

## Attachment A

### CTrail Ticket Vending Machine System

Price Proposal Form

Revision 1

January 21, 2015

TRACKED CHANGES VERSION  
FOR INFORMATION ONLY

**CTrail Ticket Vending Machine System  
Price Proposal Form  
Base System and Options**

<b>Base System</b>			
<b>Item No.</b>	<b>Description</b>	<b>Qty</b>	<b>Entire Amount</b>
1	One (1) Data Collection and Reporting System installed, tested and accepted	1 EA	\$ .
2	Twenty (20) TVMs installed, tested and accepted	1 LS*	\$ .
3	Three (3) spare TVMs	1 LS	\$ .
4	Forty (40) spare bill vaults	1 LS	\$ .
5	Forty (40) spare coin vaults	1 LS	\$ .
6	Training and manuals provided and accepted	1 LS	\$ .
7	System Operation and Maintenance (invoiced per month, for a five (5)-year duration, commencing from date of successful completion of a successful 30-Day Operational Test)	5 YR	\$ .
7a	Debit/credit handling fees and contracts	5 YR	\$ .
7b	Revenue servicing fees and contracts	5 YR	\$ .
7c	All other operation and maintenance expenses	5 YR	\$ .
	(include 7a,7b and 7c in total under item 7)		
8	Special tools & test equipment	1 LS	\$ .
9	Non-recurring engineering	1 LS	\$ .
<b>Total</b>	<b>Base System Price</b>		<b>\$ .</b>
<b>GRAND TOTAL</b>	<b>BASE SYSTEM ITEMS 1 THROUGH 9 plus ALL OPTIONS (page 2)</b>		<b>\$ .</b>

\* LS = Lump Sum

Authorized Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Price Proposal Form: Options			
Item No.	Description	QTY	Entire Amount
Option 1a	1 <sup>st</sup> additional set of ten (10) TVMs installed, tested and accepted**	1 LS	\$ .
Option 1b	Five (5)-year System Operation and Maintenance for 1 <sup>st</sup> additional set of ten (10) TVMs (invoiced per month)	5 YR	\$ .
Option 1c	Five (5)-year Extension to the System Operation and Maintenance for 1 <sup>st</sup> additional set of ten (10) TVMs (invoiced per month)	5 YR	\$ .
Option 1d	2 <sup>nd</sup> Five (5)-year Extension to the System Operation and Maintenance for 1 <sup>st</sup> additional set of ten (10) TVMs (invoiced per month)	5 YR	\$ .
Option 2a	2 <sup>nd</sup> additional set of ten (10) Ticket Vending Machines installed, tested and accepted**	1 LS	\$ .
Option 2b	Five (5) -year System Operation and Maintenance for 2 <sup>nd</sup> additional set of ten (10) TVMs (invoiced per month)	5 YR	\$ .
Option 2c	Five (5)-year Extension to the System Operation and Maintenance for 2 <sup>nd</sup> additional set of ten (10) TVMs (invoiced per month)	5 YR	\$ .
Option 2d	2 <sup>nd</sup> 5-year Extension to the System Operation and Maintenance for 2 <sup>nd</sup> additional set of ten (10) TVMs(invoiced per month)	5 YR	\$ .
Option 3a	3 <sup>rd</sup> additional set of ten (10) TVMs installed, tested and accepted**	1 LS	\$ .
Option 3b	Five (5)-year System Operation and Maintenance for 3 <sup>rd</sup> additional set of 10 TVMs (invoiced per month)	5 YR	\$ .
Option 3c	Five (5)-year Extension to the System Operation and Maintenance 3 <sup>rd</sup> additional set of ten (10) TVMs (invoiced per month)	5 YR	\$ .
Option 3d	2 <sup>nd</sup> Five (5)-year Extension to the System Operation and Maintenance 3 <sup>rd</sup> additional set of ten (10) TVMs (invoiced per month)	5 YR	\$ .
Option 4a	Five (5)-year Extension of Operation and Maintenance Period for 19 Base Contract TVMs (invoiced per month)	5 YR	\$ .
Option 4b	2 <sup>nd</sup> Five (5)-year Extension of Operation and Maintenance Period for 19 Base Contract TVMs (invoiced per month)	5 YR	\$ .
Option 5	Wireless connection for one (1) TVM (invoiced per month, with five-year duration)	5 YR *	\$ .
Option 6	Parking - mobile payment capability for TVMs	1 LS	\$ .
SUBTOTAL	OPTIONS 1 through 6		\$ .

\* Option 5 (Wireless connection) may be ~~executed~~ exercised by CTDOT three (3) times per TVM, for fifteen (15) total years of wireless service per TVM.

\*\* Contractor to include TVM installation costs as part of Options. For the purposes of submitting the Price Proposal, assume two (2) platform-bound TVMs at each station, with five (5) stations being installed per option.

# NEW HAVEN – HARTFORD – SPRINGFIELD HIGH SPEED RAIL PROGRAM

STATE PROJECT NO. 170-2296

Solicitation # 14DOT7003

## ATTACHMENT B

### Ticket Vending Machine System

#### Scope of Work

Revision 01

~~December 10, 2014~~ January 21,  
2015

## Contents

Part 1 - GENERAL .....	1
1. SUMMARY .....	1
2. REFERENCES .....	1
3. SUBMITTALS BY THE CONTRACTOR.....	2
4. SYSTEMS DESCRIPTION.....	5
5. QUALITY ASSURANCE .....	16
PART 2 - PRODUCTS .....	16
1. MATERIALS .....	16
2. FABRICATION .....	3534
3. INSPECTION AND TESTING .....	3534
4. RELIABILITY .....	3937
5. DELIVERY, STORAGE AND HANDLING.....	4038
PART 3 - EXECUTION .....	4038
1. GENERAL.....	4038
2. PRE-INSTALLATION OF TVMs.....	4139
3. INSTALLATION OF TVMs.....	4139
4. FIELD QUALITY CONTROL .....	4240
5. TRAINING .....	4341
PART 4 - OPERATION AND MAINTENANCE.....	4946
1. Summary.....	4946
2. Service Levels.....	4946
3. Maintenance Services.....	5047
4. Revenue Services.....	5148
PART 5 - MEASUREMENT AND PAYMENT .....	5249
1. Payment Terms.....	5249
2. Project Milestones and Access Constraints.....	5249
3. TVM Installation Layout.....	5551
<del>Part 1 - GENERAL .....</del>	<del>1</del>
<del>    1. SUMMARY .....</del>	<del>1</del>
<del>    2. REFERENCES .....</del>	<del>1</del>
<del>    3. SUBMITTALS BY THE CONTRACTOR.....</del>	<del>2</del>
<del>    4. SYSTEMS DESCRIPTION.....</del>	<del>5</del>
<del>    5. QUALITY ASSURANCE .....</del>	<del>16</del>
<del>PART 2 - PRODUCTS .....</del>	<del>16</del>
<del>    1. MATERIALS .....</del>	<del>16</del>
<del>    2. FABRICATION .....</del>	<del>34</del>
<del>    3. INSPECTION AND TESTING .....</del>	<del>34</del>

4. RELIABILITY .....	37
5. DELIVERY, STORAGE AND HANDLING .....	38
PART 3 – EXECUTION .....	38
1. GENERAL .....	38
2. PRE-INSTALLATION OF TVMs .....	39
3. INSTALLATION OF TVMs .....	39
4. FIELD QUALITY CONTROL .....	40
5. TRAINING .....	41
PART 4 – OPERATION AND MAINTENANCE .....	46
1. Summary .....	46
2. Service Levels .....	46
3. Maintenance Services .....	47
4. Revenue Services .....	48
PART 5 – MEASUREMENT AND PAYMENT .....	49
1. Payment Terms .....	49
2. Project Schedule and Milestones .....	49
PROJECT MILESTONES and ACCESS CONSTRAINTS .....	50
3. TVM Installation Layout .....	51
TVMS INSTALLATION LAYOUT .....	51

TRACKED CHANGES VERSION  
FOR INFORMATION ONLY

## TICKET VENDING MACHINE SYSTEM

### Part 1 - GENERAL

#### 1. SUMMARY

- A. This document describes the ticket vending machine system (“System”) for the **CTrail** regional passenger service. Options for the expansion of the System to the Connecticut Department of Transportation’s (“CTDOT”) Shore Line East (“SLE”) are included.
- B. The Contractor shall be responsible for all aspects of the design, build, and installation and testing of the System.
- C. The Contractor shall be responsible for all aspects of the operation and maintenance of the ticket vending machine system (“Operation and Maintenance”), until the completion of the Operation and Maintenance ~~P~~period. The Operation and Maintenance ~~p~~Period commences upon completion of a successful 30\_-Day Operational Test, as defined in Part 2, section 3.E. and continues for an initial five (5) year period. At CTDOT’s option, it may extend the Operation and Maintenance ~~p~~Period in accordance with the Agreement and Options set forth in the Price Proposal Form.
- D. The Contractor will also be responsible for revenue servicing of the Ticket Vending Machines (“TVMs”), which includes, but is not limited to, ticket stock, receipt stocking, and cash handling.
- E. All references to CTDOT responsibilities may be delegated by CTDOT to its authorized representative(s). This includes, but is not limited to, installation approvals, Data Collection and Reporting System (“DCRS”) access, and receipt of training.

#### 2. REFERENCES

- A. Reference Standards: The Contractor shall provide the System meeting or exceeding the requirements of the following publications and organizations as applicable:
  1. Aluminum Association of America;
  2. American National Standards Institute (ANSI);
  3. American Society of Mechanical Engineers (ASME);
  4. American Society for Testing and Materials (ASTM);
  5. International Organization for Standardization (ISO)/Institute of Electrical and Electronics Engineers (IEEE);
    - a. ISO/IEEE 7816\_-4, Organization, Security and Commands for Interchange, IEEE

6. National Electrical Code (NEC);
  7. National Electrical Safety Code (NESC);
  8. Underwriters' Laboratories, Inc. (UL)
    - a. UL 751 – Standard for Vending Machines;
  9. ANSI National Fire Protection Association (NFPA) publication 70 (ANSI/NFPA 70);
  10. Title 49, Code of Federal Regulations (CFR), Part 37 –Transportation Services for Individuals With Disabilities (ADA);
  11. Federal regulations related to automated teller machines (49 CFR Parts 27, 30 and 37) and appended guidelines for controls and operating mechanisms (Appendix Chapter A4.27) must be addressed in the fare system equipment design;
  12. Payment Card Industry Security Standards Council (PCI SCC) Payment Application Data Security Standard (PA DSS);
  13. Americans with Disabilities Act (ADA) –Accessibility Guidelines (ADA-AG) published by the United States Access Board.
- B. Capitalized terms that are referenced but not defined herein are terms of art in the field of TVMs and have the customary meaning ascribed to them by those of ordinary skill in such field.

### 3. SUBMITTALS BY THE CONTRACTOR

- A. All submittals shall be subject to CTDOT review and approval.
- B. Contract Data Requirements List (“CDRL”) –Design Submittals:
  1. The Design Reviews shall include a Preliminary Design Review (“PDR”) and a Final Design Review (“FDR”). The purpose of these reviews shall be to evaluate the progress and technical adequacy of the System design and conformance with the requirements of this Scope of Work.
  2. Preliminary Design Review:
    - a. Product Data: The Contractor shall submit to CTDOT the manufacturer’s data sheets indicating System components proposed for use, including instruction manuals, prior to procurement of any such components by the Contractor. Procurement of System components by the Contractor prior to completion of this required PDR submittal is done so at Contractor’ own risk.
    - b. Customer Interface: The Contractor shall submit to CTDOT a flow chart of all possible customer transactions, showing all interactive instructions and



messages to be displayed and/or provided by the TVM, cancellation processes, timeouts, etc.

- c. TVM Design: The Contractor shall submit to CTDOT an overall design for the TVM that meets or exceeds the requirements herein. This shall include TVM/back-office interface information.
- d. Back Office Design: The Contractor shall submit an overall design for the back office infrastructure that meets or exceeds the requirements herein. This shall include TVM/back-office interface information.

3. Final Design Review:

- a. Update of PDR Documentation: The Contractor shall update the PDR documentation addressing comments issues and changes identified during the PDR phase.
- b. Human Factors: The Contractor shall provide to CTDOT evidence that focus groups have been utilized in finalizing the customer interface.
- c. Modular Design: The Contractor shall provide to CTDOT a demonstration showing how modular design has been incorporated into the System. This shall include a description of those components that are modular (hereinafter referred to individually as a “module” and collectively as “modules”), defining in detail the interfaces and functions of each module, and demonstrating that the modules may be easily removed and replaced to accommodate new functionality.
- d. TVM Design: The Contractor shall submit to CTDOT a comprehensive and complete design for the TVM that meets or exceeds the requirements herein. This shall include TVM/back-office interface information.
- e. Back Office Design: The Contractor shall submit to CTDOT a comprehensive and complete design for the DCRS and other back office infrastructure that meets or exceeds the requirements herein. This shall include TVM/back-office interface information.
- f. Shop Drawings: The Contractor shall submit to CTDOT two (2) full and complete sets of shop drawings including connection diagrams for interfacing equipment, a list of connected equipment, and layout of all major equipment components.
- g. Operation and Maintenance Data: The Contractor shall submit to CTDOT the manufacturer’s operation and maintenance data, customized to the System installed, and including System, operator and maintenance manuals.
- h. Installation and Interface Plan: The Contractor shall submit a plan to CTDOT which shall indicate the method of installation and all connections,

the installation schedule, and any operational support required of CTDOT or other contractors. The installation and interface Plan shall also include the procedures for interfacing with the station managers and other CTDOT contractors.

