BRENT SPENCE
BRIDGE CORRIDOR
Moving the Economy,
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BRENT SPENCE BRIDGE PROJECT

PRELIMINARY TOLLING CONCEPT OF OPERATIONS

FEBRUARY 2014

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

KENTUCKY
TRANSPORTATION
CABINET

HNTB

TABLE OF FIGURES

ACRONYMS

These acronyms appear in this document:

ACD   Automatic Call Distribution

ACH   Automated Clearing House

ADT   Average Daily Traffic

AET   All Electronic Tolling

ALPR   Automatic License Plate Recognition

API   Application Programming Database

AR   Accounts Receivable

AVI   Automatic Vehicle Identification

AVDC   Automatic Vehicle Detection and Classification

CCTV   Closed Circuit Television

CMS   Changeable Message Sign

CRM   Customer Relationship Management

CSC   Customer Service Center

CSR   Customer Service Representative

DB   Design-Build Contactor

DMV   Department of Motor Vehicles

DMS   Dynamic Message Sign

DOT   Department of Transportation

DR   Disaster Recovery

DSS   Data Security Standard

DVAS   Digital Video Audit System

EMV   Europay, MasterCard and Visa

ETC   Electronic Toll Collection

FTP   File Transfer Protocol

GAAP   General Accepted Accounting Principles

GIS   Geographic Information System

GUI   Graphical User Interface

HVAC   Heating, Ventilation and Air Conditioning

IAG   EZ-Pass Interagency Group

ICDS   Interface Control Documents

ICPS   Image Capture and Processing System

ID   Identification

IP   Internet Protocol

IR   Infrared

IT   Information Technology

ITS   Intelligent Transportation System

IVR   Interactive Voice Response

LED   Light Emitting Diode

LP   License Plate

MLTP   Mainline Toll Plaza

MOMS   Maintenance Online Management System

OCR   Optical Character Recognition

OS   Operating System

PCI   Payment Card Industry

PDA   Personnel Digital Assistant

RFP   Request for Proposals

RMA   Return Merchandise Authorization

RTM   Real Time Monitor

RTO   Real Time Operations

SAS   Security Access System

SFTP   Secure File Transfer Protocol

SQL   Structured Query Language

TCS   Toll Collection System

TMC   Traffic Management Center

TMS   Traffic Management System

TSI   Toll Systems Integrator

UPS   Uninterrupted Power Supply

US   United States

USPS   United States Postal Service

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VES   Violation Enforcement System

VPS   Violation Processing System

VSR   Vehicle Signature Recognition

1. INTRODUCTION

The Brent Spence Bridge Corridor (the "Corridor") consists of 7.8 total miles of I-71 and I-75 located within portions of Ohio and Kentucky. Both routes within the Greater Cincinnati/Northern Kentucky region are major thoroughfares for local and regional mobility. Locally, they connect to I-74, I-275 and US 50. The Brent Spence Bridge provides an interstate connection over the Ohio River and carries both I-71 and I-75 traffic. The bridge facilitates local travel by providing access to downtown Cincinnati, Hamilton County, Ohio and Covington, Kenton County, Kentucky.

Based on the location of the tolling locations on the toll facility, tolls may be collected in both directions of travel. Based on the traffic and revenue studies, tolling locations may be located on the mainline or entrance ramps on the upper and lower levels of the bridge.

1.1 BRENT SPENCE BRIDGE CORRIDOR MANAGEMENT

The State of Ohio Department of Transportation and the Kentucky Transportation Cabinet (the "Owner") are currently managing the Project. The definitive organizational and governance structure for managing this bi-state Corridor are under development.

1.2 OVERVIEW

The purpose of this Preliminary Brent Spence Bridge Corridor Concept of Operations is to document the discussions to date. All operational concepts contained herein require formal approval by the Owner. As decisions related to toll collection and the operational concepts are finalized, the Concept of Operations document will be updated. It is a living document and will be updated throughout the Project Lifecycle and provides a high level guide to assist the Owner in moving forward with the implementation of tolling in the Corridor. This Preliminary Concept of Operations is one of the first steps in planning for the implementation of tolling in the Corridor. Other steps include:

1. Development of an overall implementation plan, including preliminary schedule and estimated costs for the toll collection system implementation in the Corridor.

2. Selection of the best implementation model and procurement approach for lane toll systems; Client Service Center (CSC) systems; systems maintenance, and CSC operations.

3. Finalize the detailed Concept of Operations for the Brent Spence Bridge Corridor.

The balance of this document includes the following sections which capture decisions made to date and will be updated as the Project develops:

- Section 2: Implementation and Operational Approach – Describes the procurement strategy for the Toll Lane System and the CSC System and its operation.

- Section 3: Planned Brent Spence Bridge Corridor Toll Facilities – Describes the current proposed configuration of the toll facilities in the Corridor.

- Section 4: Brent Spence Bridge Corridor Toll Collection and ITS Systems Concept – Describes the overall high level concept for the Brent Spence Bridge Corridor toll collection, including the overall concept for the systems architecture, Toll Collection System and ITS infrastructure.

- Section 5: Toll Lane System, ITS and Infrastructure – Describes the components of the Toll Lane System, ITS and supporting Infrastructure.

- Section 6: CSC System – Describes the high level functionality of a typical CSC system and identifies critical interfaces necessary to support toll collection.

- Section 7: Decisions and Schedules – Identifies the high level tolling and engineering activities with a timeline of the Project milestone and decisions.

1.3   GOALS FOR BRENT SPENCE BRIDGE CORRIDOR

The Brent Spence Bridge Replacement/Rehabilitation Project will improve the operational characteristics within the I-75 corridor for both local and through traffic. In the Greater Cincinnati/Northern Kentucky region, the I-75 corridor suffers from congestion and safety– related issues as a result of inadequate capacity to accommodate current traffic demand. The purpose of this project is to:

- Improve traffic flow and level of service,

- Improve safety,

- Correct geometric deficiencies, and

- Maintain connections to key regional and national transportation corridors.

2. IMPLEMENTATION AND OPERATIONAL APPROACH

The information herein is based on discussions to date. As final decisions are made by the Owner, this section will be updated accordingly.

2.1   BRENT SPENCE BRIDGE CORRIDOR FUNCTIONAL SCOPE

The following functional areas of scope are planned for the Corridor. The number of contractors and contracts are determined by the selected procurement approach.

- Design-Build: This includes the construction of the roadway, the infrastructure for the Toll Collection System and the ITS elements.

- Roadway Operations: This includes the facility maintenance of the toll facility and incident management.

- Toll Lane System: This includes the implementation and maintenance of the in-lane system and the Host System.

- CSC System: This includes the implementation, maintenance and operations of the CSC.

2.2   PROCUREMENT AND IMPLEMENTATION APPROACH

The Toll System Integrators (TSIs) and service providers are procured separately from the Design-Build Contractor (DB). The procurement documents for both the TSI(s) and DB will require considerable coordination within the design, installation and testing phases.

Procurement, implementation and maintenance of the Toll Collection System (TCS) are segregated as follows:

- Toll Lane System Implementation and Maintenance – Procurement of a TSI responsible for the implementation of the system that captures and performs initial processing of the lane toll transactions before passing them to the Customer Service Center (CSC) System. Once the system is implemented, the same TSI is responsible for maintaining the system. The TSI should be procured during the design phase of the Corridor to facilitate coordination between the TSI and DB.

- CSC System Implementation and Maintenance – Procurement of a TSI responsible for the implementation of the system that provides all customer account management functions; image review; interoperability with other agencies; interfaces with 3rd party toll service providers; toll transaction invoicing; transaction escalation; payment processing; financial reconciliation, and reporting. Once the system is implemented, the same TSI is responsible for maintaining the system.

- CSC Operations – Procurement of a service provider responsible for the day-to-day management and staffing of the CSC and any remote customer service locations. Note: As an option, CSC operations may be procured as part of the CSC System Implementation and Maintenance.

