Charleston Area Regional Transportation Authority

Farebox Management System
Request For Proposals

Charleston, South Carolina
Date: January 30, 2017

Due Date: February 17, 2017
Time: 3:00 P.M. EST

Receipt Location:
BCD Council of Governments
Attn: Jason McGarry
1362 McMillan Ave, Suite 100
North Charleston, SC 29405

REQUEST FOR PROPOSALS

RFP #CARTA2017-04

CHARLESTON AREA REGIONAL TRANSPORTATION AUTORITY
FAREBOX MANAGEMENT SYSTEM

RELEASE DATE: January 30, 2017

The Charleston Area Regional Transportation Authority is seeking the services of a qualified Contractor to furnish and deliver the specified quantity of electronic validating bus fareboxes, data processing equipment, spare parts and other goods and services described in these specifications. All equipment shall be provided with the appropriate license(s) and copies of software and firmware required to operate the system.

Base Equipment and Services to Be Provided

The Contractor shall provide to CARTA the following equipment and service for the base system:

- Electronic validating bus fareboxes, each furnished with one cashbox. Each farebox shall be equipped with all standard items and features specified herein.
- Installation of fareboxes on buses;
- Audit units;
- Data collection and reporting system, including necessary hardware, software and communications equipment;
- Installation and test of the data system;
- Bus operator and maintenance training manuals;
- Documentation for operation and maintenance of the equipment;
- Spare parts as specified;

The deadline for Bidders to submit written questions for information and/or clarification is **3:00 PM on Wednesday February 8, 2017.** All written questions received by this deadline will be answered in a written addendum.

The deadline for receipt of all submittals is **3:00 P.M. on Friday February 17, 2017.**

All Proposal responses should be mailed or delivered to:

BCD Council of Government
1362 McMillan Ave, Suite 100
Attn: Jason McGarry
North Charleston, SC 29405

*Note: The deadline shown above 3:00 P.M on **Friday February 17, 2017** is extremely important. The completed proposal must have been physically received on or prior to that deadline. If you plan to have your proposal delivered other than by personal delivery, please remember that even though the proposal may be postmarked prior to the deadline, if it is not received by the deadline time and date, it absolutely cannot be considered.*

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1.0 Introduction

CARTA was created in 1997 by adoption of a mutual agreement by the following jurisdictions: Charleston County, The City of Charleston, The City of Hanahan, and The City of Isle of Palms, The City of North Charleston, The Town of Kiawah Island, The Town of Mt. Pleasant, and The Town of Sullivan's Island.

CARTA provides public transportation services within the member jurisdictions, with the authority to determine scope (routes, equipment, and facilities) and standards of the service to be provided. CARTA is subject to the regulations of the US Department of Transportation (DOT), Federal Transit Authority (FTA), South Carolina Department of Transportation (SCDOT), and federal, state and local laws.

1.1 Proposal Schedule

Proposals shall be solicited and evaluated by the following schedule:

Publish/Release Solicitation	January 30, 2017
Deadline for Written Questions	February 8, 2017 by 3:00 PM
Deadline for Proposals	February 17, 2017 by 3:00 PM
Evaluation Process	TBD
Interview with Selected Bidders	TBD

A. Submission
One (1) digital, One (1) original (unbound) and four (4) copies of the Proposal shall be submitted no later than 3:00 p.m. EST to the following address:

BCD Council of Government
Attn: Jason McGarry, Procurement/Contracts Administrator
1362 McMillan Ave, Ste 100
North Charleston, SC 29405

Any proposals received after the scheduled deadline on the closing date will be immediately disqualified in accordance with CARTA policies.

Proposals shall be submitted in a sealed box or envelope that is labeled with the Bidders name and identified as containing a Proposal responding to RFP #CARTA 2017-03 for Farebox Management System.

No oral, facsimile, telegraphic proposals or subsequent modifications to such proposals will be considered except as specified herein.

B. Addenda
In the event it becomes necessary to revise any part of the RFP, addenda will be provided to all firms who received or requested the RFP document from CARTA.

C. Proposal review process
The procurement of theses Offeror's services will be in accordance with CARTA and other applicable federal, state and local laws, regulations and procedures.

Proposals shall be submitted as set forth in this RFP. The selection committee will review and evaluate Proposals in accordance with the requirements and instructions contained in this RFP.

Following evaluation of the proposals, the Selection Committee may sub-select finalist who may be invited to participate in an interview, if necessary.

1.2 Instructions and General Conditions

A. BIDDERS RESPONSIBILITY
Bidder shall fully acquaint itself with the conditions relating to the scope and restrictions attending the execution of the services under the conditions of the RFP. The failure or omission of a Bidder to acquaint itself with the existing conditions shall in no way relieve it of any obligation with respect to the proposal submitted by the Bidder to any contract resulting from this RFP.

B. DUTY TO INQUIRE
Should a Bidder find discrepancies or omissions in this RFP, or should the Bidder be in doubt as to the meanings, the Bidder shall at once notify CARTA in writing prior to the last day for written questions. If additional clarification is warranted, a written addendum will be sent to all persons or firms receiving this RFP.

C. SIGNATURE REQUIREMENTS
Only authorized officers eligible to sign contract documents will be accepted. Consortiums, joint ventures, or teams submitting proposals, although permitted and encouraged, will not be considered responsive unless it is established that all contractual responsibility rests solely with one contractor or one legal entity. This proposal should indicate the responsible entity. Bidders should be aware that joint responsibility and liability will attach to any resulting contract and failure of one party in a joint venture to perform will not relieve the other party or parties of total responsibility for performance.

D. WAIVER
By submission of its proposal, the Bidder represents and warrants that it has sufficiently informed itself in all matters affecting the performance of the work or the furnishing of the labor, services, supplies, materials, or equipment called for in the solicitation; that it has checked the proposal for errors and omissions; that the prices and costs stated in its proposal are intended by it; and, are a complete and correct statement of its prices and costs for providing the labor, services, supplies, materials, or equipment required.