C. CDRL - As-Built Submittals:

1. Shop Drawings: The Contractor shall submit to CTDOT two (2) complete sets of as-built shop drawings including connection diagrams for interfacing equipment, list of connected equipment, and layout of major equipment components prior to completion of Factory Acceptance Test (“FAT”) as defined in Part 2, section 3.C.
2. Record Drawings: During construction, the Contractor shall maintain record drawings indicating location of equipment and wiring. The Contractor shall submit to CTDOT an electronic version of record drawings prior to completion of the 30-Day Operational Test.

D. CDRL Verification Submittals:

1. Test Plans and Procedures: The Contractor shall submit the test plans and procedures for CTDOT’s approval prior to any tests being conducted. Such plans and procedures shall demonstrate that all components and features of the System are tested and will perform as required by this Scope of Work.
2. Field Tests:
  - a. Procedures, example report form(s) and example test result format shall be submitted to CTDOT by the Contractor ~~forty five~~ at least forty-five (45) days prior to testing;
  - b. Results from such testing shall be submitted to CTDOT within one (1) week after test completion.
3. PCI SCC compliance: The Contractor shall provide to CTDOT a full PCI compliant self-assessment and penetration test on all segments of the System by a CTDOT-approved independent third party. The results shall be submitted to CTDOT prior to the FAT.
4. Europay, MasterCard, Visa (“EMV”) standard compliance: The Contractor shall provide a System which is certified as compliant with the standards of an acceptable open payment platform.
5. FAT Report: The purpose of the FAT test shall be to verify that equipment to be supplied under this Scope of Work functions as described in these specifications. FAT details are specified in Part 2, Section 3. C. The successful completion of the

first FAT and submittal of the report shall be a prerequisite to produce the remainder of the equipment. Successful completion of subsequent FATs shall be a prerequisite to install or deliver equipment to CTDOT.

6. 30\_-Day Operational Test Report: At completion of System installation, the 30\_-Day Operational Test shall be conducted and a test report documenting the results shall be submitted to CTDOT. The Operation and Maintenance ~~P~~eriod shall begin upon successful completion of the 30\_-Day Operational Test.

E. Training Submittals:

1. Outlines: The Contractor shall provide to CTDOT the training program plan and draft manual outlines prior to the FAT.
2. Draft Materials: The Contractor shall provide to CTDOT draft training materials and manuals at least three (3) months prior to System installation.
3. Training: The Contractor shall conduct three (3) of each training course for CTDOT and Service Provider staff on the DCRS and TVM servicing prior to the 30\_-Day Operational Test.
4. Final Materials: The Contractor shall provide final training materials and manuals to CTDOT prior to completion of 30\_-Day Operational Test.

**4. SYSTEMS DESCRIPTION**

- A. The design shall provide for TVMs and related back office equipment in the quantities and locations shown in the TVM\$ Installation Layout table set forth in Part 5, section 3.

B. Design Requirements – Overall System

1. TVMs shall be capable of dispensing passes compatible with the CT Transit bus, CTfastrak Bus Rapid Transit (“BRT”) and Metro-North Railroad (“MNR”) fare collection equipment for a seamless System for customers to use one type of fare media.
2. Data shall be stored in a relational database (e.g. Oracle, Structured Query Language (“SQL”)) to allow for ease of reporting and combining revenue and maintenance data for the entire System.
3. Equipment shall be modular in design to permit rapid field replacement of malfunctioning modules as field replaceable units. Assemblies and components that perform identical functions within the System shall be mechanically and electrically interchangeable. All interchangeable modules, components and boards shall be mechanically keyed in a manner that makes it impossible to insert any such module, component or board into locations other than its correct location on the proper chassis. Modular parts, components, and assemblies shall be serialized and clearly marked.

4. All System equipment shall be designed to require only simple and minimal scheduled and unscheduled maintenance tasks. For ease of service, all electrical connections between components and subassemblies shall be established by means of connectors, to allow for rapid removal of a component and/or subassembly from the TVM. Plug-in connections shall be made simply, quickly and securely and shall be equipped with strain relief to prevent damage to cables and connectors.
5. TVM software logic shall include diagnostic capability to identify defective modules.
6. Fare Tables
  - a. Internally stored fare tables shall be sized with at least 110% of the sufficient space for issuing **CTrail** regional, SLE tickets, MNR, CT Transit and **CTfastrak** tickets.
  - b. The System shall simultaneously be capable of handling **CTrail** regional, SLE, MNR, **CTfastrak** and CT Transit fare and discount types. If a travel route is purchased across agency lines, the TVM shall calculate and produce all necessary fare media. For reconciliation purposes, fare media value shall be stored and reportable in the DCRS by line.
  - c. The TVM application software shall be designed to accommodate any fare structure as a configuration item. The fare table shall also be developed so it will allow reconfiguration to a flat fare, a zone or a distance based fare system. The fare matrix used shall allow for a seamless conversion to any type of fare system and shall have no impact on the operation of the TVM software or the customer.
  - d. Once new fare tables are created on the DCRS, it shall be possible to batch download the new fare table(s) from the DCRS to all TVMs or designated groups of TVMs via the data communications link without the need to manually select individual TVMs for update. New fare tables shall also be transferable onto a Solid State Memory Module ("SSMM") or other removable storage media, which can then be loaded into the TVM by a Contractor service technician. Once fare tables are downloaded into the TVM, the new fare table shall be activated automatically in the TVM at the specified date/time as determined by CTDOT.
7. Parking
  - a. The System shall provide for parking fee collection via the TVM. Parking fee payment shall be for a specific numbered parking space.

- b. Parking payments shall be integrated into the TVM interface so separate credit/debit transactions are not necessary to pay for train fare and a parking space.
  - c. The TVM shall produce a parking fee receipt. This receipt shall be separate from any fare product or transaction receipt.
  - d. A parking audit slip shall be produced when requested by staff, for validation purposes. The parking audit slip shall note time, date, location, and identify which spaces are unpaid for at the time of printing.
  - e. Pricing shall be adjustable via a schedule consisting of at least four (4) adjustable timeframes. (i.e. weekday, weekends, nights, etc.)
  - f. Pricing schedule, activation, and spot numbering shall be configurable DCRS items.
8. Parking – Mobile Payment Option
- a. As an option, the System shall allow for customers to pay for a specific numbered parking space from a mobile device.
  - b. The mobile payment functionality must function on at least 50% of smartphones sold in the USA and must support at least two Operating System (OS) platforms.
  - c. The mobile payment interface shall be submitted for review and approval of CTDOT.
  - d. Instructional signage on how to use the mobile payment option shall be proposed for approval by the Contractor to CTDOT. Signage header font shall be at least two (2) inches tall. Instruction font shall be at least one (1) inch tall. Quick Response (“QR”) -code(s) at least three (3) inches tall shall be placed on the sign, pointing to appropriate website(s) or application(s).
  - e. The Contractor shall supply signage for a maximum of 15 parking lots.
  - f. If the mobile payment option is executed, the TVM parking audit slip shall also integrate reporting of any mobile payments made.
9. Future Modular Requirements
- a. Allowances shall be made to allow for future upgrades of the System equipment.
  - b. The TVMs shall have the following provisions for future changes:
    - 1) Available space on the front panel for future mounting of:
      - a) A smart card reader or other interface device;
      - b) An Automated Teller Machine (ATM) style camera.
    - 2) Available space on the roof of the TVM/lightbox for mounting and routing cable to a cellular antenna

- 3) Available space above the return bin for an Amtrak/airline style ticket pass and issuing unit.
- 4) Sufficient open Central Processing Unit (CPU) Universal Serial Bus (USB) ports, three (3) minimum, and power for the above functionality.
- 5) Available CPU memory and drive space to support the above functionality along with MNR and Amtrak (between Springfield, MA and New York, NY) ticketing fare tables.

C. Design Requirements – TVM

1. The overall dimension of an installed TVM (including pedestal and top cap) shall not exceed eighty (80) inches in height by thirty-six (36) inches in width by twenty-four (24) inches in depth. The top of the TVM shall slope at least five (5) degrees downward and to the rear of the TVM to prevent any accumulation of rain.
2. TVMs shall be designed to operate in both unsheltered and sheltered locations.
3. Each TVM shall be capable of printing and issuing different tickets, passes, cards, and in the future, smart cards, Radio Frequency Identification (RFID) cards or a combination thereof from within the same housing.
4. TVMs shall sell the fare media required to support fares that may include flat fare, distance-based fares, zone-based fares, time-based fares, period passes, numerous reduced fares (e.g. senior, student, etc.) and transfers between **CTrail** Regional, CT Transit, **CTfastrak** bus operations and MNR to/from New York City. Each fare table shall have a capacity of at least 100,000 entries, where an entry in the fare table provides all configuration data corresponding to a ticket type/origin/destination selectable by customers.
5. At a minimum, each TVM shall initially consist of the following components:
  - a. Bill processing unit;
  - b. Coin processing unit;
  - c. Credit/debit card processing unit with Personal Identification Number (PIN) pad;
  - d. Customer Interface Display (as defined in Part 2, section 1(I));
  - e. Ticket and pass issuing unit;
  - f. Printer;
  - g. Return bin;
  - h. Key pad and function keys;
  - i. Receipt issuing unit;
  - j. Power supply;

- k. CPU; and
  - l. Network switch.
6. Each TVM shall be configured for functionality to be modified remotely. This shall include: the ticket to be printed, maximum change returned, fares associated with each button, bank notes accepted and the Customer Interface Display.
  7. The TVM shall have a clearly visible indication to both the customer and CTDOT representatives of a condition(s) that the TVM is inoperative. If a limited operation is available the TVM shall display what functions are operable such as 'CASH ONLY, NO CREDIT/DEBIT'.
  8. After payment is received for the fare of a selected ticket, the TVM shall print appropriate sales data on the ticket.
  9. Power provided in the stations for the TVM's will be 120 (+10% to -20%) volts alternating current (VAC), 60 (+1 to -3) hertz (Hz), 15 amperes (amp), single-phase circuits, with electrical ground wire and a separate equipment earth ground.
  10. All TVMs shall be connected to the DCRS. The DCRS shall provide automatic monitoring and control of all TVMs in the train stations and other ancillary System equipment. Data systems shall be turn-key and contain all collection and reporting systems. Data communications will be provided via fiber optic cable. Termination of fiber optic cable inside TVM will be by Contractor.
  11. As an option, CTDOT may require the Contractor to provide wireless connectivity to TVMs. If this option is executed, the Contractor shall provide, operate and maintain the wireless connection to the DCRS. The Contractor may utilize a third-party provider, but CTDOT will at no point interact with this third-party. Specific failure modes by a third-party wireless provider may be excluded from reliability and availability calculations; the Contractor must list and justify these failure modes in its proposal as being outside their control. At the end of the Operation and Maintenance period, CTDOT shall have the option of contracting directly with the third-party wireless provider.
  12. All System equipment shall be capable of being monitored by a Supervisory Control and Data Acquisition ("SCADA") system. The TVM shall provide one (1) SCADA output for tampering and one for repair/servicing required.

D. Performance Requirements – TVM

1. The customer interface with the TVM shall be at the front of the machine and be a customer-friendly, cleanly designed machine. All customer interface openings shall be designed to prevent unauthorized access and will be well lit.

2. All customer interfaces, coin slots, bill slots, ticket slots, and return bins shall be compliant with the ADA-AG. The TVM shall have raised lines and numbering to guide the transaction for visually-impaired customers, allowing them to make choices regarding language, zones, type and quantity of tickets and to cancel transactions.
3. All hardware, firmware and software utilized in this System must support the ability to be routinely patched and updated, at no cost to CTDOT, as releases are available. The entire System must support CTDOT approved virus protection software. Documented vendor validation of all updates shall be required within thirty (30) days of a third-party's patch release.
4. Instructional graphics shall be contained on the front panel of the TVM to clearly indicate each step a customer must follow to choose and purchase a ticket or tickets. Information on fare rates, parking fees, and other services as defined by CTDOT shall also be contained on the front panel behind polycarbonate screens. The sequence of steps shall be clearly indicated by the use of graphics and symbols meeting ADA requirements. Conceptual designs of the TVM instructions and related graphics shall be submitted for review and approval by CTDOT as part of the PDR phase. Sign frames will also be capable of being attached to the exterior of the TVM on both sides.
5. All displays on the exterior of the TVM are to be protected by shatter-resistant, polycarbonate covers or other means as approved by CTDOT. Any push buttons function keys, and numeric keys on the exterior of the TVM shall be metal and shall not be removable from the exterior of the machine, subject to CTDOT's approval. Polycarbonate protected areas shall be provided for CTDOT to place branding, schedule and fare information.
6. A conceptual description of the function, configuration, and arrangement of the exterior shall be submitted to CTDOT for review and approval as part of the PDR phase.
7. The equipment finish, graphics panels and all surfaces, including lettering, maps and other information displayed on the equipment, shall be resistant to ultraviolet radiation and air-borne contaminants.
8. The TVM shall accept United States' (U.S.) coins (except pennies), bills (up to \$100, except \$2 bills), debit card, credit card as described later in this specification.
9. All TVMs shall be capable of dispensing CTDOT approved and CT Transit/CTfastrak compatible ticket stock as a fare product. At least two (2) types of ticket stock are expected: short-term and long-term.



