10	22	C-11: OAT completed and approved, and Final As-Built Drawings representative of any changes made during test and acceptance	0 days	Fri 12/5/25	Fri 12/5/25
21	3	261	External Dependencies	302 days	Tue 11/28/23	Tue 2/11/25
22	3.1	263	Civil Contractor: Final Site Turnover	0 days	Tue 2/11/25	Tue 2/11/25
23	3.2	264	290 FAT Approval (per approved Baseline 290 schedule)	0 days	Tue 11/28/23	Tue 11/28/23
24	3.3	265	Supply Chain: receipt of last piece of equipment (BOM approval + number of months for longest lead equipment)	0 days	Tue 4/9/24	Tue 4/9/24
25	4	23	Milestones: Liquidated Damages	86 days	Thu 8/7/25	Fri 12/5/25
26	4.1	24	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	0 days	Thu 8/7/25	Thu 8/7/25
27	4.2	26	Approval of Operational Acceptance Testing (OAT)	0 days	Fri 12/5/25	Fri 12/5/25

ATTACHMENT G

Project Liquidated Damages/Penalties

Liquidated Damages for this WA No. 04

With this WA No. 04, 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	<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