3. PLANNED BRENT SPENCE BRIDGE CORRIDOR TOLL FACILITY

The exact location, configuration and number of tolling locations on the toll facility have not been finalized. This section will be updated once these decisions are made.

3.1 OVERVIEW OF PLANNED TOLL FACILITY

The location of the toll facilities has not been determined. **Figure 3-1** provides an overview of the area surrounding the bridge and shows potential locations for the toll facilities. The toll facilities may be placed on the mainline or ramps connected to the Corridor. Vehicles will be tolled in both directions of travel on the existing and proposed structures.

3.2 TOLL LANE SYSTEM LAYOUTS

This will provide drawings and narrative describing the toll system most suitable for tolling the Corridor and rationale for the locations. In addition, the geometric requirements will be defined and general gantry requirements developed to support the Toll Collection Methods described below.

3.2.1 TOLLING LOCATIONS

Tolling locations for both the northbound and southbound lanes will be determined based on the quality of the available locations and the suitability of the violation legislation that is passed in each state.

3.2.2 GEOMETRIC REQUIREMENTS

The configuration of the lanes and the number of lanes will be determined after the tolling locations are identified.

3.2.3 GENERAL GANTRY REQUIREMENTS

The gantry requirements will be developed when the DB RFP is prepared and will include review and approval by the TSI.

3.3 CUSTOMER SERVICE CENTER LOCATION(S)

The location of the primary CSC and the walk-in facilities are yet to be determined.

- The Primary Customer Service Center may be located in Ohio or Kentucky
- Walk-in CSC Facilities will be located in both states

3.4 DATA CENTER LOCATION

The location of the CSC data center (primary and disaster recovery) will be determined at the time of the CSC procurement. Considerations for selecting the locations include:

- Proximity to the existing fiber network
- Location and suitability of the primary and walk-up CSC locations to also host a data center
- Location, suitability and availability of DOT or other governmental facilities
- Proximity of the primary and disaster recovery locations to each other

Figure 3-1: Brent Spence Bridge Corridor – Potential Toll Facilities (North and South)
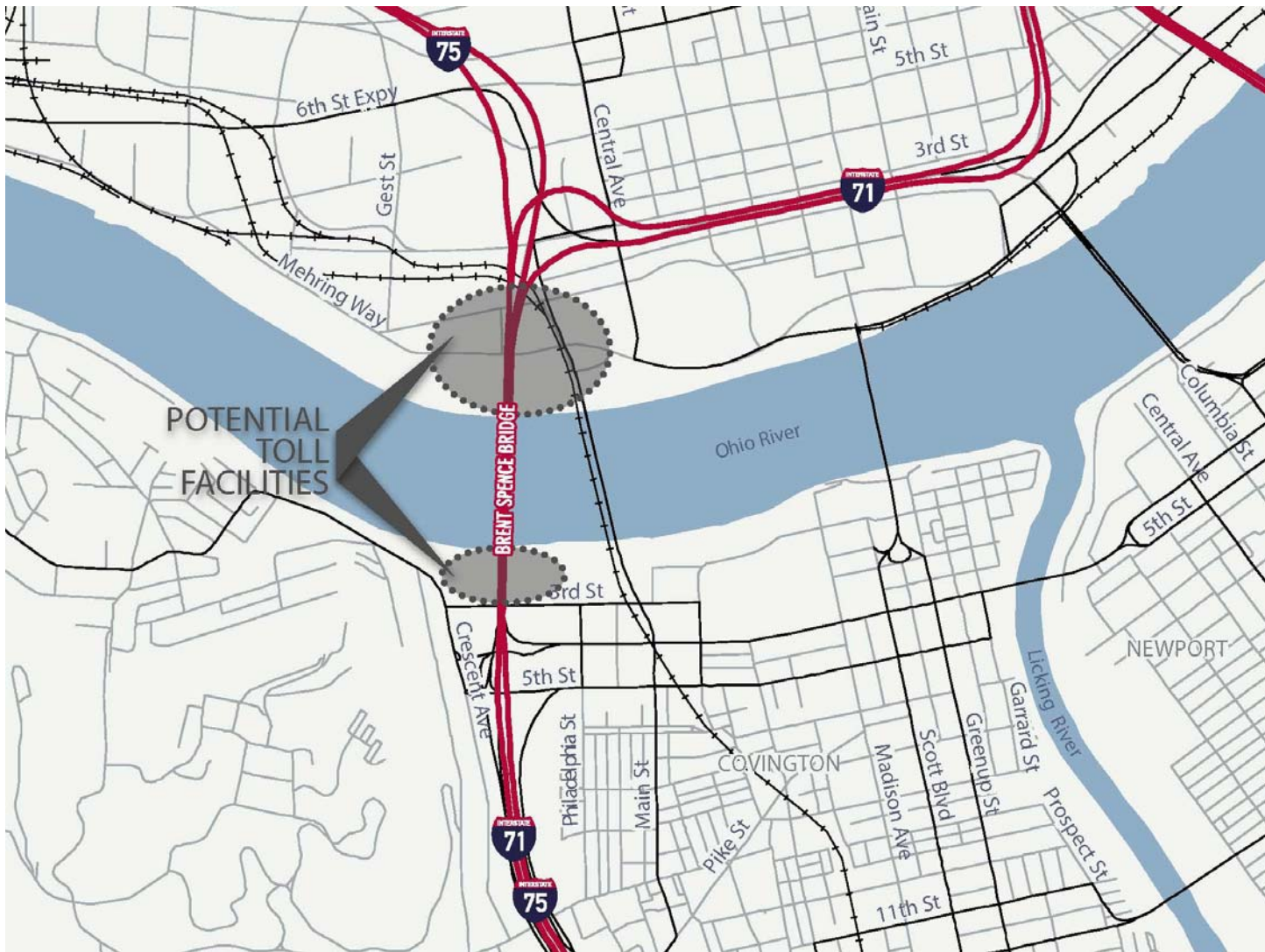
4. BRENT SPENCE BRIDGE CORRIDOR TOLL COLLECTION AND ITS SYSTEMS CONCEPT

4.1 TOLL COLLECTION OVERVIEW

This section describes the high level concept for the Corridor Toll Collection System architecture. Although decisions remain to be made regarding the toll collection system concepts, this section will build upon the concepts and framework discussed to date and the typical concept plans for Toll Lane Systems. As shown in **Figure 4-1**, at a high-level the system consists of Toll Lane Systems that cover both directions of travel and communicate with the CSC System, as well as ITS systems throughout the Corridor that communicate with the TMC.

4.2 TOLLING SYSTEMS ARCHITECTURE

The tolling system architecture, shown in **Figure 4-2**, is comprised of Toll Lane Systems at each of the tolling locations and the CSC System providing all customer account management functions: image review; interoperability with other agencies; interfaces with 3rd party toll service providers; toll transaction invoicing; transaction escalation; payment processing; financial reconciliation, and reporting. Functions within this architecture are designed to be performed where they best meet the needs (e.g., toll rate setting at the toll lane systems and image review at the CSC System); minimize complications; provide consistency and standardization, and assure compliance with the Owner's vision and operational goals. As additional toll facilities are constructed, new toll lane systems could be implemented that interface to the single CSC system adhering to this architecture.

Monitoring of the existing ITS functions in the Cincinnati region, including Northern Kentucky, was recently moved to the ODOT Central Office. The ARTIMIS facility is no longer being used for operations, however all communications are still routed through this facility. ITS components for this region will be relocated into a vault installed as part of the Brent Spence project to house the fiber hub. Traffic detectors, DMS and CCTV cameras are installed throughout the Corridor and visual displays can be viewed through Dashboard at the TMC in the ODOT Central Office. Data is exchanged between the toll system and the ITS/TMS to support toll collection and traffic operations.

4.3 MODES OF PAYMENT

Customers using the toll facility will be required to have a funded account or pay an invoice that is generated and sent to the registered owner of the vehicle. Customers without a funded account may pay for their tolls prior to the invoice being generated through the use of an online account, by telephone, or at a walk-in CSC.