10. All TVMs shall also be capable of dispensing MNR approved and compatible ticket stock. This shall include un-encoded MTA MetroCards to be used as monthly passes, one-way tickets and multi-ride tickets.
11. Passengers may purchase multiple tickets in a single TVM transaction. The customer shall be able to change any selection up to the moment when the first coin, bill or card is detected. It shall be possible for the passenger to cancel up to the moment before final payment has been made.
12. Each TVM shall provide audio and visual output of messages and instructions. Selection between a minimum of four (4) languages will be supported. The TVM, as delivered, shall support audio and text in English and Spanish. CTDOT shall be provided instructions for adding text/audio for an additional two (2) languages at a later date. The TVM shall default to no audible language, unless user requested.
13. The TVM shall emit a distinctive tone each time a button is pressed and additional input is required to complete the transaction.
14. The TVM shall issue change if excess payment is made. If a transaction is canceled or aborted the TVM shall refund value deposited.
15. Issuance of transaction receipts shall be a configurable item. If enabled, transaction receipts shall be provided upon customer request. Quantity of receipt media is to be at least 200% of that required for a single day's transactions.
16. Accounting data shall be registered, stored and sent to the back office via the network connection.
17. The TVM shall accumulate and summarize data to enable an audit of transactions occurring between coin and/or bill vault replacements. This applies to bill vaults, coin vaults, supplemental coin hoppers and supplemental bill vaults. The TVM shall generate and imprint an audit ticket with this data and with the identification (ID) of the proximity card used to unlock the TVM front panel. The audit ticket shall be suitable for purposes of financial audit. The TVM will automatically generate the serial identification number of the removed vault either during removal or immediately following removal and before the replacement vault is inserted; this information shall be immediately transmitted to the DCRS.
18. Each TVM shall be equipped with an alarm system, which shall monitor TVM security conditions and report them to the DCRS. The alarm system shall be equipped with an electronic siren capable of emitting a sound level of at least 110 A-weighted decibels (dB(A)) measured at a distance of three (3) feet with the door open. This siren shall sound whenever unauthorized entry is detected and whenever severe impacts are detected. In addition, a silent, internal

momentary contact switch, hidden inside the TVM but readily accessible, shall permit an authorized technician to trigger a silent alarm. The siren shall only be silenced by a remote DCRS reset, scanning of a valid contactless identification (ID) or removing power. When activated, this switch shall cause the TVM to notify the DCRS, but not activate the siren. Upon detection of an intrusion as described above, the DCRS will send an automatically generated e-mail or text message to an established distribution list giving the level of warning, location, machine, time and date of the detected intrusion.

19. Each TVM shall normally be ready to respond to a customer selection when it is in the idle condition. If the TVM is not ready, for all designed functions, it shall respond in the limited operation mode that is suitable for the TVM's current condition; otherwise an out-of-service notice shall be presented to the customer. If the TVM cannot illuminate the Customer Interface Display screen the unit shall default to a totally blank non-operative display.
20. A programmable display screen and push buttons shall be provided for customers to complete a transaction. The TVM Customer Interface Display shall direct the customer through the steps of the transaction with the customer's inputs being entered through push buttons and/or a touch screen.
21. Response Time
  - a. Each TVM shall have the ability to default to a "sleep mode" of operation, with 'time of day sleep mode enabled' and 'inactivity period' as configurable DCRS items. Button interaction or card/cash insertion shall restore the TVM to full operation within three (3) seconds. The TVM may take longer than three (3) seconds to achieve full display screen brightness.
  - b. All single fare ticket transactions involving cash, credit or debit cards shall be completed within ten (10) seconds of final payment being completed, i.e., final cash equal to or above the price for the ticket being purchased, or acknowledgement of the credit/debit transaction from the third party clearing house. For multi-fare purchases, each additional fare transaction shall be completed within five (5) seconds.
  - c. Banknote insertion and processing time shall be under five (5) seconds. Banknote first pass acceptance shall be over 95%.
  - d. An experienced/practiced user should be able to complete selection and be prompted for payment within ten (10) seconds. For demonstration purposes, this individual may be a Contractor employee.
  - e. The Bank Card Processor ("BCP") shall be capable of completing a bankcard transaction in ten (10) seconds or less, when financial institution authorization is provided within five (5) seconds.

22. The customer shall not have to declare the transaction payment type (i.e., cash or credit). However, payment types shall be mutually exclusive; that is, each transaction shall only be by cash or bank card. Once payment equal to or exceeding the amount due is inserted into the TVM, the coin and bill slots shall close.
23. When failures occur during a transaction, the TVM shall make every attempt to complete the transaction or return all deposited funds and, if necessary, provide a printed voucher, or if the TVM is out-of-stock of print media, display the voucher information on the screen.
24. The TVM shall be configurable to accept credit/debit transactions when the connection to the back-office is off line.
25. The maximum frequency and total value of an individual card transaction over a specific time period shall be configurable. The type and maximum value of “off line” transactions shall also be configurable, but be set to \$0 by default.
26. In the event of a TVM failure during a credit card transaction, the transaction shall be reversed as part of the cancellation process, and the charge voided and not reconciled.
27. Debit card transactions that result in a failure to dispense fare media shall be reversed.
28. The TVM shall continue to operate in a limited capacity in the event of a failure of one or more components; assuming that the failure poses no risk of further damage to the TVM or its components. The TVM shall remain in service as long as it is capable of vending tickets. Whenever possible, the TVM shall remain in service even if multiple failures occur; for example, it shall be possible for the TVM to simultaneously be in both “No Coins Accepted: or credit/debit only mode and “Exact Fare Only” mode. Only the failure of those components necessary to vend tickets (e.g. ticket and pass issuing unit, CPU, power supply, customer keyboard) or a combined failure of the cash and credit systems shall cause the TVM to go out of service.
29. Upon power loss, the TVM shall shutdown without corruption of application software, application data or completed transaction data. Transaction data stored in the TVM will be maintained for a minimum of ten (10) days following an unrestored loss of primary power.
30. Faults shall be self-diagnosing and reported by event with detailed error codes. Maintenance information shall be retained at the TVM and also sent to the DCRS.

31. Diagnostic software shall be furnished for testing and troubleshooting of all TVM functions. TVM application software shall include all software packages necessary for real-time TVM diagnostics and accounting and registration communications between the TVMs and the DCRS.
  32. The System shall employ standard communications interfaces and protocols between the station equipment and the DCRS.
  33. Access Control
    - a. Access to the equipment by authorized personnel shall be provided without undue delay.
    - b. A proximity card device will be used to uniquely identify anyone attempting to open the TVM.
    - c. All TVM generated alarms, i.e., due to intrusion, loss of power, or maintenance required, shall be sent to the DCRS and prioritized for level of attention and then displayed.
- E. Performance Requirements – Optional Wireless Connectivity
1. As an option, the Contractor shall provide wireless connectivity from the TVMs to the DCRS via cellular service or some other proven method to be approved by CTDOT.
- F. Design Requirements – Back Office Processing
1. The DCRS software shall provide an interface between the TVMs and users for all TVM configurations, troubleshooting and reporting functions. All revenue data shall be consolidated into report formats that are to be approved by CTDOT.
  2. Other “back office” equipment may include high-speed ticket encoders, receipt printers, communications interface equipment, servers, test/verification equipment, other ancillary equipment for power conditioning, communications, and spare parts, etc. Devices’ design, inclusion and function are subject to CTDOT approval. Wherever possible, Contractor should attempt to use commodity third-party host hardware and virtual machines. Any hardware required under this contract will be operated and maintained by Contractor during the Operation~~ing~~ and Maintenance ~~P~~period. Following the Contractor Operation~~ing~~ and Maintenance ~~p~~Period, this hardware will remain the property of Contractor.
  3. Data concentrators (i.e., equipment, excluding routers and switches, used to collect transaction data from a number of devices at one (1) location for transmission to the DCRS) are only allowed with prior CTDOT approval.

4. At least three (3) sets of fare tables, one (1) current and an additional two (2) future, shall be maintained at the DCRS and downloaded to the TVMs at times as requested by CTDOT.
5. Back-up data shall be maintained within TVMs for a minimum of ten (10) days or until successful transfer has been achieved between the TVM and the DCRS.
6. All fare products defined by CTDOT, MNR, CTfastrak, and CT Transit fare policies shall be accommodated. CTDOT, at its discretion, may modify the fare structure, and the Contractor shall implement the new fare structure. Fare tables will be developed within the DCRS and transmitted to all fare system equipment.
7. A separate CTDOT approved third party clearing house server shall be provided for credit and debit charge processing.
8. Through the Operation and Maintenance Period, including any extensions thereto, all back office servers are to be maintained by the Contractor at an approved third party location. Upon expiration of the Operation and Maintenance Period, including any extensions thereto, all licenses and third party agreements shall be transferred to CTDOT if requested by CTDOT.
9. The Contractor shall mitigate and correct any compatibility issues within the System, including but not limited to such items as the use of third party clearing houses.

G. Environmental Conditions

1. The System equipment shall be capable of being operated at the specified performance levels, stored, and maintained without impairment resulting from the natural or induced environmental conditions within the geographical area of CTDOT.
2. TVMs shall be designed to be resistant to liquid ingress caused by driving rain and incidentally splashed water such as would occur during routine equipment and/or platform cleaning.
3. The TVM, as a complete assembly, shall carry a third party label by a national recognized testing laboratory.
4. The following environmental conditions of the CTDOT service area shall be met:
  - a. Minimum ambient air temperature: -26° F;
  - b. Maximum ambient air temperature: 120° F;
  - c. Maximum storage temperature: 150° F;
  - d. Maximum hourly temperature range: 50° F;
  - e. Maximum solar radiation: 250 BTU/hrs/ft<sup>2</sup>;
  - f. Maximum rainfall rate: 8 inches per 24 hour;
  - g. Maximum snowfall rate: 30 inches per 24 hours;

- h. Relative humidity: 18% to 100% condensing;
  - i. Maximum wind Speed: 120 mph;
  - j. Maximum wind speed sustained for one (1) minute: 80 mph;
  - k. Maximum elevation: 450 ft. above sea level.
- 5. The equipment shall be designed to operate in the electromagnetic environment of a railroad using 700 VDC third rail and 12kV to 25 kV-AC overhead.
- 6. The equipment shall be designed to operate in the presence of railroad induced vibration.
- H. Technology Standards
  - 1. The Contractor must ensure the software interfaces with CTDOT supported internet browsers as may be updated from time to time.

## 5. QUALITY ASSURANCE

- A. Equipment and materials used shall be standard components that are manufactured and available for purchase as standard replacement parts for a minimum of five (5) - years after the parts are commercially available from the manufacturer.
- B. All manufactured products shall be thoroughly tested and have been proven in transit service for a minimum of three (3) years.
- C. All equipment and material shall be standard products of manufacturers regularly engaged in the production of TVM system equipment and material, and shall conform to the standards specified in the related sections in this Scope of Work.
- D. TVMs shall be identical to or derived from designs that are service-proven in an operating environment equal to or more severe than will be experienced in the CTDOT service area.
- E. The ~~manufacturer~~ Contractor shall repair or replace without charge, manufactured products defective in material or workmanship during the Operation and Maintenance ~~p~~Period.

## PART 2 - PRODUCTS

### 1. MATERIALS

- A. Fare Media/Ticket Stock
  - 1. CTDOT-provided ticket stock may be pre-cut (stacked), roll or fan\_-fold. Plain paper ticket stock will be only used for vouchers, receipts and audit reports. All

other printing of passes/tickets shall use appropriate agency-approved stock. Audit report and receipt stock may be unprinted paper.

2. Ticket stock shall accommodate all fare options. These may include single-trip, round-trip, and multi-trip tickets, as well as day passes, weekly passes, monthly passes, timed-passes and stored-value media. The stock shall accommodate QR-code or barcode printing for interchange with other services, as will be defined at Notice to Proceed (NTP).
3. Tickets shall be vended on pre-printed ticket stock.

#### B. Coin Processing

1. Each TVM shall be equipped with a coin processing unit, consisting of the following coin handling modules: a coin acceptor/verifier, recirculation unit, supplemental change units, a coin vault and a chassis with its associated wiring and electronic devices.
2. The coin processing unit shall accept U.S. nickel (\$.05), dime (\$.10), quarter (\$.25), half-dollar (\$.50), post-1978 dollar (\$1.00) coins, and provide change in the fewest number of U.S. coins as required. Each coin processing unit shall include coin recirculation and provide supplemental change units.
3. The TVM shall reject coins, slugs, and objects other than the above coins and return them to the user. The coin acceptor shall have a verifiable adjustment of its tolerance to accept coins; the adjustment shall be controllable by CTDOT representatives without outside technical support.
4. A single, vertically-oriented coin slot shall be provided. The coin slot shall be closed normally except when a transaction is in process. Design of the coin slot shall minimize the possible entry of foreign objects including liquids and dirt. Where such objects are inserted in the coin slot, the coin tracks and coin acceptor shall have the maximum possible self-clearing ability.
5. Each coin recirculating unit shall:
  - a. Allow use of inserted coins for making of change;
  - b. Require the change to come from the recirculating unit until it is empty;
  - c. Dispense change from the supplemental change units whenever the recirculating unit cannot dispense change. The maximum amount of change to be returned shall be modifiable by CTDOT.
6. Each coin vault shall be key-locked into the TVM and shall be removable from the TVM without tools. Any module containing coins shall not allow access to the coins when removed from the TVM. Access to coins stored in the vault shall be granted only with separate keys, different from those allowing removal from the TVM. Two (2) coin vaults shall be provided for each TVM. One (1) vault shall

normally be in service in each TVM. The second vault shall be used in rotation for revenue collections.