E. CONFIDENTIAL INFORMATION

All proposals received become the exclusive property of CARTA. At such time, as a Contract is agreed to by the contractor and the Board, all proposals submitted will become a matter of public record and shall be regarded as public records, with the exception of those elements in each proposal which constitute confidential and proprietary information or trade secrets as those terms are used in S.C. Code Ann. §§ 11-34-410 and 30-4- 40(a)(1) and which are so marked as "TRADE SECRET," "CONFIDENTIAL" or "PROPRIETARY." However, proposals which indiscriminately identify all or most of the proposal as

exempt from disclosure without justification may be released pursuant to a freedom of information request. CARTA shall not in any way be liable or responsible to any Bidder or other person for any disclosure of any such records or portions thereof, whether the disclosure is deemed to be required by law, by an order of a court, or occurs through inadvertence, mistake, or negligence on the part of CARTA or its officers, agents, or employees. Any legal costs associated with determination of what is excluded or included in a public records request is at the expense of the Bidder.

Offerors should not simply mark their entire proposal as Confidential or exempt from Freedom of Information Act. Doing so will result in CARTA's making an independent determination of confidentiality or exemption. CARTA further hereby disclaims any responsibility for any information which is disclosed as a result of Offerors such independent determination of confidentiality or exemption necessitated by the Offerors failure to properly follow this section.

F. REVISION TO RFP

The CARTA reserves the right, when necessary, to postpone the times in which proposals are scheduled to be received and opened, and to amend part or all of the RFP. Prompt notification of such postponement or amendment shall be given by the CARTA to all perspective Bidders who have requested or received copies of the RFP. Receipt of all addenda must be acknowledged in the proposals received by CARTA.

G. PROTEST PROCEDURES

Any prospective Bidder or contractor who is aggrieved in connection with the solicitation of a contract may protest to CARTA. Any such protest must be delivered in writing within five days of the issuance of the RFP. Or within five days of the amendment there to if the amendment is the issue. A protest must set forth all specific grounds of protest in detail and explain the factual and legal basis for each issue raised. This project is to be funded in part by FTA and is subject to FTA rules and regulations. FTA only accepts protests alleging that a grantee fails to have written protest procedures or has violated such procedures or fails to review a complaint or protest.

H. WITHDRAWL OF PROPOSAL

No proposal may be withdrawn after the proposals have been opened.

2.0 SCOPE OF WORK

The Contractor shall furnish and deliver the specified quantity of electronic validating bus fareboxes, data processing equipment, spare parts and other goods and services described in these specifications. All equipment shall be provided with the appropriate license(s) and copies of software and firmware required to operate the system.

The Contractor shall install the fare collection equipment and perform all tasks necessary to configure it into a complete system, with each item thoroughly tested and ready for operation. CARTA will subject the equipment to tests indicated herein to determine that it is free of manufacturing and material defects and is suitable for installation and use in revenue service.

A. Site Visit

The Contractor shall make at least one on-site visit within seven (7) working days after bid award to conduct on-site surveys that may be necessary to familiarize themselves with the proposed locations of the revenue collection equipment and the layout and organization of the CARTA bus facility. The Contractor shall contact CARTA prior to the visit. Failure to comply will result of the award going to the next compliant bidder.

B. Quality of Work

New Materials
All materials and equipment shall be new and not used or rebuilt. The new materials and equipment shall be of recent manufacture and not of such age that their performance would be adversely affected.

Modular Construction
To the extent possible, modular construction techniques shall be employed in the manufacture of the equipment. In all cases where more than one unit of equipment shall be provided, e.g., fareboxes, cashboxes, vaults, etc., each unit shall be identical in manufacture and function with the others and all units and their components shall be freely interchangeable.

Commercial Standards
To ensure consistent high quality, the Contractor shall be certified as compliant with the ISO 9001 quality assurance standard promulgated by the International Standards Organization. The workmanship employed by the Contractor shall be of the best quality and of the highest standard of commercially acceptable practice for the class of work, and shall result in the equipment having a neat, clean and finished appearance.

C. Delivery Schedule

Schedule of Events
The Contractor shall provide CARTA with a schedule for the manufacture, delivery, and installation (if specified) of equipment, training programs, and delivery of documentation.

Delivery Time – Standard Equipment
Contractor shall make the initial delivery of standard production equipment within 90 days following Contract Award or issuance of written Notice to Proceed, provided standard product is purchased. All equipment shall be installed and all specified services completed in not more than 120 days following Contract Award or Notice to Proceed.

Delivery Time – Custom Features/Special Equipment/Software
If Contractor is required to provide custom/special features requiring custom work, special equipment and/or software, additional time shall be required above and beyond the time indicated above. Contractor shall indicate proposed schedule of events indicating initial delivery and anticipated completion of work.

D. Work to be Performed by CARTA

Equipment Related to CARTA

1. CARTA shall make buses available to the Contractor for installation work. The Contractor shall propose an installation schedule for CARTA's approval. CARTA shall provide a mechanic and supervisor at the garage location where installation tasks are to be performed, and shall provide movement of buses as necessary. CARTA shall approve all installation plans and procedures by Contractor, and shall assist the Contractor in coordinating the actual equipment installation.

2. CARTA shall provide adequate storage space at the garage location to store the fareboxes and related equipment upon delivery from the Contractor. This storage shall be secure and protected from the weather.

3. CARTA shall provide adequate and secure office space in the building where the probing computer is to be installed. This space shall be heated and air-conditioned so that the temperature range is between 65 and 90 degrees.

4. CARTA shall perform system acceptance testing on all computer hardware delivered in accordance with these specifications.

E. Work to be Performed By Contractor

The Contractor shall perform the following work:

1. The Contractor shall be responsible for all work and expenses relating to the design, manufacture, and delivery of the equipment to each location specified by CARTA.

2. For those items of equipment to be installed by the Contractor, the Contractor shall provide all hardware and other materials and all personnel and supervision necessary for installation in accordance with the schedule proposed by the Contractor and approved by CARTA.