For customers paying after the fact or via invoice, a higher (differential) toll is assessed to cover the cost of image review and invoicing. Non-payment of a toll is considered toll evasion, subject to violation fees and fines. If the Owner has entered into agreements with third-party services for the collection of tolls, then transactions are transmitted to such third-party for collection. The escalation process as defined by the legislation will be used to pursue toll evaders and discourage habitual violation.

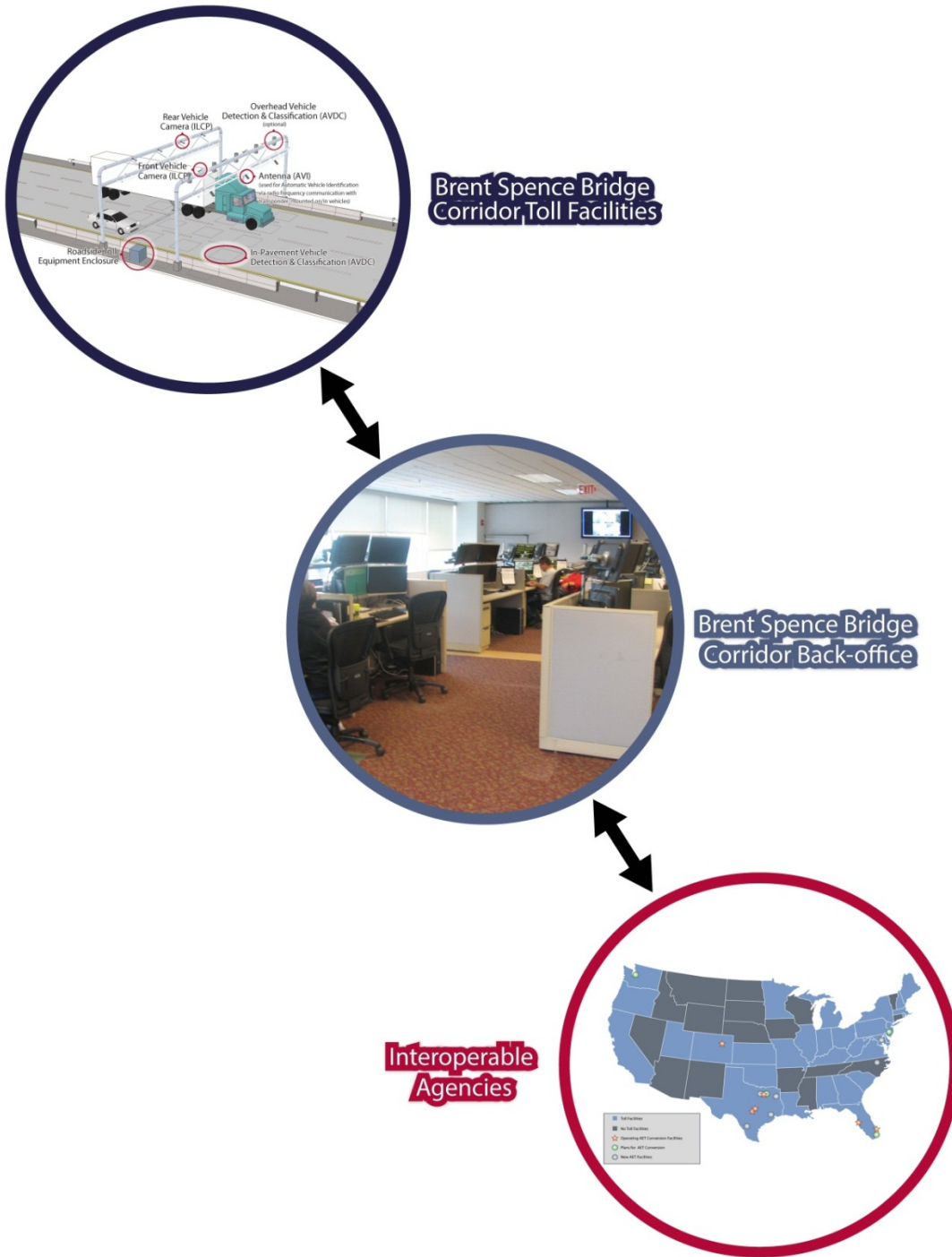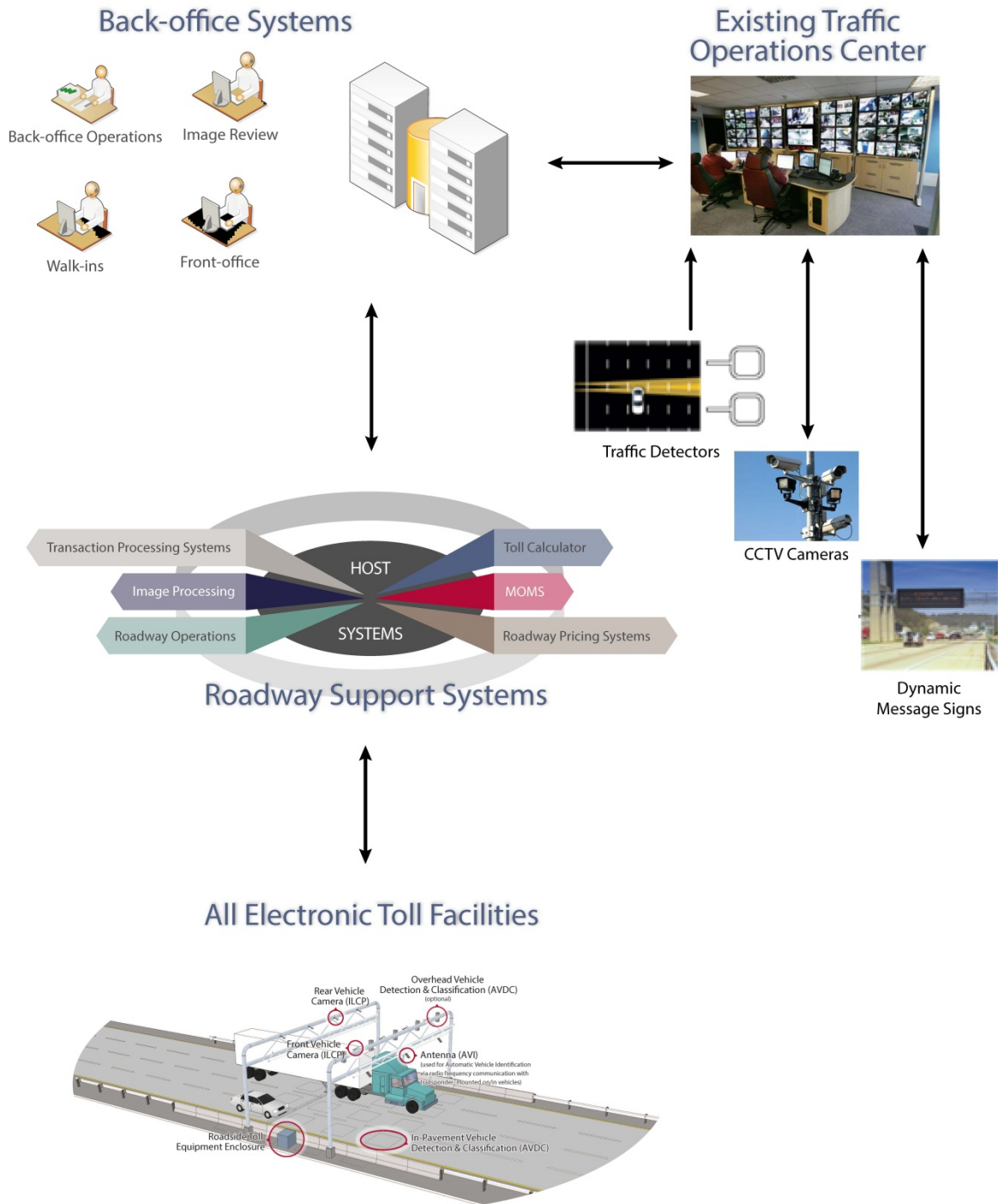Figure 4-1: Brent Spence Bridge Corridor Toll Collection System

Figure 4-2: Tolling Systems Architecture

4.4   TOLLING CONCEPT

The Corridor will use a tolling concept on the facility where vehicles will pass through one or more tolling locations on the mainline and/or ramp and customers are charged a flat toll at each. The toll transaction and associated images are transmitted from the Toll Lane Systems at each toll location to the CSC System for processing and posting to accounts. Invoices are sent to customers who do not have a funded account at the CSC. Customers will see individual toll transactions for each toll location passed within the invoice period. If the transaction belongs to an Agency with which the Owner has an interoperable relationship, then such transactions are transmitted to the interoperable agency for posting to the interoperable customer's account. A high level diagram showing the concepts discussed to-date is shown in **Figure 4-3**.