7. It shall be possible to disable the coin acceptance processing from service and allow the TVM to remain in service for bill operation. Additional spare coin vaults shall be required for use during service and maintenance of the two (2) base vaults for each TVM. Each vault shall be fitted with a device that is encoded with a number unique to that container. The device shall be used by the TVM to automatically identify the vault serial number. In addition, each vault shall be individually identified by a unique, permanently inscribed serial number; the inscribed serial number shall be identical to the encoded number.
8. The total amount of coins by denomination deposited into a vault shall be continually monitored. This monitoring shall allow the contents to be reported when the vault is replaced and prevent the vault from overflowing without warning.
9. Any unit of the coin system shall be removable and, when removed, the TVM shall remain in service for bank note transactions.

#### C. Bill Note Recycler

1. Each TVM shall be equipped with a bill/note recycling unit, consisting of the following bill handling modules: bill validator, bill dispenser/recycler, bill loader, bill escrow module, bill vault, and a chassis with its associated wiring and electronic devices. The validator and dispenser may be one (1) module.
2. Each unit shall accept at least twelve (12) different types of U.S. bank notes inserted in any of the four (4) possible length-wise orientations. The bill-processing unit shall be capable of accepting each current variant of one, five, ten, and twenty dollar bills and store all currency that is accepted once the TVM has begun processing a ticket. Two ~~(2)~~ dollar (\$2.00) bills are not required to be accepted due to the limited circulation of this bill. A capability for accepting \$50 and \$100 bills is desired for future operational flexibility, but this capability must be able to be enabled or disabled by CTDOT.
3. The bill dispenser module shall be capable of dispensing bills as change in a single stack. The bill dispenser shall have capacity to recycle at least 20 bills. The bill dispenser shall escrow and recycle \$1 and \$5 notes, with modularity allowing future expansion to also recycle \$10 and \$20 denominations.
4. The bill dispenser shall be capable of dispensing notes from a pre-loaded vault that holds a minimum of 100 notes. The pre-loaded bill vault shall be keyed the same as the payment collection vaults. A mechanism shall be in place to purge all



- or a portion of the pre-loaded notes into the collection vault, for easier vault collection.
5. The bill validator module shall reject foreign objects, foreign bills and notes and counterfeit U.S. notes, as well as bills not in acceptable condition. The TVM shall continue to remain in service for coin operation if bill acceptance is failed. A single horizontal slot shall be provided for accepting and returning bills.
  6. Bills shall be vaulted separately from the coinage, and stacked. Each bill vault shall have a minimum capacity of 500 stacked bills in street condition. Each bill vault shall be key-locked into the TVM and shall be removable from the TVM without tools. Any module containing bills shall not allow access to the bills when removed from the TVM. Access to bills stored in the vault shall be granted only with separate keys, different from those allowing removal from the TVM. Two (2) bill vaults shall be provided for each TVM. One (1) vault shall normally be in service in each TVM. The second vault shall be used in rotation for revenue collections.
  7. Additional spare bill vaults shall be required for use during service and maintenance of the two (2) base vaults for each TVM. Each vault shall be fitted with a device that is encoded with a number unique to that container. The device shall be used by the TVM to automatically identify the vault serial number. In addition, each vault shall be individually identified by a unique, permanently inscribed serial number; the inscribed serial number shall be identical to the encoded number.
  8. The total amount of bills by denomination deposited into a vault shall be continually monitored by the System. This monitoring shall allow the contents to be reported when the vault is replaced and shall prevent the vault from overfilling without warning.
  9. Time from bill insertion to bill -stacking shall be five (5) seconds or less. The bill validator module shall have a 95% first pass acceptance rate.

#### D. Credit/Debit Card Processing

1. A triple -Data Encryption Standard (DES) compliant BCP shall be provided in each TVM. The BCP shall consist of a bank card reader, a PIN pad and card control electronics, and it shall be capable of processing all electronic payment media accepted by the fare system, including: credit, debit and check cards. The BCP shall include: a keypad for entry of PIN codes for debit transactions and Address Verification Service (AVS) zip codes for credit transactions, a card reader and a receipt printer meeting applicable requirements associated with debit/credit card transactions.

2. Acceptance of debit cards is to be a DCRS configurable item.
  3. Credit/debit card velocity limits (maximum transactions within a twenty-four (24)   -hour period) shall be DCRS configurable items. These limits shall be enforced locally at each machine.
  4. TVM shall provide required cardholder   -activated terminal indicator as required by a third party clearing house.
- E. Ticket and Pass Issuing Unit
1. The TVM shall issue the vended ticket via a weather   -protected return bin designed to minimize the possibility of jamming and vandalism.
  2. The Contractor shall specify limits of ticket stock size, weight, and thickness as part of the PDR phase.
- F. Printing Unit
1. The TVM shall be equipped with a printer or printers capable of printing, encoding, activating encoding, cutting, and issuing all ticket/pass stock feeds once the purchase is made. In addition, the TVM shall be equipped to print and issue customer receipts and audit tickets for accounting and reconciliation requirements of CTDOT. Ticket font and format must comply with CTDOT specified ticket format, to be supplied within sixty (60) days after ~~of~~ NTP.
  2. Depending upon ticket type, the printer shall be capable of printing, at a minimum, the following information on each ticket:
    - a. Expiration time (settable) in twelve (12)   -hour notations, including “AM” or “PM” designation;
    - b. Month, day, and year of purchase;
    - c. Station name where purchase was made;
    - d. TVM number — up to five characters/digits;
    - e. Ticket type (including origin/destination as appropriate);
    - f. Amount of fare paid; and
    - g. Ticket serial number.
  3. Occasional ticket print format modifications or additional ticket types for sale from the TVMs will be required. The System shall be designed and built to be modifiable by CTDOT or its representatives. Ticket printing format, including information to be printed, print location, orientation, size and font, number of tickets per transaction and per cut (such as the size of strips when multiple tickets are sold), and encoding information shall be controlled by programmable software and the required print file shall be capable of being downloaded to the TVMs from the DCRS.

4. If enabled by CTDOT through the DCRS configuration, upon customer request a receipt shall be printed containing the same information as printed on the ticket. Blank stock shall be used for this receipt.
5. Upon authorized technician request, the TVM shall produce audit tickets. At a minimum, the following audit tickets shall be provided:
  - a. Re-circulating coin replenishment;
  - b. Coin vault removal/insertion;
  - c. Coin hopper removal/insertion;
  - d. Bill vault removal/insertion;
  - e. Recovered money inserted;
  - f. TVM current status;
  - g. TVM revenue status;
  - h. TVM daily sales history; and
  - i. TVM diagnostics.

G. Return Bin

1. The opening for the ticket/coin return bin shall be recessed and covered with clear polycarbonate spring-loaded or weighted door that opens inward, and which does not present a pinching hazard when opened and closed by customers. The door shall be at least 0.25 inches thick and completely cover the opening when closed. The bin and its door shall be robust, scratch-resistant, and visually prominent. The geometry of the bin and its door shall minimize intrusion into the machine while the ticket/coin return bin door is open. The bin shall be designed to drain any liquids placed in the bin to the outside of the TVM. The preferred minimum height of the centerline of the ticket/coin return bin is at least 24 inches from the finished floor and in compliance with the ADA-AG.
2. As soon as a customer has completed payment for a transaction or a transaction is canceled that results in coins being deposited in the ticket/coin return bin, a light in the ticket/coin return bin shall begin flashing. The ticket/coin return bin light shall continue flashing until ten (10) seconds after all tickets and coins have been deposited there by the TVM, or until the next transaction is initiated, whichever occurs first.

H. TVM CPU

1. The CPU for the TVM shall be rated to meet the anticipated internal TVM environmental characteristics.
2. Equipped with at least three (3) USB ports or other approved computer access allowing service personnel to download statistical information manually and to allow for future upgrades.

3. The program controlling the TVM functions shall process all fare transactions, alarms and service requests with sufficient speed so that normal business activities are not impacted by delays attributable to slowness of the TVM processor.
  4. Local storage capacity shall be sufficiently large to store a minimum of ten (10) days of data related to transactions, alarms, service requests, and such other information as CTDOT may require~~etc.~~ Sales and configuration data shall also be backed up to a separate solid-state device.
  5. Components of the CPU shall be heavy duty items, commercially available ~~items~~ from more than a single source.
- I. Customer Interface Display
1. A trans-reflective, back-lit liquid crystal display (LCD), or functionally equivalent screen bearing simple, basic instructions shall sequentially instruct the customer as to the purchase of any ticket or pass available for sale by the TVM.
  2. Displays must be fully legible in bright sunlight and shall provide a viewing angle of least 45° from perpendicular in all directions.
  3. The display shall use dark characters on a light background. Characters shall be at least 0.75 inches tall and be of sufficient contrast to make them easily readable in all ambient light conditions.
  4. Context-sensitive ADA compliant voice messages shall provide the information shown on the display or otherwise conveyed through the TVM.

J. Lighting

1. The TVM shall be equipped with an illumination unit that shall illuminate the front of the TVM when the ambient light conditions are low; a photoelectric eye shall control this light.
2. There shall be a light inside the TVM cabinet to aid maintenance and service personnel, and it shall illuminate each time the cabinet door is opened.
3. Each TVM shall include a yellow status indicator visible from the front of the machine which will blink to indicate a malfunction.

K. TVM Cabinet

1. All enclosures shall be corrosion resistant utilizing National Electrical Manufacturers Association (NEMA) 4X enclosures, painting, or other coating. Exterior devices (bill acceptor, pin pad, etc.) shall be sealed to the cabinet in such a manner that the seal (but not necessarily the device) also meets NEMA-4. Devices shall be affixed to the TVM cabinet in a fashion which prevents tampering with the door closed.
2. All enclosures will be U.S. -based UL certified. The UL certification must be clearly visible and affixed on the enclosure by the manufacturer and/or installer.
3. The System equipment shall be capable of being anchored into locations other than station platforms, such as building floors, mezzanine floors, and on concrete slabs and a stand-alone base.
4. Contractor shall securely install and anchor the System equipment into the station platforms (a minimum of six (6) inches deep) using approved stainless steel drop -in anchors. Conduit for the System equipment shall be provided by the CTDOT contractor responsible for station construction at the new stations. Pull strings must be available for ease of cable pulling. The Contractor shall provide a mounting template to the CTDOT contractor responsible for station construction.
5. TVM pedestals shall be interchangeable among all of the TVMs supplied. At the point of connection, the pedestal shall be flush with the TVM. The TVM shall be ADA compliant with a minimal height pedestal. Where multiple machines are at one location, some machines may be raised approximately 20 inches to provide a better user experience for median height customers.
6. The TVM shall have a heating unit installed, sufficient to ensure card stock and equipment condition.
7. The TVM cabinets shall form an integrated structure capable of resisting, without permanent deformation, fatigue, failure, or undue wear, and other stresses

inherent in the type of service for which this equipment is intended including 200 lbs./ft.<sup>2</sup> applied horizontally in any direction at the top of the machine cabinet.

8. The open TVM door hinges shall be able to withstand a concentrated vertical force of one hundred and fifty (150) pounds applied at the extreme outer edge of the door without causing damage or deformation of any part of the door or TVM cabinet. When opened, the cabinet shall be designed to eliminate external environmental conditions from entering into the cabinet, i.e. rain.
  9. Except for plastic panels and covers, the System equipment shall resist without damage a kick or punch resulting in a concentrated load of 200 lbs./in.<sup>2</sup> while the equipment is operating and outer door is secured.
  10. System equipment, including all its installed components, shall remain in operation and survive vibration of 0.6g, 5 to 60 Hz along each of three (3) mutually perpendicular axes.
  11. The TVM cabinets shall be completely unitized. All sections (excluding the leveling pedestal and light fixture) shall be suitably welded together.
  12. All System equipment shall be so arranged to distribute the equipment weight over the mounting base evenly. Equipment and System components requiring frequent inspection, maintenance or adjustment shall be readily accessible and replaceable.
  13. The mounting base and housing shall be incorporated into the unitized cabinet so that maximum use of metal consistent with good engineering practices can be obtained incorporating high strength, low weight features, and so that all System equipment is able to be installed on a fully interchangeable basis.
  14. All cabling and conduits shall be properly labeled and sealed.
- L. Keys and Locks
1. Controlled key locks shall be furnished to implement a minimum of three (3) levels of security. The locks to each access on any TVM shall be keyed differently according to function. However, all TVMs shall be keyed alike for maintenance and revenue servicing. The levels defining the hierarchy of access are: ~~full access is level A, very limited access is level C.~~
    - LEVEL A = MAINTENANCE CREW AND ADMINISTRATIVE PERSONNEL
    - LEVEL B = REVENUE SERVICE CREW
    - LEVEL C = MONEY PROCESSING CREW AT REVENUE FACILITY
  2. Access to each TVM shall be by a high security lock designed to minimize vandalism and theft. All locks shall be flush mounted.
  3. All keys shall be secured and logged by the Contractor.