3. The equipment, subsequent to testing, shall be complete in every respect and ready for revenue service.

4. All equipment delivered shall be of the latest engineering and software change level available and shall incorporate modifications for all known operational problems.

5. The Contractor shall deliver the equipment to the location specified by CARTA, which shall provide suitable storage facilities prior to installation of the equipment.

6. Revenue collection vault(s) shall be installed at a location specified by CARTA.

7. The Contractor shall make available full and competent engineering services to identify and correct all problems associated with the performance of its equipment prior to going into service.

8. Contractor shall be responsible for repairs under the terms and conditions of the warranty provisions indicated herein. Subsequent to the warranty period any parts, assemblies, and equipment shipped to the Contractor for repairs shall be subject to repair charges in accordance with an agreed upon schedule of prices or quotation for parts and labor.

9. The Contractor shall provide the services of a qualified representative to meet with CARTA to provide consultation and instructions regarding installation of the equipment specified herein. For installation of equipment, the Contractor shall use the existing electrical power available on CARTA vehicles.
10. The Contractor shall inspect the AC power available for the data system at the bus garages. If inadequate the Contractor shall inform CARTA staff of the necessary modifications.

11. All work shall be performed and completed in conformance with these specifications and in accordance with the schedule described herein or accepted in writing by CARTA.

F. Acceptance Testing

General
Acceptance testing shall serve to confirm that the entire system has been designed, built and installed with sufficient quality to meet the requirements of this specification.

Test Plan
All tests shall be done in accordance with a written test plan reflective of the specifications provided herein. The results of any and all testing, whether conducted by the Contractor or CARTA, shall be made available to both parties.

Acceptance Testing
The Contractor shall install all equipment procured under this contract including fareboxes and other on-board equipment, revenue collection equipment, and the data system, and provide technical consultation to Customer's staff.

Acceptance testing shall consist of a reliability test and an accuracy test, as described below. Testing will take place over a period of twenty-eight (28) days. If the equipment performs as specified it will be accepted by agency and final payment made. If it fails to perform acceptably the Contractor will be informed and given up to fourteen (14) days to make corrections or adjustments to the equipment.
Fareboxes will be operated on buses operated in normal daily revenue service over normal routes operated by the agency. CARTA is responsible for acceptance testing, with consultation from the Contractor as needed.

Reliability Test
Following the break-in period, the farebox system will be tested for reliability and accuracy. During the four week test period, all failures will be recorded. Those failures deemed to be a result of a product defect or design flaw (not the result of human error, passenger abuse, vandalism, bent or defective media, etc.) will be carefully analyzed. If a fleet defect is declared, the acceptance test will be suspended until the defect is corrected in the entire fleet. A four week rolling average of Mean Time Between Failures (MTBF) will be calculated by dividing the number of failures into total farebox operating days. If MTBF meet the requirements stated in this contract, the reliability test will be concluded. If MTBF is less than the stated requirement, the test will continue until a four-week rolling average that meets or exceeds the requirement is reached.

"Farebox operating days" mean total days that the farebox was installed in the bus and available for revenue service, including weekends and holidays, regardless of how many days the bus was

actually used. The agency at its option may unilaterally determine that all fareboxes and equipment have passed the reliability test.

Accuracy Test
Concurrently with the reliability test, the accuracy of the farebox shall be confirmed by auditing five (5) randomly selected fareboxes per day. The selected fareboxes will contain cashboxes with a minimum of $75.00 each in collected revenue. The cashboxes will be emptied separately using the audit unit and the revenue counted. Meanwhile, accumulated transaction data will be extracted from the farebox using the portable data probe. Accuracy will be judged by comparing revenue as determined by physical count to the revenue indicated on the farebox data registers. Fareboxes placed in bypass will not be counted and adjustments will be made for bogus coins.

A four-week rolling average for accuracy will be computed. If the accuracy is 99% or better, the system will have passed the accuracy test and the test will conclude. As with the reliability test, if the accuracy does not meet the 99% requirement, the test will be continued until the required performance is met.

The Contractor and CARTA will meet to ascertain the cause of any failures of the reliability or accuracy tests. The agency is expected to continually monitor all physically counted revenues versus data system reported revenues. Any significant anomalies are to be reported to the Contractor immediately.

Final Acceptance
When both the reliability and accuracy tests are passed and all fareboxes and auxiliary equipment is delivered (and installed as required), the system will be accepted by the agency and final payment made.

G. Warranty

The equipment shall be subject to the following warranty:

1. Contractor shall warrant that all of the equipment furnished under this contract is free from defects in materials and workmanship and shall operate as specified herein under normal service conditions.

2. Contractor shall provide such a Warranty for a period of one year after the installation and acceptance of all equipment. The Warranty shall cover all parts and labor associated with the factory repair of the equipment during the Warranty period.

3. The remedial work to correct any and all potential deficiencies shall include the repair or replacement of equipment, components, devices, and/or materials. It is understood that Contractor shall be responsible for the costs of all materials and labor, except as provided herein.

4. CARTA shall operate and maintain the equipment in accordance with the instructions provided by Contractor in order to maintain this Warranty. It is understood that the Warranty shall not apply to any equipment which has been repaired and/or altered without knowledge or consent

of Contractor or is in conflict with Contractor's instructions, and which repair or alteration affected its stability, reliability or operation performance.

5. The Warranty shall not apply to any equipment which has been damaged through accident or negligence, or which has been subjected to other than normal use under conditions prevalent in buses. Temperature, humidity, bus vibration and ambient electric conditions shall be considered normal operating conditions for this equipment.

6. The Warranty shall not cover the replacement of normal consumable items or items which are customarily replaced during scheduled preventative maintenance, such as light bulbs.