4.5   TOLL COLLECTION METHODS

The Corridor will use All-Electronic Tolling (AET) with no toll booths Vehicles will travel through the tolling location at highway speed without stopping. Toll collection equipment to support AET will be installed on all toll lanes.

4.6   VIOLATION ENFORCEMENT STRATEGIES

In AET facilities, customers without a funded pre-paid account are invoiced for new and unpaid toll transactions every billing cycle if toll payments are not received within the stipulated timeline. Invoices are automatically generated by capturing the rear and front (if present) license plate of the vehicle, obtaining the vehicle registration information and issuing the owner an invoice. Nonpayment of the toll transactions after they are reported on two invoices will result in the delinquent transactions being considered 'violations'. Based on the business rules, the customer may continue to receive monthly invoice but delinquent transactions will enter a violation escalation process which is in accordance with the states' legislation and statutes. A high-level overview of the invoicing process is shown in **Figure 4-3**.

4.7   IN-LANE ENFORCEMENT

Customers who repeatedly fail to pay the tolls can be pursued through manual enforcement if the Owner so decides. The CSC System will provide the capability to maintain a list of repeat violators and enforcement officers may be alerted in near-real time when a vehicle on the repeat violator list is detected driving through the toll lanes. In addition to the automated enforcement, this allows enforcement officers to stop any vehicle identified to be evading toll and issue them a manual citation if the states' legislation and statutes permit.

- Vehicle registration hold/suspension
- Referral to a collections agency
- Issuance of a citation
- Legal remedy through the courts

FIGURE 4-3: PROPOSED VEHICLE TOLL COLLECTION PROCESS

VEHICLE ENTERS TOLL ZONE

Valid transponder recognized?

Y — User fee is deducted from pre-paid account

N

Image of license plate taken

Optical character recognition of plate

Plate belongs to customer?

Y

N

Plate lookup to identify registered owner

BEGIN INVOICING PROCESS

Registered owner sent video invoice for user fee

Payment received within 30 days?

Y

N

Registered owner sent late notice

User fee + processing

Payment received within 30 days?

Y

N

Registered owner sent violation notice

User fee + penalty

Violation notice contested within 30 days?

Y   N

Registered owner's registration/ renewal blocked until paid

Collections process continues until collected or determined uncollectable

Registered owner sent court summons and invoice submitted to collection

Collection costs added

Registered owner prevails?

N

Payment received within 30 days?

N

Y

Y

PROCESS COMPLETE

NOTE: At any point during this process the vehicle's registered owner can provide documentation to have the toll re-assigned. The process will then re-start with a video invoice being sent to the appropriate registered owner.

To maximize the collection of violation revenue and to streamline operations, most of the processes above are performed by exchanging data electronically with the referenced entity. Most states allow the vehicle registration hold/suspension and collections process to occur in parallel, however, when a citation is issued, in most states all other collection efforts are required to cease. Nonpayment of a citation can result in the violator being taken to court. The Owner can establish business rules that dictate the criteria that make a violator eligible for each escalation. The System procured will have the flexibility to configure the escalation process in accordance with the states' legislation and the Owner's business rules including: notification process; escalation; dispute resolution and a hearing process for customers that are not satisfied as a result of the dispute process.

4.8 TRANSPONDER TECHNOLOGIES AND INTEROPERABILITY

No decisions have been made at this time on the transponder technology or interoperability options. Discussions to date and possible options are documented in this section.

The AVI readers will be multiprotocol and capable of reading multiple types of transponder. A typical AVI reader is able to reliably detect and read up to 3 protocols. The transponders issued by the CSC and the protocols supported for interoperability are dependent on the Owner's interoperable strategy, as well as the nationwide interoperability requirements stipulated by MAP-21.

Viable transponder options include:

IAG

- Proprietary Technology (Kapsch)
- Required to join IAG
- Transponder is more expensive (↓ $9 to $17/each)
- No low cost sticker tag option
- Prominent in Northeast US

6B

- Proprietary Technology (TransCore)
- Mid Price Transponder (↓ $8/each)
- Sticker or Hard Case

6C

- Open Protocol Technology
- Low Cost (↓ $2/each)
- Sticker or Hard Case

5. TOLL LANE SYSTEM, ITS AND INFRASTRUCTURE

This section describes the components that make up the Toll Lane System, the ITS, and the infrastructure needed to support these systems.

5.1 TOLL LANE SYSTEM

The in-lane tolling components at the roadside, shown in **Figure 5-1**, and the Host System make up the Toll Lane System. The typical toll collection system architecture and equipment is presented in this section. The final configuration will be based on the needs of the Owner, and the number of in-lane tolling components may vary. The contracting model used will determine the location of the Host System.

5.1.1 IN-LANE TOLLING COMPONENTS

The devices and components in the lanes detect the toll tags in vehicles, read the transponders, capture the images and process and transmit the transaction to the Host System. The following is a summary of major in-lane components/subsystems:

- AVI System: Readers and antennas that communicate with transponders installed on vehicles as they travel the lane to read the transponder identification number. In some toll facilities the readers write to the transponder; however, on this Corridor toll facility writing to the transponder is not a requirement.

- AVDC System: Scanners, loops, treadles and other sensors that detect and report vehicles as they travel the lane and also classify them based on each toll facility's toll and class schedule. Based on the vehicle classification structure and the redundancy that is required, a combination of various sensors can be installed.

- ICPS: Front and rear cameras, light sensors and illumination devices are installed in the lanes to capture and save images of the vehicles as they travel the lanes. Based on the business rules, images of all vehicles or images of just vehicles without a valid transponder are saved and processed. Automatic license plate recognition (ALPR), which digitally identifies and records the license plate number using the image data, can be performed in the cameras or on images servers or on servers that is part of the Host System. ALPR may also be performed at the CSC System based on the final System requirements and contracting model.

- Zone Controllers: The main computer system in the lane that receives events and messages from other subsystems as the vehicle travels through the toll zone and then processes the data to create vehicle transactions. The zone controller transmits the transaction data, alarms and other messages to the Host System via the facility server (optional) for further processing. The zone controller is also able to record transactions at the tolling site should connection to the Host System be interrupted.

- CMS: Electronic signs on which toll rates and operational status/mode of a lane are conveyed to the customers. The toll locations may not have a DMS if static toll rates are displayed on static signs.

- Lane Electronics: Comprised of other electronics, network components and devices required to connect the lane systems for successful consolidation of data and images and transmission to the Host System and ultimately the CSC System.