4. The Contractor shall provide the capability to have different sets of TVMs keyed differently.
5. Access and security methods may be proposed by the Contractor prior to or as part of the PDR phase, and are subject to CTDOT's review and approval.

M. TVM Power Supply

1. TVM shall have an accessible main power switch internal to each enclosure or pedestal for removing all power from the unit.
2. The TVM shall protect itself from external power surges. The surge device shall conform to UL 1449 and not utilize "crowbar" electronic components such as Thyristors, Triacs or similar acting devices.
3. The TVM shall safely cancel active transactions and gracefully shutdown upon loss of external power. The TVM shall automatically restart once power is resumed.

N. TVM Computerized Access

1. The TVM shall be programmed with individual codes and corresponding security codes, which shall restrict the actions taken by the individual based on his or her authorized activities. A detailed description of the TVM access method, security codes, restrictions per security code, and security code database content and modification procedures shall be provided for CTDOT review and approval as part of the PDR phase.

O. Maintenance Test Workstation

1. A minimum of one (1) TVM, consisting of spare fare collection equipment parts, shall be maintained in an operating condition at the Contractor's maintenance and test facility to be located within fifteen (15) miles of the CTDOT offices at the New Haven Union Station, hereinafter referred to as the Maintenance Test Workstation ("MTW").
2. A computer terminal shall be provided to CTDOT, at the MTW location, that provides access to the DCRS.
3. The MTW shall be used for troubleshooting TVM systems, testing fare collection tables before deployment and testing design changes of TVM equipment and fare media.
4. The MTW shall be capable of operating in a credit card processor sandbox configuration. In this mode transactions can be completed by keying a special code on the pin pad. This mode shall only be available on the TVM used in the MTW.

P. DCRS – General

1. DCRS is to be located at a third party server host, to be approved by CTDOT. The DCRS shall be accessible to CTDOT via remote web-browser access over a secure internet connection.
2. Contractor shall provide a DCRS that accommodates ~~Suitable provision shall be provided~~ for a reasonable expectation of growth in the number of transactions processed; over the duration of the Operation and Maintenance Period provided for the resulting need in increased memory capability and back-up storage media or devices.
3. An archive of all DCRS data shall be provided to CTDOT ~~on a monthly basis~~, at CTDOT's request, in monthly increments or as otherwise required by CTDOT in a form that is easily importable into escrowed DCRS software.
4. A conceptual description of DCRS hardware and software shall be submitted at the PDR for CTDOT review and approval. This shall include a conceptual description of the DCRS application software, user interface, database tables and backup methodology.
5. Final DCRS configuration and hardware selection are subject to CTDOT approval. The use of third party supplied virtual machines may be proposed by the Contractor.
6. The DCRS shall perform all required functions to upload and download information from and to the TVMs.
7. All computer hardware shall be readily obtainable from multiple sources and not require any proprietary components available only from the Contractor.
8. The DCRS shall be of sufficient power and speed to perform its required functions. These shall include:
  - a. Collect, process, and store all data generated by all TVMs each day;
  - b. Generate daily reports as scheduled and on demand;
  - c. Respond to users' queries (via remote internet connection) in a timely manner;
  - d. Pass alarm information to the workstations;
  - e. Poll each TVM to determine the status of DCRS-to-station communication; and
  - f. The DCRS shall be capable of transmitting, receiving, processing, and storing data in all possible scenarios, including:
    - 1) Simultaneous (asynchronous) receipt of data from all stations;
    - 2) Simultaneous receipt of data from one or more stations while data is being transmitted to one or more stations;



- 3) Simultaneous receipt and/or transmission of data to/from TVMs while receiving report queries from, or performing other functions directed by DCRS users, etc.
9. The back office data processing functions/servers will consolidate all data into a data stream that is acceptable for CTDOT's fare accounting process. The data from the TVMs will be collected into a relational database that can be read from a CTDOT system, with reports available on demand.
10. A separate server shall be provided for credit/debit processing to a third party processor.

Q. DCRS - TVM Configuration Management

1. All configuration files and operational parameters of the TVMs shall be managed by DCRS. No change to these files or parameters shall be transmitted to any TVM without a record of the change being generated.
2. The DCRS shall store all changes made to all configuration files and operational parameters and allow for historical review of no less than the previous 200 changes made. Records of each change to TVM configuration files and operational parameters shall include the user responsible for the change, the date and time the change was made, the TVMs to which the change was transmitted, and the date and time of transmission.
3. Methods to alter configuration files and operational parameters shall not require the user to edit fields with a text editor, but shall instead utilize preformatted input forms supported by the relational database.
4. As required in this Scope of Work, some operational parameters shall be capable of being downloaded to any single TVM, any specific group of TVMs, and all TVMs.
5. The configuration files and operational parameters to be managed shall include at the minimum the following information:
  - a. Station names;
  - b. TVM locations and types;
  - c. Fare tables;
  - d. TVM ticket print format;
  - e. Display screen configuration;
  - f. Operational parameters such as timeouts, vault full levels, accepted bill denominations, etc.;
  - g. Event descriptions, categories, and priorities;
  - h. Cash handling device (such as vault, hopper) serial numbers in System;

- i. Digitally recorded voice message file assignments (when to play which message and in what language); and
    - j. Technician identification and access codes.
  - 6. Each TVM shall have the capability of being controlled by an authorized user, based on password/user ID security via the DCRS, to perform the following functions:
    - a. Put a TVM in service or out of service;
    - b. Cause the TVM to perform self-diagnostics of any selected module or all modules;
    - c. Reset the TVM (such as cause the TVM to restart all programs without affecting data registers); and
    - d. Enable or disable any payment mode.
- R. DCRS - Voice Messaging System Management
  - 1. The voice message system shall utilize either stored human speech or synthesized speech using AT&T Natural Voices<sup>®</sup> software or CTDOT approved equal.
  - 2. The DCRS shall provide software tools to manage the assignment of all voice messages to each step of all TVM transactions.
  - 3. Management of voice messages shall also permit assignment of new voice messages to additional ticket types created by CTDOT, and to delete voice message assignments for ticket types that are discontinued by CTDOT. Each voice message file shall be individually tracked and managed. Voice message management is supported for English, Spanish and two (2) additional languages. Pre-recorded voice messages shall be uploaded in audio formats such as WAV or MP4, or other as approved by CTDOT at the PDR.
- S. Software
  - 1. Software for the DCRS shall consist of current commercial versions of CTDOT-approved operating system software, relational SQL, database management software, and other applications needed to perform the DCRS functions. In addition, proprietary application software shall be supplied as necessary, and all software programs shall be configured for optimal performance of the DCRS, TVM and associated networks. All proprietary software, software source code, and compilers shall be submitted for escrow per the requirements of CTDOT set forth in Part 3, section 1 A.1.
  - 2. The DCRS shall be accessible from any CTDOT computer with internet access. There shall be an unlimited number of user IDs and a minimum of fifteen (15)

- concurrent licenses of any and all software used to access the DCRS system. All licenses shall be perpetual.
3. The method of securely connecting to the DCRS shall be submitted for review and approval at the PDR phase.
  4. Contractor shall provide~~Furnish~~ printed technical and user documentation of all software provided. All required software licenses, including, but not limited to, any third party software licenses, shall be identified and, upon expiration of the Operation and Maintenance period, unconditionally provided to CTDOT without expiration at no additional cost. The Contractor shall arrange for all software licenses to be provided in the name of, or assigned to, CTDOT upon expiration of the Operation and Maintenance period.
  5. DCRS Application Software
    - a. Application software for the DCRS shall consist of proprietary software programs, configuration files used to customize user interfaces and other operational characteristics of the DCRS, prepared reports and queries, special software tools, other commercially available software packages, and any other special functions resulting from software provided as part of the DCRS.
    - b. All DCRS application software shall be remotely accessible to CTDOT representatives over a secure internet connection. Dynamic displays, such as the real-time status and event monitoring, shall be updated at least every fifteen (15) seconds. No routine functionality shall require an individual to be physically present at the DCRS.
    - c. Real-Time Status and Event Monitoring
      - 1) As on-line events are reported to the DCRS, a graphical summary of the status of TVMs shall be updated and maintained by the DCRS. Using graphics of sufficient detail to create a recognizable pictogram of the CTrail Hartford Line regional map showing all stations, the DCRS shall provide current status information to a connected workstation. Provision shall be made for all future additions of territory and TVMs to the pictogram.
      - 2) The DCRS shall indicate system status in five (5) levels of detail. At the highest level, the pictogram shall show all stations and shall depict the status of station equipment and communications by the use of colors defined as:
        - a) Green: - All equipment at station functioning normally;

- b) Blue: - Access in progress or attention needed at one (1) or more TVMs (This must result in a priority 3 alarm going into effect);
  - c) Yellow: - One (1) or more TVMs malfunctioning, being out of service, not communicating to DCRS as expected ~~on failure~~, or being off-line (This must result in a priority 2 alarm going into effect);
  - d) Red: - Security alert – such as intrusion, impact, or silent alarm, ~~etc.~~ (This must result in a priority 1 alarm beinggoing in effect);
  - e) White: - No connected equipment at station.
- 3) When a station has more than one (1) alarm in effect, the station shall be shown in the color of the highest priority alarm. For example, if a station has one (1) TVM out of service and an intrusion alarm at another TVM, the station shall be shown in red.
  - 4) When a workstation user selects a station, a schematic diagram of the equipment at the station shall be displayed, using the same color scheme described above to indicate the status of each TVM.
  - 5) When a workstation user selects a specific TVM from the second level of status display, detailed information about the item status shall be displayed in text form.

d. Data Polling and Event Recording

- 1) Polled data shall be available on demand and from automatic polling at a pre-selected frequency and time (such as ‘each day at 2 AM’ or ‘every 15 minutes between 4 AM and 6 PM’). Received data shall be automatically processed and populated into all pertinent databases.
- 2) The DCRS shall record the date and time each TVM was last polled.
- 3) Polling of TVMs shall provide the following:
  - a) Cash in TVMs by coin and bill denomination in all cash storage devices;
  - b) TVM status and status of all modules, as defined in Part 3, Section B.3.c;
  - c) Sales since last polling, separated by ticket type per day and by cash and bank card (if a cash/bank card TVM option is exercised);
  - d) Cash removed from and added to the TVM since last polling;
  - e) All events recorded but not previously transmitted to DCRS;
  - f) Date and time synchronization;
  - g) Downloading data and configuration files.

- e. From any internet accessible CTDOT device that is connected to the DCRS, based on password/user ID security, any authorized user shall be able to download to any single TVM, any group of TVMs and all TVMs:
  - 1) Fare tables;
  - 2) Security access codes;
  - 3) Configuration files;
  - 4) Operational parameters;
  - 5) New and updated ticket layout and text;
  - 6) New and updated customer display screen text;
  - 7) New and updated voice message files; and
  - 8) Any other information necessary for the operation and maintenance of the TVMs.
- f. It shall be possible for any authorized user to specify the date and time when any data download is to occur, and to review and cancel any previously scheduled download.

T. DCRS - Database Queries and Reports

- 1. The software shall provide the capability to query the database to produce a series of information reports for auditing, cash and ticket control, and fare management information.
- 2. Relational Database Manager (RDBM)
  - a. The DCRS shall store all pertinent data relating to the operation of the TVM System in one or more relational databases. These databases shall be managed by a commercially available software package that shall be subject to CTDOT approval at the PDR phase. The database manager shall support standard SQL commands and queries, and shall be of sufficient flexibility and power to perform the necessary functions described herein.
  - b. The RDBM software package shall include the necessary add-on tools to allow customization of reports, creation of queries, and generation of reports in graphical format. All databases shall store data in a format that complies with Open Database Connectivity (ODBC).
  - c. The RDBM shall be utilized to configure all necessary database tables, relationships, queries, reports, data entry forms, and automated data population procedures.
  - d. The RDBM shall be remotely accessible by CTDOT representatives over a secure internet connection.
- 3. Query, Report, and Database Input Forms

- a. These input forms shall be displayed on the user interface and provide “fill-in-the blank” simplicity of use. Each blank on the input form shall correspond to a field in the associated database table.
  - b. Each query and report shall have an input form to enter data necessary to perform the task. Each input form shall be customized to the task being performed, and all shall follow similar layout and design themes.
4. Query and Report Output Format
- a. To the extent possible, the output format of all queries and reports shall be of similar style. Each report and query shall produce data in tabular format with each column clearly titled on each page. Each row of output data (excluding column titles) shall be consecutively numbered.
5. Queries and Reports to be Provided
- a. The System will provide a minimum of twenty (20) queries and reports at time of DCRS delivery. The prepared queries and reports shall be presented in a menu form for selection at any time. Each query and report shall have access permissions assigned to limit availability to those users authorized to view data presented by the query or report.
  - b. Each prepared query and report shall also be capable of being automatically processed at predetermined dates, times, and frequencies. It shall be possible for CTDOT to identify reports to be run daily, weekly (for example, every Wednesday), monthly (such as the first day, last day, or any specific day of each month), quarterly, and so on. The System shall further support these reports being automatically emailed to a configurable mailing list.
  - c. The queries and reports to be provided at time of delivery ~~can be~~ are grouped into four (4) major categories:
    - 1) Summary Reports, which provide an historical view of data within a date range. These reports shall include detailed information and/or totals of related events or transactions, and shall indicate the polling status of each TVM listed or the overall polling status of TVMs included in the report if TVMs are not listed individually. This shall include fields such as sales data, transaction times, number of abandoned/cancelled transactions and records of other conditions and events which should be logged as agreed upon during Design Reviews.