7. For the purpose of this Warranty the following types of facilities are defined:
   - Malfunction: A malfunction is defined as the cessation or diminution of function in a given device and/or component that causes degraded performance of the equipment but does not render the equipment inoperative.
   - Equipment Failure: Equipment failure is defined as the cessation or diminution of function in a given device and/or component that renders the equipment inoperative and/or unsuitable for the intended purpose.
   - Random Failure: This is the failure of a given component and/or device that is essentially unrelated in cause to other equipment failures.
   - Pattern Failure: This is the failure of a given component and/or device in several items of equipment or the repeated failures of the component and/or device in the same item or equipment, which failures in the opinion of CARTA and Contractor are related in cause.
   - Class Failure ("Fleet Defect"): This is a failure of a given component and/or device in ten (10%) percent of the equipment provided. The determination of a "Class Failure" by CARTA and the Contractor shall assume that all such equipment within its respective category has these defects and shall ultimately experience these same failures.

H. Equipment and Services to Be Provided

In addition to being able to pay with coins and currency, the new smart card system will permit the implementation of a variety of electronic fare products that will enable customers to travel seamlessly using one fare card, without having to pay cash should they choose. The Contractor will be responsible for providing and implementing a full System on a turnkey basis, with all equipment installed, tested and ready for revenue service according to Schedule.

The System will be transaction based in that each card touch to any smart card reader will create a transaction, have auto-load capability enabling customers to add value to their smart cards per the Auto-Load Rules as required in the specification, and each device in the System shall operate per the Hot List Rules.

The Contractor shall provide the following equipment and services for the System. The below quantities are estimates at the time of writing. The Contractor shall provide the types and amount of equipment as shown on the Deliverables List and Pricing Schedule:

In addition to the equipment described above, the Contractor will provide a sufficient quantity of every type of smart card to be used in the System including full and limited-use cards. The Contractor will provide a sufficient quantity that will last for a minimum of twelve months from start-up.

Contactless Smart Cards

A startup supply of smart cards will be provided by the Contractor. The Contractor shall provide CARTA with a final detailed plastic and paper smart card specification that will include a specification for the plastic card that will be used for general distribution. At a minimum, the amount of smart cards to be provided by the Contractor shall be:

1. 100,000 – Plastic contactless smart cards with consecutive serial numbers.
2. 100,000 – Paper, printed pre-encoded contactless smart cards with consecutive serial numbers.
3. 100,000 – Paper, printed contactless smart cards with consecutive serial numbers.

Smart Card Procurement Specifications

Technical specifications shall be provided by the Contractor suitable for use by CARTA to purchase all fare media. The Contractor will include documents as may be related to paper limited use contactless smart cards so that the final documentation will provide CARTA with complete documents suitable for use to procure of all types of fare products.

All fare products provided for CARTA shall be plastic or paper ISO 14443 Type A or B compliant contactless smart cards. There are three categories of smart cards being used, 1) plastic more permanent, 2) a more durable limited use paper card that will last as a 30-Day period pass, and 3) plastic cards that will be personalized for example, Reduced Fare ID's and Employee ID's. Within these categories the more permanent card is intended to last four years and has the capability of operating with a high degree of security, and a limited use card that is intended to be used and revalued for ninety days from first use.

Required Special Testing

As a part of the design and implementation, the Contractor will participate in a System Integration and Pilot Test. Contractor shall assist CARTA in performing this test by providing staff, all fare products, and all scripted tests in order to completely test all operational parameters of the System. In order for the System Integration Test to begin all required components of the network, equipment and network must have been installed by the Contractor in addition to the various required end devices. The System Integration Test (SIT) shall be developed by the Contractor and approved by CARTA. The SIT shall be managed by both CARTA staff and Contractor staff as directed by the CARTA staff. Staffing for the SIT shall be provided by CARTA and the Contractor. CARTA staff will approve the criteria for testing and the pass/fail criteria. CARTA's decision will be final. The System Integration Test shall be performed per the Master Schedule. The Contractor must pass all elements of the System Integration Test before further progress can be made in implementing the System. It is to be noted that errors in transaction processing by any element of the System shall be considered Critical Failures. As a part of the criteria for passing the SIT no Critical Failures will be allowed.

Additional Deliverables

The Contractor shall provide all Operational Spares and spare parts.

The Contractor shall provide Maintenance and Operations manuals, training and training materials per this Specification.

The Contractor shall provide installation of all equipment as required in this specification.

I. General System Descriptions

CARTA is purchasing a full and complete smart card system. All components and elements shall operate as a single integrated system with all fare products and equipment being compatible with each other. This Specification is written to describe a complete System as defined by CARTA. It is expected that Offerors will fully understand and provide a compliant Proposal. However, if an Offeror provides an alternative approach that complies with the intended requirements and provides the required reliability and performance, it will be considered.

The System to be provided is a contactless smart card system that will allow CARTA to have the flexibility to change fare tables, issue various fare products and collect, store and analyze detailed data. It is intended to be simple and easy to understand by not only our customers but CARTA operating staff. The Central Computer System will collect all data, monitor the system for faults and issues, alert staff to any anomalies, and provide reporting capability for all data.

The following is a description of the functional characteristics of the System and each type of equipment the Contractor will be required to provide. The equipment shall also conform to the technical requirements as stated within this document in later sections. Should the Contractor choose to provide equipment that has different characteristics it will be the Contractors responsibility to demonstrate how these requirements are being met to the satisfaction of the Evaluation Committee. The Evaluation Committee's decision will be final.

2.1 SCOPE OF WORK – TECHNICAL REQUIREMENTS

A. Validating Farebox – Technical Description

Function
The farebox shall be a bus mounted, freestanding device used to collect and securely store fares using a variety of fare media. The farebox shall be controlled by electronic logic and supported by electronic memory, displays and indicators. It shall permit the easy insertion of fare media by boarding passengers, provide a display for passenger information and have an attractive and uncluttered appearance using human factors engineering practices and industrial design.

The farebox shall be reliable in revenue service operations, accurate in its counting and data reporting, and secure in its retention and transfer of data and collected revenue. Under normal operating conditions, processing of fares shall require no driver intervention or inspection of fare media except as necessary to process transfers and reduced or other special fares. The farebox shall automatically determine that fare media inserted, scanned, or presented are genuine and comply with established conditions of use.

The farebox shall function under the environmental and operational conditions stated herein and shall be designed and manufactured to provide a high degree of security against forced entry and/or unauthorized manipulation.