Figure 5-1: In-lane Tolling Components
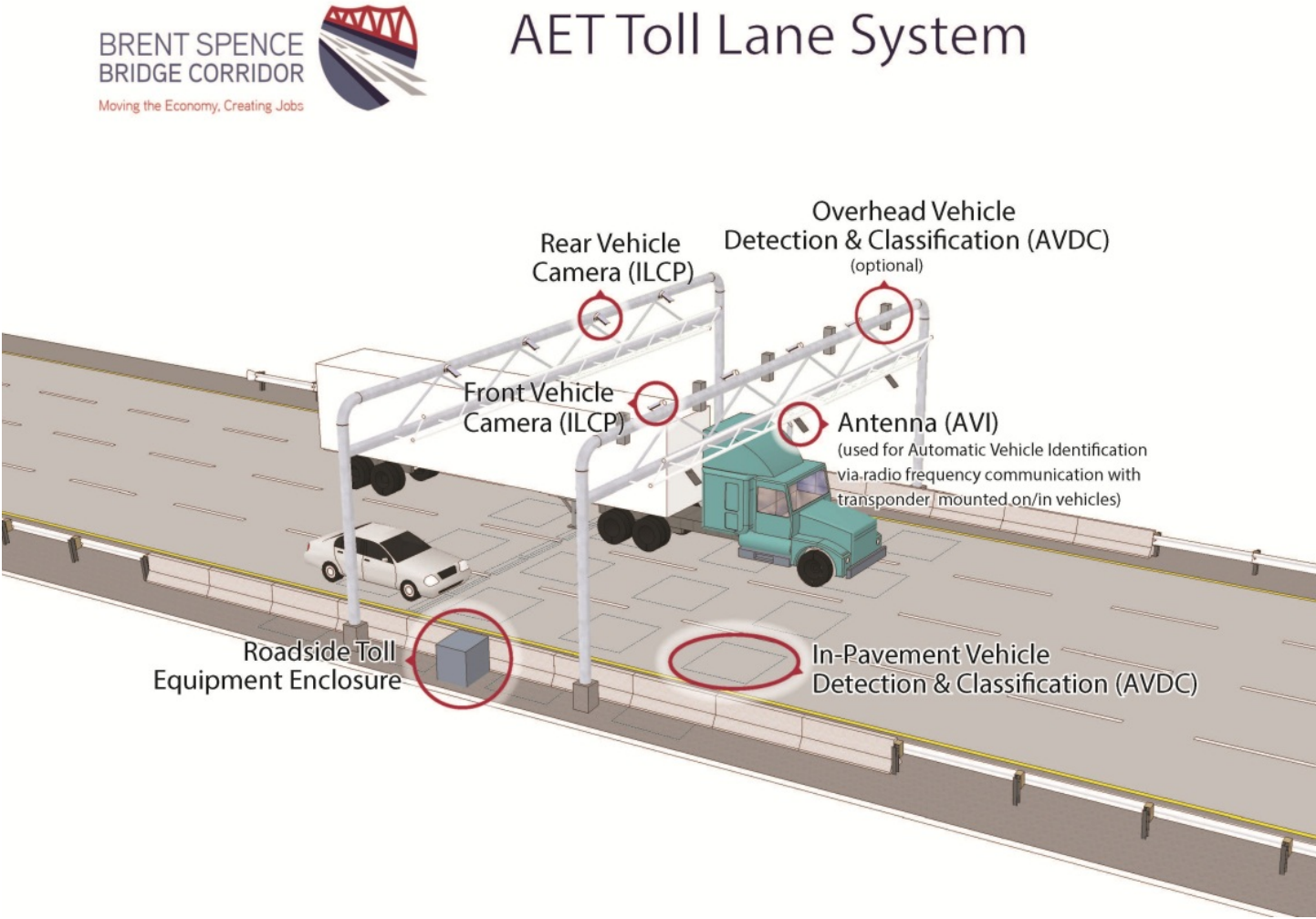
Facility Server: Some toll system integrators include one or more facility servers depending on the number of tolling locations and their location that act as an intermediate system between the zone controller and the Host System.

5.1.2 HOST SYSTEM

There is one Host System that supports the toll facility and all tolling locations connected to it and their operations. The Host System is composed of high availability (acceptable downtime to be quantified in RFP) systems with primary and secondary (disaster recovery) systems at separate locations. The Host System can be physically located at a suitable location relative to the lane systems and CSC system. The transactions, images and messages processed by the in-lane systems are transmitted to the Host System where business rules are applied to create a well-formatted transaction that is transmitted to the CSC System for processing. The Host System may also provide other functions including image pre-processing; establishing toll rates for variable pricing systems; MOMS; real-time monitoring; operational dashboards and reporting. The Host System interfaces to the CSC System utilizing standardized data and image transmission formats and protocols. There is a tight integration between the two systems for the real-time transfer of information and reports are available for reconciliation and audit.

5.1.3 DIGITAL VIDEO AUDIT SYSTEM (DVAS)

In addition to the front and rear cameras for license plate images, all tolling locations will have high resolution audit cameras providing coverage of multiple lanes per camera that support the monitoring of the tolling location. These additional cameras may be used for auditing or clarification of the ICPS. The DVAS will also provide surveillance footage for use in customer disputes and toll avoidance issues. DVAS will record video and overlay vehicle data on the video during real-time monitoring and playback. The DVAS may be viewed through a Host System application and using the real-time monitor.

5.1.4 SECURITY ACCESS SYSTEM

All roadside equipment enclosures will require card access, and the enclosures and tolling location are monitored via security access cameras. Roadside cabinets will have cabinet doors alarms that are reported to the security access system.

5.2 TOLL CLASSIFICATION STRUCTURE

Final decisions have not been made on the type of vehicle classification, but currently the Owner is evaluating axle-based vehicle classification. In an axle-based classification structure, the vehicle class and toll is determined by the number of axles on the ground when the vehicle drives through the toll zone. This is one of the simplest forms of vehicle classification and used by a majority of the toll agencies in the United States.

5.3 PRICING MECHANISMS

All vehicles are charged a corresponding toll amount (including $0 tolls), and different pricing is supported based on:

- Vehicle classification (number of axles, vehicle profile or a hybrid method).

- Mode of payment (pre-paid account via transponder or license plate, post-paid invoice, etc).

Other pricing features supported by the System will include:

- Static pricing, where toll for each vehicle class does not change

- Variable pricing, where toll for each vehicle class may change. For example:
  - o Time of day pricing
  - o Weekday/weekend pricing
  - o Holiday pricing
  - o Sponsorships

The system will have the capability for the Owner to suspend tolls at any time so that vehicles driving through the tolling location during a designated incident are not charged a toll; however, the total loss of revenue is tracked. Discounts and rebate programs available to customers are addressed in the **Section 6.3**.

5.4 GENERAL INFRASTRUCTURE REQUIREMENTS

Each tolling location will require the minimum infrastructure described below. Detailed requirements will be created during the applicable RFP development process.

- Toll gantry with lightning protection and grounding installed by the DB to mount the toll system equipment. The type of gantry has not been decided, but will support the toll system equipment necessary to meet the requirements of the Scope of Work to be developed as part of the RFP process.

- The DB will bring power from the service location to the roadside equipment enclosure.

- A fiber communications network installed by the DB will connect the Corridor tolling locations, the Host System and ITS devices to the CSC and the TMC respectively.

- The pavement is prepared by the DB to the specifications required for installation of the in-ground vehicle detection (loops) and classification system (if needed). Loop installations and sealing are performed by the Lane Toll System contractor.

- Back-up generators (permanent or portable) are installed as a backup in the event of prolonged power failure.

- Roadside equipment enclosures are installed at the site of the tolling location to house the toll system electronics/servers, UPS and HVAC units.

5.5 INTELLIGENT TRANSPORTATION SYSTEMS (ITS)/TRAFFIC MANAGEMENT

While collection of tolls is the main objective, management of traffic operations and ensuring the continuity and safety of the traffic operations is critical. ITS data is currently collected and organized in the region at the ODOT Central Office. Responsibility for traffic operations and maintenance of the roadways has not been

assigned. The responsible agency must develop an incident management plan for the Corridor. The ITS and Traffic Management System (TMS) are installed separately from the toll collection systems. Based on the operations model, an interface may be provided from the TMS to the toll collection system so that there is access to traffic data.

5.6   TRAFFIC DETECTORS

Traffic detectors may be installed throughout the Corridor to detect traffic speeds and volumes. Data from these devices are made available to the traffic operator at the Traffic Management Center (TMC) through dashboards for use in the TMS.

5.7   CCTV CAMERAS

CCTV cameras are installed throughout the Corridor to monitor traffic and incidents. Data from these cameras are made available to traffic operator at the Traffic Management Center (TMC) and others as required.