- 2) Status Reports, which provide “snapshots” of TVM conditions, including but not limited to the most recent data available. All status reports shall list the date and time each TVM was last polled.
- 3) Database Reports, which provide printouts of configuration files, operational parameters, and other data used to determine operations of the TVMs. Database reports shall indicate the date and time the database table being shown was last modified and by whom.
- 4) Comparison Reports, which provide that ability to compare and contrast prior year, month, or week with the current period to provide metrics to key CTDOT decision makers. The time frame shall be selectable by CTDOT authorized users without any involvement required on the part of the Contractor.

6. Query and Report Customization

- a. Software shall be provided to enable authorized users to prepare new or modified queries and reports with minimum of programming knowledge. Such customized queries and reports shall be capable of being executed as they are created, and shall be capable of being added to the menu of prepared queries and reports. When added to the prepared query and report menu, customized queries and reports shall be treated by the DCRS the same as any Contractor -supplied query or report. Authorized users shall also be able to edit and delete any prepared query or report on the selection menu.
- b. For experienced programmers, the DCRS shall permit the use of SQL commands to create specialized queries.
- c. After System acceptance, for the first twelve (12) months of revenue service, Contractor shall provide technical assistance to CTDOT as necessary to modify or create up to forty (40) additional CTDOT specified queries and reports.

7. Polling Status and Output Data Validity

- a. The validity of reported data shall be indicated on each query and report where necessary. Data validity shall be determined by whether the TVM or TVMs included in the report or query have been polled since the end of the reporting interval. For example, if CTDOT wants a report for tickets sold as of today at noon:
  - a) TVM #1 was polled at 1 PM, so it has data for noon – VALID

b) TVM #2 was last polled at 11 AM, so it has no data for noon – INVALID

b. If a TVM has not been successfully polled since the requested query and report end times, the query and report shall clearly indicate that the data is not valid due to faulty polling status. Where a query or report list data by individual TVM, each item shall indicate the validity of the data. Where a report or query summarizes data from more than one (1) TVM, the validity of the data shall be indicated on the report and shall be based on whether data from all TVMs included in the report has been received since the end of the reporting interval.

U. DCRS - Alarm Monitor

1. The System shall transmit current alarm and security conditions.
2. The DCRS shall display alarm conditions to active workstations and re-display alarm conditions as required in the event of non-receipt of a verification notice from the workstation operator.
3. Communications failure alarms detected by the DCRS shall be treated as yellow system status, priority ~~two (2)~~ alarms, as set forth in Part 2, Section 1.S.5.c.2 c.
4. All events that trigger and clear alarms (audible sirens) shall be transmitted by the DCRS to the workstations.
5. If an “outer door open” event is received by the DCRS and a corresponding “entry authorized” or “entry unauthorized” message is not received within a DCRS configurable time (default forty-five (45) seconds prior to detection of door opening and one (1) second after detection of door opening), the DCRS software shall assume that an intrusion is in progress and shall transmit such an alarm to the workstations.

V. DCRS - Equipment Modification and Configuration Control

1. A database shall be included in the DCRS that tracks the subcomponents within each TVM. An input form and database report shall be provided to CTDOT for this database.
2. The configuration control records shall include an identification serial number and nameplate information, of each major component and part installed and assembled in each TVM. The configuration control records shall also include software and firmware revision levels of all major serialized components. Training in the management and maintenance of this database shall be held prior to TVM equipment installation.

W. DCRS - Network Administration



1. DCRS software shall perform all necessary administrative functions for the DCRS network.
2. The Contractor is to provide all necessary tools to allow CTDOT to efficiently administer the DCRS computer and TVM connections.

X. Network Security

1. Access to the System shall utilize a secure connection between all System devices and to out-of-network workstations. System network security shall comply with PA-DSS. Unauthorized users shall not be able to alter or view data. The network environment shall be secure, in accordance with ANSI X9.24, Retail Financial Services Key Management.
  - a. Network design shall be sufficient to justify segmentation of the IP network out of PCI-DSS Cardholder Data Environment (CDE) scope. Techniques such as Point-to-Point Encryption (P2PE) are expected to be used to accomplish segmentation.
  - b. Access to the System shall be login and password protected, with various levels of passwords as appropriate to ensure a secure database.
  - c. All unused port numbers shall be disabled in software.
  - d. Users shall be assigned passwords based upon the security level requirements associated with their specific functions.
  - e. Passwords shall be modifiable only by the password owner and by use of a master password.
  - f. Password databases shall be encrypted so that they are not readable by displaying the contents of the database.
  - g. Entered passwords shall be masked on the display monitor.
  - h. Revenue data, such as sales and transaction data, and vault contents data shall not be alterable by anyone.
  - i. The DCRS shall store data describing all TVM configuration changes, including who made the change, the date and time of the change and the configuration of the TVM prior to and after the changed configuration.

2. **FABRICATION**

Not applicable.

3. **INSPECTION AND TESTING**

- A. The Contractor shall conduct a full program of testing, the purpose of which shall be to demonstrate the System fulfills all of the specifications and requirements as set forth herein. All systems, components, installation, and any associated workmanship or

materials are required to be reviewed, tested, and accepted prior to turnover of the System to CTDOT. The Contractor shall test and verify that all functional requirements set forth in the specification have been met by the System.

- B. Acceptance Test Plan: Contractor shall prepare and deliver to CTDOT a comprehensive acceptance test plan that describes all the activities and tasks associated with testing during each test phase – factory, field, and operational, hereinafter referred to as the “Acceptance Test Plan”. The Acceptance Test Plan shall be delivered to CTDOT at least sixty (60) days prior to the start of any testing. At a minimum, the Contractor’s Acceptance Test Plan shall conform to the requirements of ANSI/IEEE Standard 829 and shall contain the following elements:

1. A summary statement of each test phase.
2. A list and schedule of test items to be performed during each phase.
3. A test itinerary identifying each individual test to be performed, the anticipated duration, staffing requirements, the purpose of the test, the method of testing, step-by-step description of the test procedure, the conditions that shall exist at the start of the test, and expected results with pass/fail criteria.
4. A description of the overall test environment including: test equipment details; test equipment configuration sketches and diagrams including cabling requirements; and hardware and software required for the test, including the number and type of devices to be used during the test and/or the method of simulation.
5. A description of the expected outputs (reports, database listings, statistical analyses, etc.) to be provided to document the test results, test incident report forms, and test incident log.

- C. Factory Acceptance Testing (FAT)

1. The Contractor shall perform the FAT. The purpose of the FAT shall be to verify that equipment to be supplied functions as described in these specifications. It shall involve the inspection by CTDOT and/or its representatives, of all major physical components of the System furnished under this ~~contract~~ Agreement as well as testing the functionality in a controlled environment in accordance with the FAT Plan. At a minimum, the FAT shall include, but is not limited to:
  - a. Physical inspection of equipment panels and cabinets for conformance with approved shop drawings;
  - b. Network-based System communications functions;
  - c. Server and workstation performance features;
  - d. Operator and administrator functions, as follows;

- 1) On-site reports;
  - 2) Revenue servicing; and
  - 3) All other operating and administrative functions as required by this specification.
- e. Application Program Interface (API) functions;
  - f. Testing of payment methods (coin, bill, credit, debit);
  - g. Security (entry, keying, alarms); and
  - h. Stress testing as follows:
    - 1) Transactions from sixty (60) simulated TVMs to DCRS; and
    - 2) Automated TVM transactions to demonstrate robustness of mechanical mechanisms for cash return, ticket printing and receipt printing.
2. Prior to the initiation of the ~~factory test~~ FAT the Contractor shall have submitted to CTDOT draft outlines of the hardware, software, and operations documentation, training manuals, and draft outlines of any other documentation that is required for full System operation.
  3. Acceptance of the ~~factory test~~ FAT results shall not relieve the Contractor of the responsibility for the installed System to meet the specifications as set forth herein.
- D. Field Installation Acceptance Test
1. The Field Installation Acceptance Test shall be performed by Contractor on the final installed equipment, properly connected, configured, and interfaced to the actual field devices. Field Installation Acceptance Test shall demonstrate the full and complete functionality of the final, installed System. Simulation may only be used to perform stress and performance testing.
  2. Contractor shall make Preliminary as-built drawings ~~shall be~~ available to CTDOT and its representatives during the Field Installation Acceptance Test so their accuracy can be verified by CTDOT in the field.
  3. Field Installation Acceptance Test shall be conducted by the Contractor and observed by CTDOT representatives. Contractor shall perform each test as described in the Field Installation Acceptance Test Plan in its entirety with the use of actual System equipment. Contractor shall determine the detailed results of each test and shall record the success (pass) or failure of each test.
  4. Acceptance of the field installation test results by CTDOT shall not relieve the Contractor of the responsibility for a fully operational System to meet the specifications as set forth herein.

5. Any repairs, construction, or modifications as required to comply with this Part 2 section 3 shall be performed by the Contractor without additional cost. Contractor shall make changes or perform additional work as CTDOT may direct, for proper performance, functionality, and operation of the System, prior to the start of the 30\_-Day Operational Test.
- E. 30\_-Day Operational Test
1. At least sixty (60) days prior to the commencement of the 30\_-Day Operational Test, the Contractor shall submit a plan for conducting the 30\_-Day Operational Test (Operational Acceptance Test Plan) to CTDOT for review and approval.
  2. Operational acceptance testing shall commence following notification by CTDOT that the results of the Field Installation Acceptance Test are satisfactory and following receipt of the Contractor's certification that the System is ready for the 30\_-Day Operational Test.
  3. The 30\_-Day Operational Test shall be performed on the final installed and configured hardware and software. During the test, normal System use shall be available to all System users utilizing all applicable manuals, printed guides, and procedures submitted by the Contractor. The Contractor shall periodically perform various operations to verify correct System operation. These operations shall be specified within the Operational Acceptance Test Plan.
  4. During the 30\_-Day Operational Test, the System shall be monitored by the Contractor for compliance with the performance standards set forth herein. At the completion of the thirty (30) consecutive calendar days, the Contractor shall demonstrate to a 95% confidence interval that the Mean Cycles Between Failure (MCBF) requirements are met, using a statistically valid analysis as approved by CTDOT representatives. If reliability fails to be demonstrated during the 30\_-Day Operational Test, the test period shall continue to be extended by 15\_-day intervals until the reliability requirements are demonstrated successfully. In parallel, the commencement date of the Operation and Maintenance period of the entire System will also be delayed by 15\_-day intervals without additional fee. Data from earlier test periods shall continue to be included in the analysis unless the Contractor demonstrates, to CTDOT's satisfaction and approval, that specific modifications have been made to the System which are expected to address failures in earlier test intervals.
  5. The Contractor shall perform any re-calibration, re-configuration, or re-programming of the System required as part of the normal operational configuration and to correct any System bug or errors encountered insuring that the System performs in accordance with this specification and required

sequence of operations. All changes performed must be fully documented by the Contractor and shall not be implemented without prior approval by CTDOT.

#### 4. RELIABILITY

- A. Subject to the manufacturer's recommended maintenance practices, the System shall be designed for a minimum service life of fifteen (15) years of operation in the CTDOT service area. All equipment ~~is expected~~ will ~~to~~ operate seven (7) days per week and twenty-four (24) hours per day. The selected manufacturer shall supply parts, materials and service for the entire anticipated service life.
- B. The ticket processing concept proposed by the contractor shall be demonstrated and shown to meet reliability criteria as a System prior to acceptance of the TVM. Ticket System performance shall include transport jams, read-write errors, ease of bezel entry, resistance to moisture, printing of graphics and frequency of repair of replaceable items.
- C. Reliability measures shall be based on a mix of fare media and shall include ticket, coin, bill, credit cards, debit cards and pin pads. One cycle shall be defined as all actions required to obtain fare media.
- D. For the purposes of this Agreement, the measure MCBF shall be used to determine reliability. Failures shall not include acts of excessive vandalism (the equipment shall be designed to withstand minor acts of vandalism), use of out of specification stock, or mutilated coins or bills. The MCBF for the TVMs shall be 10,000 mean-cycles between failures with failure calculated as follows:
1. Full failure: When a TVM is unusable, this will count as one (1) failure.
  2. Partial failure: When a TVM enters a degraded mode (ex: cash or credit only) this will count as 0.5 failures.
  3. Back-office failure: A failure of the back-office that prevents reporting, credit card processing or debit card processing shall count as 0.5 failures for each TVM deployed. The designed Mean Time Between Failures ("MTBF") for the DCRS shall be at least 25,000 hours.
  4. Time-to-Repair: For each of the above failures which are not corrected within two (2) hours, the failure will be listed again against the MCBF. Ongoing failures will not be counted against MCBF from 11 PM to 4 AM.
- E. Contractor shall propose and implement a method acceptable to CTDOT, for a monthly MCBF report to be automatically generated from the DCRS. Modifications may not be made to the contents of this report without CTDOT concurrence.