The farebox shall provide specific information regarding daily operation, including revenue collected, types and quantities of fares collected, driver/route identification, and other information needed to account for revenue and monitor the equipment.

Features
The farebox shall have the following operational features:

- Accept, validate, count, and register fares in the form of U.S. coins, tokens, and paper currency;
- Return those coins and bills that are not valid or acceptable to the system;
- Accept, validate and, if necessary, re-encode magnetic fare cards;
- Accept and process contactless smart cards;
- Accept mobile tickets (optional)
- Print, encode and issue a magnetic transfer, daypass or other agreed-upon document from an internal supply of blank unencoded stock;
- Provide change for fare overpayment in the form of a stored value card good for subsequent fare payment;
- Permit the recording of various types of fare transactions using driver activated pushbutton

Location
The farebox shall be installed on the bus near the driver and in proximity to the front door. It shall be positioned so that an entering passenger may quickly and easily insert or present the required fare using coins, tokens, paper currency, magnetic fare document, or optional contactless smart card. This position shall facilitate all required maintenance tasks and permit easy removal of the cashbox.

The farebox shall be provided with an operator control unit (OCU) furnished with a keypad and display to permit the driver to operate the farebox. The OCU shall be housed separately from the farebox and electrically connected to it. The OCU shall be mounted on the bus dashboard, a stanchion, or the farebox and positioned to enable the driver to readily view the display and operate the keypad. In normal operation it shall be possible for the driver to operate the fare collection system without having to view or touch the farebox or fare media.

The mounting location for the farebox and OCU shall be subject to CARTA approval.

B. Operating Environment

External Environment
The proposer shall provide independent laboratory test results certifying that the farebox shall be able to operate without any degradation in performance under the following environmental conditions:

Storage temperature: –25°F to +140° F (–32°C to 60°C)

Operating temperature: +32°F to +122°F (O°C to 50°C)

Storage humidity range: 5% to 99% R.H. non-condensing

Operating humidity range: 20% to 95% R.H non-condensing

Thermal shock: 1° per minute drop in temperature over 15°F range between 110° and 60° Vibration 1.5g (rms), 5 to 200 Hz

Shock: Up to 5g (instantaneous)

Dust: Airborne particles and dust encountered in revenue service or caused by general cleaning and sweeping. It is understood that for cleaning using cyclone or high pressure air devices, use of water-resistant covers over the fareboxes is recommended.

Inclination: Up to 10 off vertical for short duration

Water/solvents: Water spray on equipment from cleaning bus floors and walls; Industrial cleaning solvents; wet fare media; rain, mud dripping from passengers' clothing or possessions

Electromagnetic interference: Immune to 400V spikes of up to 5 microseconds duration across the incoming power supply lines

The farebox shall remain operational in the presence of the following contaminants: airborne particles, grease, oil, and other contaminants accumulated on coins, tokens, and bills within reasonable limits.

Electrical Power
The farebox shall have the following electrical characteristics:

- Power source: 12 or 24 VDC nominal (bus battery)
- Operating range: 10 to 36 VDC
- Power consumption: 180 watts peak, 25watts typical

No converter or other special modification shall be required to permit the farebox to operate on either 12 or 24VDC input voltage.

The farebox shall be protected against damage and/or loss or modification of data under the following conditions:

- Loss of voltage (zero volts).
- Under voltage (0 to 10 VDC)
- Overvoltage (36 VDC to 50 VDC)
- Reverse polarity of the input voltage
- Fluctuating voltages between 10 and 50 VDC

The farebox power supply shall include adequate filters and other provisions to regulate the bus-supplied voltage and suppress power spikes and noise that could contribute to erroneous registration or generation of data. The power supply shall be rendered immune to electrical interference caused by such items as fluorescent light, bus alternators, air conditioning units, radios, etc. Adequate protection

against transient surges in the bus power supply shall be incorporated to the extent necessary to prevent damage to electronic components.

Loss or restoration of power shall not result in corruption of data in memory. If power fails or drops below 10 VDC while a transaction is in process, the transaction will resume after normal voltage is restored. Sustained farebox operation with voltage levels ranging from 10 to 50 VDC will have no adverse effect on farebox performance and will not cause permanent damage to the farebox nor result in loss or corruption of data.

The farebox shall be unaffected by electromagnetic radiation from bus equipment, including radio, lights, electronic destination signs, air conditioners, and generators. The farebox shall not emit EMI or RFI that produces harmful interference with other on-board electronic devices and systems.

C. Accuracy and Acceptance

Coins and Currency
The total amount of money registered by each farebox in the form of coins and bills shall not vary from the actual amount by more than ±1% (plus-or-minus one percent) for amounts greater than $300.

Accuracy calculation shall be adjusted for bent or bogus coins, improper operation, and operation in environmental conditions beyond the limits specified herein.

Valid coins shall be accepted at a rate of not less than 95% on first insertion and 98% on second insertion. Valid bills shall be accepted at a rate of not less than 95% on first insertion and 99% on second insertion.

Magnetic Cards – Swipe Reader
Magnetic fare documents swiped through the card reader shall be successfully accepted and read on first proper insertion at a rate of not less than 99%, assuming each document is valid and the document is not damaged so as to destroy the ability of the reader to correctly read the encoded data. Acceptance following second swipe shall equal or exceed 99.5%.

Magnetic Card Processing Unit (MCPU)
Magnetic fare documents inserted shall be accepted and read on first proper insertion at a rate of not less than 99.5%, assuming each document is valid and the document is not damaged sufficiently to destroy the ability of the MCPU to correctly read the encoded data.

The magnetic fare document re-encoding verification rate shall be not less than 99.9%. Re-encoding failure is defined as a magnetic fare document that cannot be read by the MCPU after re-encoding.

Smart Card Processor
Smart cards shall be successfully read and processed on first proper presentment at a rate of not less than 99%, assuming each card is valid and not damaged so as to destroy the ability of the smart card processor to correctly read the encoded data.