5.8   DYNAMIC MESSAGE SIGN (DMS)

Dynamic Message Signs are installed throughout the Corridor to provide motorist travel times and alert them of incidents. The message displayed on the DMS is visible to traffic operator at the Traffic Management Center (TMC) and others as required. Operators will have the capability to control and override the message displayed on these signs.

6. CSC SYSTEM

The CSC procurement and operational model has not yet been determined. Decisions on the operating model will result in the development of either RFP(s) for the CSC system and operations or an inter-government agreement with an existing toll entity. Therefore, a generic and typical functional and operational model is described in this section.

6.1 CSC SYSTEM OVERVIEW

The Corridor will have a single CSC that will support all toll facilities owned and operated by the Owner and will accommodate planned future growth and the potential for the addition of parking related functionality. The CSC will provide all customer account management services; image review services; transaction processing; invoicing; payment processing; transaction escalation; third-party interfaces, and financial reporting and reconciliation and will serve as a single point of contact for all customers using all current and future toll facilities. In addition to a primary customer service center location, associated walk-in locations will support customers in both states. Customers will have the ability to purchase transponders, replenish their account and pay invoices/notices at several retail locations that accept multiple payment types including cash. The CSC system is capable of supporting future toll facilities, interfacing to these toll lane systems, and providing separate financial reporting by facility. The design of the CSC system and its interface to the toll lane systems is modular using standardized interfaces that will allow for easy integration of future toll facilities.

6.2 CSC SYSTEM CONCEPT PLAN OVERVIEW

The CSC System (also referred to as "the System"), which is part of the Corridor Toll Collection System, includes multiple environments as required to complete the design; development; integration; testing; delivery; and maintenance of the CSC and sustain day-to-day operations. The CSC consists of:

- The primary CSC, supporting front-office and back-office operations. The primary CSC System is usually located at the CSC or at a data center.

- Walk-in CSC locations.

- Secondary (disaster recovery) CSC systems located at a separate location than the primary CSC System

- Communications network to support customer service with the various third-party interfaces

- Call center telephony infrastructure including telephone lines, call switching equipment, call center automatic call distributors (ACDs), and an integrated voice response (IVR) system

6.3 CSC SYSTEM ARCHITECTURE

The CSC production environment is a fully redundant, fault-tolerant configuration of servers, storage, databases and backup systems, connected using high-speed inter-system storage and networking fabric, including any ancillary equipment necessary to provide a complete and acceptable high availability (acceptable downtime to be quantified in RFP) production system. In the event of a complete failure of one

or more of the components or sub-systems in the CSC production environment, affected components or sub-systems shall fall over to the secondary CSC System at the DR site. The operating system and database used for all servers shall be a multi-user and multi-tasking from a manufacturer that is widely recognized and used for complex, high-volume database operations. A separate environment is provided for testing and training.

6.3.1 USER APPLICATION AND USER ACCESS CONTROLS

The graphical user interface (GUI) design is a browser-based CSC application with accepted industry design standards for ease of readability, understanding and appropriate use of menu-driven operations, user customization and intuitive operation. Controls will:

- Allow authorized users to access the CSC System using an authenticated, role-based login, provided through a user account maintained within the System.

- User list may be obtained from the SAS managed by the Owner. Provide access via user roles and various controls to manage user interface.

- Provide online help for each screen, each editable field and each selectable option within each screen.

- Provide workflow and application help menus that integrate seamlessly into the interface.

- Provide help menus that provide clear descriptions and walk-through procedures for all standard tasks.

- Provide confirmation screens for users to verify data for critical user actions before it is committed to the database.

- Support customer identification before releasing any data to customer.

- Provide an audit trail for all data changes, updates and actions taken on the data by users, customers and systems.

6.3.2 CUSTOMER ACCOUNT MANAGEMENT

Customers may establish a single account for paying tolls at all tolling locations in the Corridor. The System will allow for the potential of expansion of regional/national interoperability. The CSC System will support transponder accounts and funded/credit card backed license plate accounts and follow these general guidelines:

- Support pre-paid accounts, their management and maintenance.

- Capability for post-paid accounts where customers are billed or invoiced is required. The invoicing/video billing and escalation process are under development and the System will have the capability to support the invoicing and escalation process required by the state legislation and Owner business rules.

- The System will have the capability to incorporate a validated image of a license plate associated with a customer account into the vehicle matching database, such as a license plate provided by the

customer via a mobile application. Customers will have the ability to establish and maintain their accounts in the manner they prefer, whether online, via IVR or through speaking with a CSR (see Customer Contacts and Information below).

- Customers (mostly commercial) who have an existing transponder that is interoperable can register the transponder and set up a business account.

- Account establishment and maintenance is intuitive, easy to understand and should prevent customers from making unintended mistakes.

- Customers may pay license plate tolls within a configurable period of time after the toll transaction takes place (grace period toll).

- The System will support a variety of customer account types:
    o personal (including non-revenue and employee)
    o commercial
    o government
    o unregistered (customer purchased transponder from a retailer and replenishes it via Money Services Retailer)
    o fleet, including parent/child accounts
    o rental car

- Ability to apply differing business rules based upon account types and attributes and flags on the account.

- The System will provide the capability to apply business rules and account requirements for each valid account type:
    o payment options
    o replenishment amounts
    o low balance thresholds
    o insufficient balance threshold
    o account balance

- The System will support comprehensive license plate, vehicle information and transponder management functionality.

- The System will have the flexibility to apply the relevant discount plans, rebates and other incentives based on the business rules. This could include credits applied for transit or parking usage.

- The System will provide for special discounts and programs for transit programs based on an interface to the transit system(s).

- The System will support the configurable assessment of fees and fines (automatically and manually) to accounts, depending upon the account types.

- The System will allow for configurable account replenishment methods:
    - credit card
    - PayPal
    - mobile payment
    - electronic check
    - ACH
    - cash/check/money order
- The System will provide the capability to make corrections, adjustments and reversals to transactions in following approved business rules and in accordance with accounting standards.
- If parking functionality is supported, customers may opt-in and pay for parking transactions through their toll account.
- The System will institute various validations for ensuring accurate data entry, for example normalizing address and license plates, validating email addresses and mobile number, and confirming eligibility for various discount programs.

6.3.3 CUSTOMER CONTACT AND COMMUNICATIONS

- Customers will have the ability to establish and maintain their accounts in the manner they prefer, whether online, via IVR or through speaking with a Customer Service Representative (CSR). Accounts can be established by the following methods:
    - self-service website, including web-chat
    - self-service mobile application
    - self-service mobile website
    - mail
    - telephone
    - fax
    - walk-in
    - third-party retailer
    - automatically set up an account using information provided by fleet or rental companies
    - automatically set up an account using information provided by the DMV Lookup
- The System will provide the capability to track, store and electronically view all customer information, contact and history on all accounts.
- The System will provide the capability to associate incoming customer communication with the Account for all communication channels.

- Customer notifications are created, processed and transmitted based on configurable attributes and the customer's preferred methods of notification.

- The creation and sending of outgoing notification includes multiple distribution channels, such as electronic transmission (e-mail, SMS text messaging), printing and mailing, and outbound phone calls.

- Notification management will provide several methods of delivery and allow for configuring how each notification item is delivered.

- The System will use case management tools to track transmission of notifications to customers and manage requests made by customers or authorized users.

- Configurable customer statements are set up based on business rules and account types.

- The System will meet payment industry standards for payment processing.

- The System will provide the capability to track customer contacts and behavior and to measure customer satisfaction.

- Configurable and advanced unified search criteria so that CSRs can find customers with any piece of data whether they are for transponder or violation account holders.

- Access/communications via social media (e.g., Twitter, Facebook)-linked to surveys and customer outreach.

6.3.4 IMAGE REVIEW

Images and license plate data are saved at the CSC System and manual image review will take place as follows:

- The System will have the capability to receive and process image and transaction data provided by Corridor. The Optical Character Recognition (OCR) and Vehicle Signature Recognition (VSR) processing are performed at the Toll Lane Systems and only those images requiring review is reviewed at the CSC or third party services. Based on the contracting model (separate contractors), the OCR and VSR functionality will be added to the CSC System since it is the System of record for the license plate data.