## 5. DELIVERY, STORAGE AND HANDLING

- A. Contractor shall deliver materials in manufacturer's labeled packages. Store and handle in accordance with manufacturer's requirements, in a facility with environmental conditions within recommended limits.
- B. Contractor shall protect all equipment against damage during transit and storage. All equipment shall be shimmed, braced, blocked, and tied down to prevent distortion or other damage during transportation.
- C. Contractor shall properly store all materials and handle to prevent deterioration or damage due to moisture, weather, temperature, corrosion, contaminants, dirt, vandalism, or other causes.
- D. After delivery to the installation site, a field inspection of the equipment shall be made by the Contractor. If any equipment has been damaged or for any reason does not comply with the requirements hereof, the Contractor shall replace, or, at CTDOT's discretion, repair the equipment at the Contractor's sole cost even though this equipment may have been previously inspected and approved for shipment.
- E. Contractor shall install equipment immediately upon delivery to the installation site. Pre-installation TVM storage shall be at Contractor facility located in Connecticut or a third-party facility in Connecticut, at Contractor's cost.

## PART 3 - EXECUTION

### 1. GENERAL

- A. Software Source Code And Documentation:
  1. The Contractor shall arrange, at its expense, for a complete copy of the software and source code to be deposited with an escrow agent on the date of Final Acceptance of System by CTDOT and shall provide to CTDOT with all information needed for CTDOT to directly access the escrowed software and source code. On that date, the Contractor shall provide CTDOT with written confirmation from the escrow agent that such deposit has been made. Contractor shall arrange for updating the escrow deposit with all modifications and changes to the software and shall deposit a renewed copy of such source code whenever the software has been updated. The source code deposited shall include comments, explanations, and instructions to compile the software, and all software utilities and other materials necessary for use of source code. The costs of the escrow shall be borne by the Contractor and, [subject to Section A.3- below](#), the duration

of the escrow shall be coterminous with the Operation and Maintenance ~~P~~period.

2. The source code shall be released from escrow to CTDOT upon: (a) failure of the Contractor to function as a going concern or operate in the ordinary course; or (b) the voluntary or involuntary bankruptcy of the Contractor. Upon release from escrow, and notwithstanding anything in this Agreement to the contrary, CTDOT shall have the right to use, copy, and modify the source code in order to use and support the software for the System, subject to all license restrictions. Regarding any release to CTDOT of the source code, CTDOT and its authorized representative(s) shall have the right to use the source code in order to use and support the software for the System, including the right to engage the services of a third party to assist CTDOT to use and support the software for the System.
3. Upon termination of CTDOT's Agreement with the Contractor, CTDOT shall have the right to maintain the escrow at CTDOT's expense. If contract termination is caused by (a) failure of the Contractor to function as a going concern or operate in the ordinary course, or (b) the voluntary or involuntary bankruptcy of the Contractor, CTDOT shall continue to be licensed to use the software and the source code to support and maintain the software for the System. This clause shall survive the expiration or termination of this Agreement.

## 2. PRE-INSTALLATION OF TVMs

- A. Surface Cleaning: The Contractor shall clean out openings immediately before installing TVMs and comply with manufacturer's written instructions.
- B. The Contractor shall confirm power circuits are installed and can be activated. The Contractor shall coordinate with other CTDOT contractors as required.
- C. The Contractor shall confirm data cable has been installed and can be activated. The Contractor shall coordinate with other CTDOT contractors as required.

## 3. INSTALLATION OF TVMs

- A. Wire and Cable Installation
  1. The Contractor shall make the proper fiber and electrical connections, including the furnishing of all wire, cable, and other materials as necessary to make final connections.
- B. Finishing Requirements

1. The interface between the bases of the TVM and the station platform shall be sealed with a material approved by CTDOT. The seal shall perform as a durable, attractive, watertight seal and shall be resistant to abrasion, weather, corrosion, staining, and migration. The seal shall not deteriorate in any manner except as indicated in manufacturer's data. The seal shall be installed in compliance with the manufacturer's requirements and recommendations. It shall be possible to remove and replace the System equipment without damage to the platform, anchor bolts, or the equipment.

C. Installation Procedures

1. Not less than 60 days prior to delivery of the first TVM, the Contractor shall submit for CTDOT's review and approval drawings of the equipment installation, indicating details on the equipment installation, and electrical and communications connections. In addition, the installation and removal procedures shall be sufficiently detailed such that CTDOT could perform TVM installation and removal.
2. The Contractor shall demonstrate to CTDOT that they have the necessary labor force and equipment to meet the allowable Project ~~Schedule and~~ Milestones [and Access Constraints](#) set forth in Part 5.
3. The Contractor shall be required to perform temperature sensitive work during the winter months. Therefore, preparations must be made by the Contractor to protect this work from the cold and adverse conditions that the winter months may bring. There will be no additional compensation paid to the Contractor for this work but it shall be included in the general cost of the work.

4. **FIELD QUALITY CONTROL**

- A. [The Contractor shall c](#)Conduct complete inspection and testing of equipment, including verification of operation with connected equipment.
- B. [The Contractor shall t](#)Test devices and demonstrate operational features for CTDOT representative and authorities having jurisdiction, as applicable.
- C. [The Contractor shall c](#)Correct deficiencies until results satisfactory to CTDOT are obtained.
- D. [The Contractor shall m](#)Maintain test records in an orderly manner in accordance with the Agreement.
- E. [The Contractor shall s](#)Submit written copies of test results to CTDOT.



## 5. TRAINING

- A. The Contractor shall only conduct training for CTDOT as is required to utilize the DCRS. This training shall be considered complete when the Contractor trainer certifies that CTDOT personnel who had undertaken the training are qualified to use the DCRS applications. For future use by CTDOT, training materials and manuals shall be provided for all aspects of the System.
- B. The Contractor shall supply training material and manuals sufficient for CTDOT or CTDOT representatives to configure, operate, maintain and repair the equipment and Software supplied. Training material shall be provided such that CTDOT will have sufficient information for any internal or contracted future System service as needs become known. This shall include an overview of the Software organization, required input data and specific Software features developed, and process and procedures for the development and maintenance of fare tables. Features of the System necessary for managerial administration and understanding of the System shall be included in the training either as a specific session or included as a topic within the presentations. The training outline shall also include the final configuration and set up of the production DCRS application, the implementation and testing of the connection with third party clearing house(s) and installation and commissioning of one (1) production TVM. This clause shall survive the expiration or termination of this Agreement.
- C. The Contractor shall supply a training program plan for review and approval by CTDOT during the PDR phase. The training program plan shall include the following information, as a minimum: a general description of the training program; program schedule; and preliminary course descriptions.
- ~~D.~~ The Contractor shall supply, training material outlines, manual outlines and a sample manual chapter for CTDOT review and approval prior to the FAT. The Contractor shall provide draft training materials and manuals no later than three (3) months prior to System installation, for CTDOT comment. Finalized course descriptions, training material outlines, manual outlines and final copies of all manuals, addressing earlier CTDOT comments, shall be submitted prior to completion of the 30\_-Day Operational Test for CTDOT review and approval.
- ~~D.~~ E. Additionally, a TVM operating in a stand-alone manner shall be available during normal business hours for CTDOT personnel and representatives to inspect at a location approved by CTDOT, within 15-miles of New Haven Union Station.
- ~~E.~~ F. Videos of the DCRS training shall be provided for future CTDOT training sessions in a format to be approved by CTDOT. Following the training, the Contractor shall deliver the draft trainer manual for CTDOT review and approval. Contractor shall revise trainer

notes and deliver a final training manual to CTDOT prior to completion of the 30-Day Operational Test.

~~F.G.~~ The Contractor shall provide CTDOT a full set of system maintenance, installation and administration manuals, fare media specifications, parts list, parts list of commonly available items, and supplier information. This shall include two (2) hard copies and an electronic format to be approved by CTDOT at PDR.

~~G.H.~~ The Contractor shall be responsible for the following training program activities:

1. Conducting the DCRS related training sessions, and providing follow-up training as required.

~~H.I.~~ Training Program General Requirements

1. All training presentations and material shall be in English.
2. Instruction shall be tailored to the specific needs of each class of personnel to be trained or familiarized on the system and equipment; e.g., revenue collection and reporting emphasis for revenue personnel and management; general overview for executive management.
3. DCRS training sessions shall occur at CTDOT-designated facilities.

~~H.J.~~ Training Schedule: Training shall be scheduled in coordination with and ~~subject to~~ ~~for~~ approval by CTDOT. The schedule shall be consistent with the following factors:

1. Production equipment and System software are available to support “hands-on” classroom training.
2. Completion of training will occur in time for CTDOT personnel to perform their duties related to the ~~new~~ System prior to System implementation;
3. Lag time between training completion and actual use of skills will be minimal.

~~J.~~ Training Program Plan: The Contractor shall submit a training program plan for review and approval by CTDOT during the PDR phase. The training program plan shall include the following information, as a minimum:

- ~~1.~~ General Description of the training program
- ~~2.~~ Program Schedule
- ~~3.~~ Course descriptions

K. Training Course Curricula and Materials

1. Training shall occur only after CTDOT review and approval of all training course curricula, materials and manuals.
2. The curriculum and training material for each course shall include at least the following:

- a. Course Outline and Lesson Plan: Lesson title, lesson objectives, instructing sequences (outline).
  - b. Instructor Material: Used initially by the Contractor instructors, the instructor material shall be in sufficient detail to enable CTDOT management and supervisors to, in turn, train newly-hired or newly-assigned CTDOT personnel.
3. At the completion of all training courses, one (1) set of training material originals suitable for reproduction, shall be delivered to CTDOT.
  4. Final materials shall be provided in a format that is modifiable and reproducible using standard Windows – Office software.

~~L.~~ Training Courses

- ~~1.~~ The Contractor shall conduct training classes on DCRS usage.

~~M.L.~~ Manuals – General

1. The Contractor shall provide a complete documentation plan to CTDOT, identifying all manuals required for the operation and maintenance of the System and the development and delivery schedule for submission of each manual to CTDOT. All manuals are to be written in English.
2. The manuals shall be complete, accurate, up to date, and thoroughly cross-indexed with no extraneous material such as advertisements or irrelevant information.
3. Manuals shall be bound in hard or flexible covers. Illustrations shall be clear; and printed matter, and shall be legible. If reduced drawings are incorporated into manuals, original lines and letters shall be darkened as necessary to retain their legibility after reduction. Larger drawings may be folded into manuals to page size but in no case shall be larger than 18 inches by 24 inches. Any reproduction shall be of near-perfect quality. No blotched or illegible areas on any reproduction are allowed. These materials shall also be submitted to CTDOT electronically in original format, as approved by CTDOT at the PDR phase, and in PDF format.
4. All manuals are to use nomenclature, symbols and designations common to those found and approved by such bodies as IEEE, which are common to the U.S. work place. References to supplemental information shall be included where necessary. All manuals shall include final as-built, single-line diagrams, cable/conduit labeling information and panel schedules.
5. Manuals shall be assembled so that a person possessing reasonable intelligence and skill could take the manual and maintain or operate the specific system or equipment without difficulty or requiring assistance from other sources.

6. Manuals furnished may be manufacturer's standard publications in regard to size and binding provided they comply with the specified requirements relative to quantity and quality of information and data and upon approval by CTDOT.

~~N.~~M. Operating Diagrams

1. Electrical wiring diagrams and other diagrams necessary for operation of the equipment shall be provided for System equipment.
2. No single diagram shall show more than one system or parts thereof.
3. Diagrams shall be reproduced by photographic process to a size not to exceed 18 inches by 24 inches and shall be complete and legible in all respects. Systems shall be subdivided into portions, which are operable from location where diagrams are installed, and to provide intelligible information within specified size. Other formats which are equal in clarity, sharpness, durability, and permanence will be considered.