Mobile Ticketing
The mobile ticketing system shall quickly process all transactions while being highly accurate and reliable, achieving:

- No less than 99.9% in-service availability for all functionality
- No less than 99.99% accuracy for all transactions and data transmissions

D. Reliability and Maintainability

Reliability
The farebox shall be designed for the highest degree of reliability. It shall be capable of operating a minimum sixty (60) days' mean time between failures. Failure is defined as (a) the inability of the equipment to perform an essential function, such as the processing and recording of the various types of fares and the collection and secure storage of revenue, or (b) an occurrence in which continued operation poses a threat to the equipment, driver, passengers, garage personnel or others. If money is exposed due to the cashbox exceeding the capacity specified herein, such occurrence shall not be counted as a failure. The farebox's electronic circuit boards, including associated electronic components, shall be capable of operating an average of ten thousand (10,000) hours between failures provided there is no abuse, vandalism, operation beyond standards or lack of maintenance per the Contractor's instructions.

Maintainability
Mean time to repair an inoperative farebox shall not exceed ten (10) minutes. Repair is defined as the diagnosis, removal and replacement of one or more defective assemblies (such as a coin mechanism, bill transport, electronic board, etc.) in order to restore the farebox to working condition. Repair of the defective assembly is not included in mean time to repair.

Modular Construction
Modular construction shall be used throughout the farebox. Each module shall be self-contained and shall be inserted in a singular, correct fashion by means of guides and electrically connected by means of polarized plugs.

Component Removal Without Tools
The coin and bill modules, magnetic card processing unit, magnetic swipe reader, optional smart card processor, and farebox logic board shall be readily accessible when the top cover is opened and shall be capable of being removed and/or replaced without the use of any tools.

E. Coin Processing

Coin Slot
The coin slot shall be positioned on the top surface of the farebox and shall allow the rapid gravity insertion of coins and tokens by passengers. It shall be funnel-shaped to direct inserted coins into the farebox and designed to deter the entry of paper or large foreign matter into the coin slot to minimize coin jams. An internal lamp shall be provided to illuminate the coin slot. Inserted coins shall be directed to the coin validator.

Coin Validator
The coin validator shall be capable of processing and validating coins and tokens. The coin validator shall determine the validity of inserted coins based on their metallic content and shall be capable of distinguishing between ten (10) different valid coins/tokens provided each item has a distinctive metallic signature. The coin validator shall accept, validate, and count the value of pennies (1¢), nickels (5¢), dimes (10¢), quarters (25¢), and Susan B. Anthony and Sacagawea dollar coins ($1.00). Up to two (2)

sizes of tokens shall also be validated by the coin unit provided that each token's metallic signature is readily distinguishable from other coins and tokens. The validator and associated logic shall be solid state, employing no motors or moving parts for the validation process. Coins accepted by the validator shall have their value posted to the logic and displays and immediately be directed to the cashbox.
The coin validator shall be capable of handling deformed coins, i.e., coins that are bent or bulged, not perfectly round, or have attached foreign material, with the exception of:

- Coins that are so bent, bulged, encrusted with foreign material, or otherwise damaged that they will not fit through the coin slot.

- Coins whose electrical characteristics have been so altered due to loss or addition of conductive material as to render them unrecognizable by the validator.

Coin Rejection

Coins shall be rejected by the validator if the inserted coin is:

- Valid U.S. coinage, but not one of those that the validator is programmed to accept;

- Bogus, foreign or counterfeit;

- Coins incapable of being recognized by the validator as described above.

Rejected coins shall be returned to the passenger via a coin return cup, located on the front of the farebox. Coin return cup shall be fitted with a transparent spring-loaded door to prevent coins from falling from the cup and an internal lamp to provide illumination to the cup.

Coin Bypass
In the event that the coin slot is jammed and/or the validator is inoperative, a means shall be provided to permit coins to pass directly from the coin insertion slot to the cashbox, bypassing the coin validator. Coins processed in this manner shall not be counted or registered by the farebox.

Use of the coin bypass mechanism shall not affect the security of the farebox or the collected revenue. Activation of the coin bypass mechanism shall require deliberate action by the driver. Once the bypass has been activated, it shall not be possible for the driver to reset it from outside the farebox. Resetting the mechanism shall require access to the farebox interior by authorized personnel. The farebox shall note in its memory and retain for data transmission the exact times when the bypass was activated and deactivated.

When the coin bypass is activated, bills and electronic fare documents shall continue to be accepted, registered and processed in a normal manner. When probed, any farebox which has been placed in bypass since the last time it was probed shall emit a tone that is noticeably different from the normal probe tone to indicate that the farebox is in the by-pass mode and requires remedial action.

Coin Validator Calibration
If use of tokens is contemplated, Customer agrees to provide Contractor a minimum of 300 sample tokens in order to calibrate the coin validator. Sample tokens shall become the property of the Contractor. Contractor shall take appropriate security measures to ensure that sample tokens are not fraudulently returned to circulation. If required, Contractor shall reimburse Customer for the replacement cost of the tokens at five cents per token.

F. Bill Acceptor

The farebox shall be provided with a bill acceptance module capable of accepting, validating, and counting paper currency. The bill acceptor shall be mounted in the upper portion of the farebox and provide an entry bezel near the top of the farebox for easy entry of paper currency. The bill acceptor bezel shall be positioned near the coin slot and shall accept bills that have been opened to their full size and inserted lengthwise. The dimensions of the bill acceptor bezel shall hinder the accidental entry of coins into it. The mechanism used to transport the inserted bills to the validator shall be positive and not require precise insertion by the passenger. A guide surface shall be provided to assist in the entry of the bill into the farebox. The paper currency shall be inserted approximately one- quarter inch (1/4") before the bill transport becomes operational and advances the bill to the validator.

The bill transport shall have the capability of handling, without jamming, deformed paper media, i.e., paper media subject to daily "street" use, including wrinkled, torn, folded, or damp media. The limits of deformation and the corresponding action of the bill transport are described below.