- The System will allow for configurable multiple reviews of images (including blind reviews) and for supervisor review and audit.

- Dashboards are provided to monitor image review performance.

6.3.5 VIOLATION PROCESSING SYSTEM

Motorists who do not pay the toll are pursued for toll evasion in accordance with the legislation. The System will support configurable violation escalation and aging processes and assessment of fees and penalties by Corridor as follows:

- If the license plate transaction is not paid when it is billed or posted to a customer account, it will escalate to a violation.

- The System will provide registered owner lookup through DMV and certified out-of-state third party providers.

- The System is capable of issuing both separate and consolidated violation notices by state in accordance with business rules and legislation.

- The System will support dispute and affidavit process in accordance with business rules and legislation.

- The System will support scheduling of hearing and creation of evidence package.

- The System will support placement of violations in collections; place registration hold and pursue violations through court and subsequent civil judgments, in accordance with what is allowed under law.

- The System will support state tax intercept programs for the collection of delinquent violation payments if allowed under law.

- The System will provide the capability to identify and interface with the jurisdictions that support license plate registration hold.

6.3.6 PAYMENT PROCESSING

Customers can make payments through all commercially-available payment methods, including: cash; check; money order, electronic check; certified check; cashier's check; approved mobile payment sources; PayPal; credit card; debit card, and ACH.

- Payments are accepted at the following venues:
    o in-person at walk-in centers
    o Money Services Retailers
    o over the phone with a CSR
    o over the phone via the IVR
    o automatic payments
    o self-service website
    o self-service mobile website
    o self-service mobile application
    o mobile applications
    o mail
    o lockbox

- The System will allow for provision of innovative solutions for storing, handling and transmitting credit card information in compliance with PCI-DSS, for example, outsourcing, tokenization and hosted checkout solutions.

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- Certain payment methods, such as cash and debit card may be accepted only at walk-in centers and Retailers.

- The CSC may also accept payments through its agreements with money services retailers, lockbox vendor and collection companies.

- Appropriate controls are in place to ensure the security of payment transactions, including controls over cash, checks and customer credit card information. These controls are expected to be PCI and GAAP compliant and meet the requirements for an SSAE-16 Type II Audit.

- Deposits are processed, deposited and recorded in a timely manner, using the most efficient and cost-effective methods available in the industry (for example, by utilizing remote deposit as opposed to sending physical checks to the bank).

- The System will provide the functionality to process all payments accepted and apply them toward, including but not limited to: prepaid balance, specific toll transactions, specific account fees and purchase of Inventory Items, such as transponders, invoice payments and possibly discount plans.

- The System shall handle all payment exceptions including: partial payments, overpayments, return payment, chargebacks, and errors in applying payments, refunds and reversals.

- The System will initiate credit card (including EMV), debit card and ACH payments with a merchant service provider(s) that will process the electronic payments.

- The System will process, post to the appropriate accounts and reconcile payments transmitted by the lockbox service provider.

- The System will provide capability to process both ACH debits and ACH credits with the merchant service provider or bank.

- The System will provide a process for refunds based on the original transaction and ensure such refunds are shown on the account history and are reconciled.

6.3.7 INVENTORY MANAGEMENT

The CSC will issue/sell transponders and may sell gift cards and other inventory items to customers. The System will provide the functionality to inventory these items as assets and track their issuance/sale as follows:

- The System will track and maintain transponder inventory for all transponder types and other inventory items.

- Inventory levels are required to be monitored by the System regularly and communicated to the operations to ensure no disruption in transponder availability.

- The System will provide the capability to create and track multiple inventory types, for example different types of transponders and other inventory items and to track history and other key items of transponder management.

- Inventory management and fulfillment will include capabilities for sales and leasing, including tracking and reconciliation for all transponder sales venues.

- The System will allow for transponder testing, identification of transponders for recall and replacement programs.

- The System will have the capability to either sell or consign transponders to third-party vendors.

6.3.8 FINANCIAL SYSTEMS

The System will provide an integrated, configurable, self-balancing, accounting module for all transactions including:

- Provide for double entry recording of all financial transactions.

- Separation of financial data shall be maintained for each corridor, and for all interoperable agencies and third party business partners and service providers.

- Create journal automatic entries for recording and tracking all toll transactions and payment events.

- Provide an audit trail for each transaction.

- Every payment that resulted in a receivable being marked paid shall be traceable to the receivable(s) it paid.

- Every paid receivable shall be traceable to one or more payments that were allocated to its payment.

- Accounts payable shall be accurately tracked and payments made reconciled.

- The System will include a journal entry template for every transaction that impacts revenue, liability balances (for example, Prepaid Accounts) or asset balances (for example, accounts receivable).

- The System will record all CSC activities and all status changes.

- Once the Revenue Day is closed, any changes or adjustments to transactions are recorded as a separate entry in the Revenue Day in which the correction is made. No changes are made to the Revenue Day in which the original transaction occurred.

- The financial activities performed by authorized users are tracked by shift. In addition to reconciling payment activity, shift management will also serve the purpose of reconciling transponder inventory at the beginning and end of a shift.

- The System will provide a process for refunds based on the original transaction and ensure such refunds are shown on the Account history and are reconciled.

- The System will ensure proper customer transaction settlement (the payment of tolls, fees and fines) by the customer. Customer transaction settlement also includes any payment reversals, chargebacks and refunds.

- The System will support the processing of disbursements, including but not limited to:
  - o Customer refunds
  - o Settlement with agencies
  - o Settlement with Interoperable Agencies

- o Settlement with retailers

- o Settlement with third-party service providers and other business partners

The System will support 100% reconciliation of transactions and financial activity as follows:

- The System will handle write-offs and escheatment in accordance with state law and Owner business rules.

- The System will have the ability to separate and properly attribute revenues to different agencies who share facilities or to allocate by state:

The System will provide the functionality to attribute the revenue associated with a single transaction or transactions to a single agency, or multiple separate agencies. A customer's use of shared facilities requires a configurable amount or percentage of the toll (and associated fees) be attributed to the agencies who share the facility.

A customer's use of multiple tolling locations that may be located in different states will also potentially require sharing or allocation of tolls and fees.

6.3.9 THIRD-PARTY SERVICES/INTERFACES

The System will provide electronic automated interfaces to interoperable agencies, third-party service providers and business partners. Transfer of the data is per approved interface control documents (ICDS) and applicable industry standards for formats, validations, error detections, reconciliation and re-transmissions. The System will provide a dashboard for tracking the data transmission between the interfaces. These interfaces could include:

- Interoperable Agencies

- rental car

- retailers

- payment services/POS

- money service providers for future cash accounts

- mail-house/print

- lockbox

- collections

- future interface to transit customer usage data for transit credits

- future business partners including other agencies

- future parking programs (e.g., airports)

- Department of Motor Vehicles

- out of state Departments of Motor Vehicles

- third party image review

- future providers (billings and collections)

- Geo tolling

- mobile tolling

- commercial/fleet billings

- credit card providers

- banks

6.3.10 SECURITY

- The System will provide security and access controls in accordance with industry best practices and in compliance with applicable standards.

- The System is in compliance with the current PCI DSS for a Level 1 merchant or the appropriate merchant level as defined by the PCI Security Standards Council. Data is required to be secure from the at-lane collection point through the back-office and billing.

- Third-party software and tools will provide for virus protection, intrusion detections and networking monitoring.

6.3.11 DATA STORAGE

The System will provide the capability for fully automated and configurable storage of historical data (archival) and the permanent deletion of inactive or obsolete data (purging) in accordance with state statutes and operational requirements.

6.3.12 BUSINESS SYSTEMS MONITORING

- The Business System monitoring will support system maintenance and monitoring requirements for all hardware, software and other system components by monitoring back-office processes, equipment, jobs and interfaces in real-time to identify degradations in performance or availability before they impact end users.

- The System will generate alerts and create actionable trouble tickets that can be tracked to resolution.