~~O.~~N. TVM Manuals

1. TVM Operating Instruction Manual – shall contain all information needed for safe, proper, and efficient operation of the TVMs. Manuals shall include general orientation and familiarization information for all features of the TVM. Detailed information shall be provided regarding location, function and operation of all controls, indicators, switches, hardware and reset buttons, and trouble diagnosis. All normal operational sequences shall be described in detail. This manual shall also describe how revenue servicing and data reconciliation will be handled if the area's communications network has failed.
2. TVM Preventive Maintenance Manual – shall contain all information needed to enable maintainers to perform all periodic inspection and preventive maintenance tasks including all routine lubrication, inspection and replacement of consumable items. The manual shall contain recommended preventive maintenance schedules grouped, as much as possible, into compatible and convenient intervals of time, or operating hours. If binder size limitations permit, this manual may be combined with the TVM Corrective Maintenance Manual.
3. TVM Corrective Maintenance Manual – shall contain all information needed to enable maintainers to diagnose problems, and to make adjustments and repairs to all TVM components and sub-assemblies. Repairs include adjustments, repairs or replacements prescribed to restore the TVM components and subassemblies to a normal operational condition in an efficient and timely manner. The manual shall also include:
  - a. A general description of each subsystem, component and subassembly;

- b. Procedures to exchange all major components;
  - c. Functional block diagrams;
  - d. Detailed schematics;
  - e. Wiring diagrams; and
  - f. Pictorials with exploded views to permit easy part identification.
4. TVM Shop Repair and Overhaul Manual – shall contain a detailed description of each assembly and subassembly to enable maintainers to service, maintain, repair, replace, rebuild, and overhaul the TVM. If binder size limitation permits, this manual may be combined with the TVM Parts Manual. The manual shall also include:
- a. Circuit board diagnosis and repair procedures;
  - b. Complete systematic procedures;
  - c. Wear and tolerance limits for determining when overhauls are needed;
  - d. Overhaul procedures for all major components;
  - e. Special tools and equipment required; and
  - f. Pictorials with exploded views to permit easy parts identification.
5. TVM Parts Manual – shall enumerate and describe every TVM component with its related parts, including the supplier's number, the Contractor's number, and provision for entry of CTDOT stores number. The manual shall also include:
- a. A complete list of spare parts with vendor's name, contract, part number and current price list as of six (6) months prior to installation;
  - b. Cut-away and exploded drawings to permit identification of all parts not readily identified by description;
  - c. Parts common to different components, such as screws, shall bear the same Contractor's number with reference to the other components where they are found;
  - d. Each part or component shall be identified as being part of the next assembly;
  - e. Commercially available items such as standard fasteners, fuses, lamps, fittings, switches, solenoids, and motors shall be identified by standard hardware nomenclature in addition to the Contractor's number.
6. TVM Software and Programming Manual – shall describe how to operate and maintain the TVM software. Procedures for updating the TVM application software source code, including data files, data file structure, and data file mapping and cross-referencing.

P.O. DCRS Manuals: The Contractor shall provide complete and organized DCRS Manuals that shall include, as a minimum, the following information:

1. OEM Manuals – shall be provided unaltered. All manufacturers' hardware and software documentation for the DCRS, workstation, and any associated networking hardware and software shall be supplied in their entirety. Where appropriate, these manuals may be bound with the Contractor's documentation.
2. DCRS Administrator's Manual – shall supply all necessary procedures to administer the DCRS and the associated networking hardware and software. Administrative requirements of the DCRS operating system software shall be described in detail or specific references to the manufacturer's operating system documentation shall be supplied. All administrative procedures, including managing user accounts, data archiving, and backup creation and restoration (full and incremental) shall be provided in this documentation.
3. DCRS Workstation User's Manual – shall provide complete documentation on the use of the revenue and maintenance Workstations. All functions supported by these workstations shall be fully explained, including logging onto the system, querying the database, generating reports, altering fare table and other operating parameters, downloading data, polling TVMs for data, managing the voice messaging system, and proper responses to all input requests. Extensive use of sample screens shall be employed throughout the manual.
4. DCRS Report Formatting Manual – shall provide instructions on how to create new queries and reports and to modify existing reports. Instructions on how to add reports to the list of prepared reports, to schedule reports for automated generation at predetermined times, and to delete unused reports shall also be provided. If necessary, specific references to manufacturer's documentation shall also be provided to clarify instructions. If binder size limitations permit, this manual may be combined with the DCRS Design and Database Structure Manual.
5. DCRS Design and Database Structure Manual – shall describe the design of the DCRS network architecture and the communications protocols used between the DCRS, TVMs, and the DCRS workstations. The manual shall provide a complete description of the database structure, including definitions, parameters, and relations for all database fields, records, and tables.
6. Wiring diagrams shall be provided that reflect the as-built condition of the communications system.

## PART 4 - OPERATION AND MAINTENANCE

### 1. Summary

- A. The Contractor shall provide operation and maintenance services of the System following initial TVM installation, through completion of the 30-Day Operational Test, and until the end of the Operation and Maintenance ~~p~~Period. This shall include all aspects necessary for operation of the System including, but not limited to, ticket stock replacement, receipt replacement, cash handling, cash reconciliation, onsite TVM corrective maintenance, offsite TVM maintenance of subcomponents, DCRS maintenance, preventative maintenance and System reporting.

### 2. Service Levels

- A. For each calendar day, the TVMs shall achieve an average availability of 96%. Availability shall be calculated as the percent total time TVMs are available for full revenue service, calculate at a per-minute granularity. If during one (1) hour, one (1) out of ten (10) TVMs were out of service for ten (10) minutes, the availability for the hour would be 98.33%.
- B. Any TVM failure that potentially impacts a customer's ability to purchase a ticket will cause the TVM to be counted as unavailable. This includes, but is not limited to, TVM component failure, failure to replace ticket stock, and failure to provide timely revenue servicing, ~~etc.~~
- C. In case of DCRS failure, or other wide-spread System failure restricting credit card purchases, all TVMs shall be considered as unavailable.
- D. Unavailability due to the following causes is excluded from the average availability calculation. TVMs subject to these conditions will be considered available through the duration.
  1. Active revenue servicing;
  2. Data communication issues not due to Contractor equipment failure;
  3. Vandalism; and
  4. ~~When~~ As the result of force Majeure event ~~is in effect~~.
- E. The Contractor shall submit a monthly report by no later than the 15th day of each month to CTDOT indicating the service levels achieved during the prior month, and the prior twelve (12) months. Via the DCRS, CTDOT shall have access to daily and weekly service level reports. Upon CTDOT's request, the Contractor shall submit comprehensive documentation in support of the calculated service levels, including incident reports, repair histories, status logs and DCRS reports.

- F. If the Contractor fails to meet the required service levels in any week, the Contractor shall undertake immediate steps to quickly rectify the problems. Failure to correct such performance shortcomings may, at CTDOT's sole discretion, result in Liquidated Damages being assessed and/or payments being withheld. Nothing in this section shall be construed as a waiver of any of DOT's remedies under the Agreement, nor relieve the Contractor from any liability related to its breach of the Agreement.

**3. Maintenance Services**

- A. The Contractor shall perform all preventative maintenance, all corrective maintenance, all hardware repairs, and all routine refurbishments for the fixed monthly fee stipulated for Operation and Maintenance. The Contractor shall invoice CTDOT on a monthly basis for any repairs due to vandalism or unavoidable accident.
- B. The Contractor shall submit the TVM Parts, Repair and Labor Pricing Manifest for CTDOT review and approval ninety (90) days following FDR or thirty (30) days prior to TVM installation, whichever is sooner. The Parts, Repair and Labor Pricing Manifest shall include material and labor prices for replacement of the lowest replaceable units. A per-hour pricing list shall be provided for all staff positions.
- C. Technical Services
1. During the Operation and Maintenance Period, the Contractor shall make qualified technical staff available for 2,000 hours per year.
  2. The Contractor's technical staff shall be expected to perform remote technical support, onsite technical support, software development, and upgrades/updates to System software as more particularly set forth in section 5 below.
  3. Any task that requires over one (1) hour of effort shall require a formal task order. Formal task orders may be requested [by CTDOT](#) by email or other written correspondence. Upon receipt, the Contractor shall provide a good faith estimate of the number of labor hours required to satisfy the request, the individuals assigned, proposed schedule, and any other relevant information. Hours expended in excess of 50% over the approved task estimate shall not count against the allocated technical services hours. The Contractor shall continue working until the task is completed. If the Contractor cannot or will not complete the task, all hours expended on the task shall be 'refunded'.
  4. CTDOT will provide to the Contractor a list of individuals authorized to request remote technical support. CTDOT will also provide a list of individuals authorized to formally request task orders, accept Contractor estimates and approve execution of task order per Contractor estimate.



5. Remote technical support shall be provided by the Contractor during normal Eastern Time Zone business hours as designated by CTDOT. Onsite technical support must be quoted for other direct costs (ODCs) and approved by CTDOT. Approved ODCs shall be invoiced monthly with actual receipts provided for justification.
6. All software work performed by the Contractor (or by any subcontractor(s) on its behalf) shall be warranted against defects for a period of one (1) year after installation. Labor required to correct defects in software (other than off-the-shelf, commercially available third party software) shall not count as Technical Services hours. All software modifications shall be tested, documented and escrowed in the same manner as required for the initially delivered software.
7. Within approximately two (2) years of each major OEM operating system or relational database release, as used for DCRS or TVM, CTDOT may request Contractor to convert portions of the System to the new OEM release.
8. Any hours remaining in the labor bank at the conclusion of the Operation and Maintenance ~~pe~~Period shall be forfeited.

#### 4. Revenue Services

- A. The Contractor, not CTDOT, is **fully responsible** for all revenue servicing, including, but not limited to any third party services, during the Operation and Maintenance ~~pe~~Period.
- B. The Contractor may subcontract portions of the revenue servicing to other entities, such as cash collection by an armored car service.
- C. Revenue servicing shall include, at a minimum:
  1. Exchange of partially full and full bill vaults with empty bill vaults;
  2. Exchange of partially full and full coin vaults with empty bill vaults;
  3. Exchange of partially empty and empty coin hoppers with full coin hoppers;
  4. Exchange of partially empty and empty bill hoppers with full bill hoppers (if used);
  5. Replenishment of ticket stock;
  6. Replenishment of receipt stock;
  7. Counting and depositing revenues collected in accordance with the Agreement and Connecticut General Statutes Title 4 - Management of State Agencies Chapter 47 - State Property and Funds Section 4-32 - State revenue accounting; and
  8. Any third party agreements required for credit or debit processing
- D. Ticket stock will be provided by CTDOT to the Contractor.

- E. Revenue servicing shall be performed at least twice a calendar week, or more frequently as required to meet service levels.
- F. Contractor shall provide a revenue service plan for CTDOT review and approval ninety (90) days following FDR or thirty (30) days prior to TVM installation, whichever is sooner.

## PART 5 - MEASUREMENT AND PAYMENT

### 1. Payment Terms

- A. CTDOT approved PDR is a prerequisite for all subsequent payments.
- B. CTDOT approved FDR is a prerequisite for all subsequent payments.
- C. TVM and DCRS FAT are prerequisites for all subsequent payments.
- D. Payment for the Operation and Maintenance ~~P~~eriod shall not begin until thirty (30) days after successful completion of the 30-Day Operational Test. The Contractor will not be reimbursed for System operation and maintenance during the period of time the 30-Day Operational Test is ongoing.

### 2. Project ~~Schedule and Milestones~~ and Access Constraints.

- A. The following table details the System Project ~~Schedule and Milestones~~ and Access Constraints for this Scope of Work. Failure to meet the milestones may result in the assessment of Liquidated Damages and/or payments being withheld as set forth in the Agreement.

**PROJECT ~~SCHEDULE~~ and MILESTONES and ACCESS  
CONSTRAINTS**

#	Description	Date
	Notice to Proceed (estimated)	February 27, 2015
Milestone No. 1	Approval of Preliminary Design Review (PDR)	June 1, 2015
Milestone No. 2	Approval of Final Design Review (FDR)	January 2, 2016
Milestone No. 3	Successful completion of first TVM Factory Acceptance Test	May 1, 2016
Milestone No. 4	Successful completion of DCRS Factory Acceptance Test	May 1, 2016
Access Constraints No. 1	<b>CTrail</b> Hartford Line Service stations available for TVM installation	July 27, 2016
	<del>Ticket Vending Machine Deliveries Complete</del>	<del>October 20, 2016</del>
Milestone No. 5	All installation, inspection and testing complete, excluding the 30_-Day Operational Test.	December 22, 2016
	<del>Start of 30-Day Operational Test</del>	<del>December 29, 2016</del>
<del>Start of Revenue Service</del>	<del>CTrail Hartford Line Service start of revenue service and start of DCRS hosting</del>	<del>On or about December 29, 2016, subject to final determination by State</del>
Milestone No. 6	Successful completion of 30_-Day Operational Test <u>and successful start of DCRS hosting with start of Revenue Service</u>	<u>On or about December 29, 2016, subject to final determination by State</u> <del>30-Days after start of Operational Test</del>
	<del>Completion of Base System Operation and Maintenance Period</del>	<del>60 months after successful comple-</del>

		tion of the 30-Day Operational Test
	Options / Extended Services	To be determined by CTDOT

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**3. TVMS Installation Layout**

A. The following table details the TVMS Installation Layout for this Scope of Work.

**TVMS INSTALLATION LAYOUT**

Station	TVM Count	Plans Available	Notes
Wallingford	4	Yes	2 in overpass towers, 1 on west platform, 1 at southeast gateway canopy
Meriden	4	Yes	2 in overpass towers, 1 on each platform
Berlin	4	Yes	2 in overpass towers, 1 in existing structure, 1 on east platform
New Haven	2	<del>As addendum</del> Will be made available	
State Street	2	Will be made available <del>As addendum</del>	
Hartford	2	Will be made available <del>As addendum</del>	
Springfield, MA	2	A Will be made available <del>s addendum</del>	
Spares	3		Contractor is expected to store these TVMs during the Operation and Maintenance <del>p</del> Period.
<b>TOTAL BASE SYSTEM</b>	<b>23</b>		
<b>Options</b>	<b>3 sets of 10</b>	No*	<b>Remaining NHHS</b> – Windsor, North Haven, Newington, West Hartford, Enfield, Windsor Locks <b>Shore Line East</b> – Branford, Guilford, Madi-

			son, Clinton, Westbrook, Old Saybrook, New London Spare TVM <del>ss</del>
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