The acceptor shall have indicator lights and shall show, by a green light that the acceptor is ready to accept bills or alternatively, by means of a red light, that it is not ready or able to accept bills.

Currency Acceptance

The bill acceptor shall accept an inserted bill in any one of four orientations – face up, face down, either end first. The acceptor logic shall examine the inserted bill and determine its validity and denomination. Invalid currency and denominations that have not been programmed for acceptance by the farebox shall be rejected.
The acceptor shall be capable of accepting and validating the following U.S banknotes:

- One-dollar bills (1$);
- Five-dollar bills ($5) (old and new style);
- Ten-dollar bills ($10) (old and new style);
- Twenty-dollar bills ($20) (old and new style); The acceptor shall process and accurately register:
- Bills not uniformly flat or in new condition;
- Bills that are damp but not saturated.

Processing time shall be less than two (2) seconds per bill regardless of the denomination being processed, as measured from the time the bill acceptor begins to draw in an inserted bill until it is ready to accept another bill.

Currency Rejection

Any of the above bills may be programmed by the system to be rejected for policy reasons. All bogus bills, foreign currency, and photocopies of valid currency shall be rejected. The farebox shall reject:

- Bills inserted into the transport in folded condition, thus reducing the overall length of the bill by more than 1/2" (one-half inch).

- Paper media having tears more than 1/2" (one-half inch) long.

- Paper media having internal holes or tears.

- Bills having tape or other foreign material adhering to it.

- Any inserted paper other than currency, including magnetic or other tickets.

If a bill is rejected, the transport mechanism shall reverse and the item shall be returned to the passenger via the entry bezel.

Bill Transport

The bill validator shall feed an accepted bill into a bill transport, which shall progress the bill into the cashbox. The bill transport shall employ a pulley and belt mechanism to positively engage an unfolded bill, irrespective of condition. No force shall be required to cause the bill transport to start. Solid-state devices shall be employed to start the bill transport. The transport shall operate until the bill has been deposited into the cashbox.

Manual Bill Override

Upon examining a rejected bill and determining that it is genuine, the bus operator shall have the ability to activate an “accept next bill” feature using the farebox keypad. This feature shall allow the bill validator to accept the next inserted item without regard to its validity. The driver shall have the ability to input the denomination of the bill to be manually accepted. One and only one bill shall be accepted upon each activation of the “accept next bill” feature. Following acceptance, the validator shall revert to normal operating mode. All uses of the “accept next bill” feature shall be recorded by the farebox and uploaded to the data system. Customer shall have the ability to limit use of the feature to certain denominations of bills. It is understood that due to the possibility of human error manually accepted bills are to be excluded from farebox accuracy calculation.

Accuracy

Valid bills shall be accepted at a rate of not less than 95% on first insertion and 99% on second insertion.

G. Magnetic Card Processing Unit

Functional Description
The farebox shall be provided with an integral magnetic card processing unit (MCPU) capable of processing a magnetically striped, thermally coated document. The MCPU shall be capable of performing the following functions:

- Accept and read a previously issued magnetic fare document such as a stored ride/value card, transfer, or pass, and:

- If the card is valid, encode, verify, and print on it as appropriate, and return it to the passenger;
- If the card is invalid, reject it and return it to the passenger.

Upon operator command, issue, print, encode and verify a transfer, daypass, change card, receipt, audit ticket or other agreed upon document from an internal cassette of blank unencoded documents.
All documents processed in the MCPU shall be 2-1/8 inches wide by 3-3/8 inches long and 0.007 inches to 0.010 inches thick. Documents to be issued shall be made of paper stock 0.007 inch thick. Documents to be printed shall have a thermal coating on the same side as the magnetic stripe. The coating shall be suitable for print conversion at 65 degrees C.

The MCPU shall be enclosed within and integral to the farebox with an illuminated entry bezel on top of the farebox in proximity to the coin and currency slots. The MCPU shall be designed to enable passengers to easily and rapidly insert cards into the slot and then remove them.

Magnetic Fare Document Processing Requirements

The magnetic stripe of the magnetic fare documents shall be of the high coercivity type (typically 2700 Oersteds) and shall be placed in ISO tracks 2 and/or 3. Data on track 2 shall never be exposed to a write head and shall therefore be fixed. Track 3 shall contain variable data such as current value, date, time, bus number, route of last use, next available print location, etc. Transfers, which have no fixed track, shall have only variable data relevant to transfer issue and use.

All data on both the fixed and variable tracks shall be encoded at a minimum density of 120 bits per inch. All data encoded by the MCPU shall be verified by the read head before the document appears at the exit bezel. If the data read does not match what was written, the MCPU shall automatically re-encode the document and attempt to verify it again.

Printing on a Document

The MCPU shall have a full width thermal print head, which may be used to print information in the form of text, symbols and graphics anywhere on the document, except for a 1/8 inch outer margin and over the magnetic stripe. Resident fonts shall include not less than three sizes in regular and reversed (white on black) print. It shall be possible to store special symbols for use as required.

The MCPU shall be capable of printing the following:

- Remaining value on previously issued stored value documents
- Remaining rides on previously stored ride documents
- Expiration dates on previously issued rolling period passes
- Expiration date, time, etc., on newly issued transfers, and a time stamp on previously issued transfers
- Change cards, receipts, audit tickets, and other agreed upon documents.

For nonrenewable stored ride/value cards (no reloading of rides or value permitted), the remaining value shall be printed on single lines and/or in columns. For renewable cards, the remaining value shall be printed only when the value gets to a critical point representing one or two fares, indicating that the card should be recharged.

Blank document stock shall have no value until printed and encoded by the MCPU. Stock shall be supplied in a cassette with a capacity of at least 700 individually stacked die-cut cards. It shall be possible to add document stock before the existing stock is exhausted.

Printing shall be on the magnetic stripe side of the document. Printing shall be of the thermal type, made up of dots with a resolution of not less than 190 dots per inch. The MCPU shall be capable of printing in a portrait orientation, up to 20 rows of type, not less than 16 characters per row, in a typeface of not less than 12 points.