- The System will provide chronological recording of system events and user account activities.

6.3.13 REPORTING

Reporting is integral to any toll collection and the CSC financial and operational integrity and reporting functionality is streamlined, quick, intuitive and user-friendly. The System is expected to deliver accurate reports in a usable format including graphical with drill-down capability. Reporting is a critical element of any business organization and is required to:

1. Provide for transaction and revenue reconciliation and investigate discrepancies.

2. Monitor system and operational performance.

3. Monitor human performance and business process efficiency.

4. Ensure compliance to systems, operations and maintenance performance standards.

5. Reconcile toll transactions to individual toll facilities.

6. Reconcile third-party financial and transactional interactions.

7. Accommodate and assess the impact of policies and business rules.

8. Identify ways to improve the quality of service provided to customers.

9. Provide automated reporting on system performance relative to required metrics.

10. Comply with reciprocity reporting requirements.

11. Evaluate the success of the toll collections.

12. Fulfill the financial reporting requirements.

Reports are broken into four broad categories:

- Informational Reports: provide information to Management about the status and numbers of transactions moving through the revenue cycle.

- Financial Management Reports: provide information which will permit finance to record in its general ledger systems financial activity related to the CSC. These reports also enable management to perform analyses on transactions submitted to the CSC for processing, including but not limited to analyzing billing and collection trends.

- Operations Reports: provide the data necessary for the contractor and the Commission to evaluate the contractor's performance against the performance standards and provide the reporting necessary to prepare and support the contractor's billing.

- Interface Reconciliation Reports: provide the reports necessary for the contractor to reconcile all interfaces and also provide reports demonstrating successful completion of the reconciliations in accordance with the performance standards.

Reports are further broken down by functionality (e.g. self-service web-site; collections; write-offs) under each of these four categories.

- Reports will be flexible enough to allow users to make changes to reports on an ad-hoc basis. For example, a report may include all the data elements required by a user for analyzing past due receivables with the exception of a single data field. The authorized user will have the ability to add that data field to the report without the need for custom report generation or programming.

- Some reports are best displayed as of a point in time (for example, receivable balances) while other reports are best displayed for activity over a range of time (for example, cash collected for a specific period of time). Users often have a need to generate reports that include historical balances as of the end of a particular Revenue Day. It is expected that the System track, calculate and maintain such Revenue Day-end balances such that retrieval of historical information is easily accomplished.

- Users also often have the need to generate reports that include information regarding historical transaction activity over a range of time both in summary and in detail. It is expected that the System provide the functionality to quickly and accurately deliver such reports to the user in a usable format.

- Standardized reporting shall be achieved via canned and ad-hoc reporting interfaces using both the production database for real-time reporting, reports database and/or a data warehouse for more complex, non-real-time and/or data intensive reports. Third party products will be included for non-technical users to generate such reports.

6.3.14 DASHBOARDS

There are different types of dashboards that monitor the performance of the System and the operations. These dashboards will include:

- image review

- account management and case management

- call center

- transponder fulfillment

- payment processing

- executive level

- finance

6.3.15 ANALYTICS

The System shall have a data warehouse environment independent and separate of the production environment for reporting and analytics.

6.3.16 WEBSITE

- The System will provide an application programming database (API) to allow for the development of a web-site through a third party should it determine not to use the System integrator provided web-site.

- The System will also provide a secure self-service website in English that is current with multiple browsers including:
  - o Microsoft Internet Explorer
  - o Mozilla Firefox
  - o Google Chrome
  - o Apple Safari
  - o Opera Software

o smart-phone/tablet/mobile browsers

- The System will provide the capability for customers to access and use the web-site for all functionality that is allowed a CSR with the exception of certain functions that are specific to the role of an authorized user (e.g., set up of a non-revenue account).

- The System will provide web analytics tools for the measurement, collection, analysis and reporting of internet data for purposes of understanding and optimizing website usage, business and market research and to assess and improve the effectiveness of the self-service website.

- The System will provide the capability for customers to access and use the website for all functionality that is allowed a CSR with the exception of certain functions that are specific to the role of an authorized user (e.g., set up of a non-revenue account).

- The System will provide a self-service website that supports the latest versions of mobile browsers. The self-service mobile website will provide the same features and functionality as the self-service website.

6.3.17 MOBILE APPLICATIONS

- The System will provide an API to allow for the development of a mobile application through a third party, should it determine not to use the System integrator provided mobile application.

- The System will provide a self-service mobile application specifically designed to operate with smart-phones and tablets.

- The System will provide a mobile CSR application that allows CSRs to operate off-site via smart phone or tablet.

6.3.18 TELEPHONY AND INTEGRATED VOICE RESPONSE SYSTEM (IVRS)

- The System will provide a telephony system including an integrated interactive voice response (IVR) system with a modern private branch exchange (PBX) and automated call distributor (ACD) that is fully integrated with the customer service center customer contact system.

- The System will provide an integrated customer service center customer contact system meeting the following requirements, including but not limited to:
  - o high availability (acceptable downtime to be quantified in RFP) requirements
  - o fully integrated with the functional CSC
  - o fully integrated into the desktop environment
  - o supports all CSC CSR's simultaneously
  - o supports all other functional requirements

- The System will support all required primary rate interfaces (PRIs) need to meet current and planned call volumes.

- The IVR system will allow customers to perform all actions that they might ask of a CSR with the exception of certain functions that are specific to the role of an authorized user, for example adding a non-revenue plan to a transponder or changing the toll rate due to a system classification error.

- The IVR system shall be capable of various modes of operation depending upon operations status (e.g., non-working facility hours versus open facility).

- The IVR system will be current and flexible and provide technology for items including natural speech recognition, screen pop ups; authorization of customer identity; customer input and retention of allowed information for viewing by CSR; and supervisor audit of calls.

6.4 GENERAL TOLLING BUSINESS RULES

Rules that affect and help determine the business practice that will be followed for various steps in the transaction and toll collection process will be developed in a general manner. Many business rules are consistent throughout the toll industry and some are specific to the type of project (i.e., bridge vs. long roadway) and location of the project; however, the general business rules proposed for this project will be documented.

6.5 CUSTOMER SERVICE CENTER MODELS

There are several options for customer service center systems and operations that can be implemented for this project and its anticipated toll collection methods. The options and recommendations for a preferred method will be documented later in the planning process.

6.6 GENERAL PERFORMANCE REQUIREMENTS

Most of the technology that will be deployed for toll collection and traffic management will be procured under performance based specifications. General industry standards that are prevalent in other toll collection systems will be used. The performance requirements will be detailed during the development of the requirements for the RFP.

6.7 GENERAL MAINTENANCE REQUIREMENTS

Preventive and corrective maintenance of the toll collection system is necessary to make sure systems are functional and operating to their specified standards. Based on the Maintenance model decided by the Commission, general industry standards for maintenance that are prevalent in other toll collection systems will be used. The performance requirements will be detailed during the development of the requirements for the RFP.

6.8 GENERAL OPERATIONAL REQUIREMENTS

Based on the Operations model decided by the Commission, general industry standards for operations that are prevalent in other customer service operations will be used to service the Corridor toll customers.

6.8.1   CSC OPERATIONS EQUIPMENT

The System will accommodate the use of equipment and peripheral devices to support CSC operations, including front and back-office. This includes:

- Point of sale (POS) machines.
- Check scanners.
- Printer/scanners.
- Bar code readers.
- Front-office work stations.
- Image review work stations.

6.9   CUSTOMER OUTREACH CONCEPTS

Preliminary general plans for public information and outreach will be developed that focus on the initial opening of the facility and the day-to-day operation after the facility is established.

7. DECISIONS AND SCHEDULES

All the areas described above may have decisions, significant or insignificant, that impact the procedures, operations, policies, business rules, or many other aspects of the operation of the Bridge. As part of our efforts, a matrix of decisions and required dates for the decisions will be developed based on a given opening date for the Bridge. All information in the Preliminary Concept of Operations document will be based on current information and can be updated in the future as additional information becomes available and the required decisions are made.