The MCPU shall be capable of printing text in a variety of fonts and sizes in either landscape or portrait orientation. The MCPU shall be capable of printing graphics of any size except as limited by the printing area on the card. It shall be possible to reserve certain areas on the document for such variable and/or conditional information as may be required and agreed upon.

Transfer Issuance

Upon manual or automatic command the MCPU shall be able to issue a paper transfer which shall be encoded with the conditions of use and expiration on the magnetic track and printed in readable form. The transfer shall be printed on the die cut thermal stock contained within the MCPU.

Transfer Acceptance

The MCPU shall accept previously issued transfers from other fareboxes installed as part of this procurement and determine their validity and authorized use. It shall accept the transfer, read it to determine validity based on expiration time, number of rides taken, direction, and/or other agreed-upon restrictions of use, print on and re- encode the transfer as appropriate, register the completed transaction in memory, and return the transfer. If a transfer is limited to a particular number of rides (e.g., two transfers allowed per fare paid), the MCPU shall have the ability to re-encode it to reflect each use without issuing a new document, and imprint it with the current time, route, direction, bus number and other agreed-upon information in human-readable form. If the transfer is expired, the MCPU shall print “EXPIRED” or similar message on it in large, easily readable letters.

The farebox shall maintain separate "Transfers Issued" and "Transfers Received" registers in memory and transmit the information collected to the data system during probing.

The MCPU shall be capable of being programmed to:

- Process transfers with or without driver intervention. For transfers processed without driver intervention, downloadable acceptance parameters shall provide the ability to:
    - Permit or exclude round tripping on transfers and to permit a stopover privilege on a continuing trip;
    - Accept transfers based on direction of continuing trip.

- Issue a transfer, day pass, or proof of payment without changing document stock. Identification of the type of document shall be a downloadable text string printed on issue.

- Condition transfer acceptance on payment of additional fare.

Change Cards

The MCPU, shall have the ability to create and issue "change cards." A change card is a document provided to the passenger in the event that more than the required amount is inserted into the farebox and the passenger would like to receive the difference between what was inserted in cash (coins and bills) and the required fare.

A change card shall function as a stored-value card on subsequent use. Since paper ticket stock is intended for a limited number of uses, the MCPU shall provide for automatic card reissuance if a change card is used more than a predetermined number of times. In such cases the MCPU shall automatically void the original card and re-issue the remaining value on a new card. Printing on the original and newly issued cards shall show balances and card disposition.

Receipts

The MCPU shall have the ability to print and issue a receipt from internal ticket stock. Such receipts may be provided for card upgrades, printout of one or more transactions using a smart card.

MCPU Card Stock Replenishment

The MCPU shall have an internal removable cassette which shall hold not less than 700 cards 0.007 inches thick. The cassette shall be removable to enable additional cards to be inserted or another full cassette inserted in its place.

The MCPU shall have sensors to indicate when the card stock is low, with approximately 100 cards remaining. The indications shall be visual on the driver's display.

A viewing window shall be incorporated into the farebox design to permit observation of the vertical stack of card stock in the MCPU. This window shall make it possible to determine the approximate amount of stock in the MCPU without having to open any lids or covers.

The ability to add card stock to the MCPU without discarding the existing stock is preferred. If other means of stock replenishment are proposed, bidder shall describe the replenishment procedure in sufficient detail to permit the authority to determine the impact on operations, including recommended reloading thresholds, estimated additional stock required, and maximum time required to replenish.

- MCPU Processing Time
- The MCPU shall have the following maximum processing times:
- Read Only 1.0 second
- Read, Encode and Verify 1.3 seconds
- Read, Encode, Verify and Print 1.6 seconds

- Issue, Encode, Verify and Print 2.0 seconds

H. Magnetic Swipe Card Reader

General

The farebox shall be provided with a swipe card reader to process read-only magnetic documents such as passes which have been previously encoded with data such as serial number, card type, validity dates, etc. The card reader shall be integral to and flush with the top surface of the farebox near the coin and currency slots.
The card reader shall permit passengers to easily and rapidly swipe cards through a slot. The reader shall have its slot oriented so that cards shall be swiped from right to left (from the passenger's viewpoint), in the general direction of passenger boarding. A guideway shall be provided to direct the card into the slot for swiping. A polished stainless steel plate shall be provided at the bottom of this guideway to resist abrasion and prevent the card from snagging on any surface irregularities as it is swiped. The guideway shall be illuminated for ease of use at night. The maximum speed at which a card can be swiped and still be accurately read shall be at least 70 inches per second. The read mechanism shall be spring loaded and shall accommodate passes with a minimum thickness of .006 inch and a maximum thickness of .030 inch.

Processing Time
The swipe card reader shall allow automatic processing of a correctly swiped, valid magnetic card in 0.5 seconds or less. Use of the swipe reader shall not impede passenger boarding or flow in any manner.

I. Contactless Smart Card Processor

General
The farebox shall be provided with a device capable of processing a contactless smart card placed within approximately two inches of a designated location ("target") on the farebox near the coin and bill insertion slots. It shall not be necessary for the passenger to remove the smart card from his/her wallet, purse, etc., for a card to be successfully processed.

Safeguards shall be provided to prevent the smart card processor from accidentally processing two cards simultaneously.

Data on a smart card shall not be corrupted if the rider withdraws the card before processing is complete. In such event the transaction in progress shall be canceled.

Once processing of a given smart card is complete, the processor shall not initiate another transaction involving the card unless and until it is withdrawn and re-presented to the "target."

Smart Card Configuration
Smart cards shall be configurable as stored ride/value cards, passes, or transfers and shall function in the same manner and be subject to the same processing rules as magnetic fare cards so configured.

Operation
When the farebox is logged in, the smart card processor shall be continuously active and looking for a smart card.

J. Mobile Ticketing Application

General
The mobile ticketing application and other supporting software provided shall allow customers with smart phones and tablets, including those at minimum running Apple IOS®, Google Andriod®, and Windows Mobile® operating system, to perform the following:

a) Purchase a CARTA unlimited ride pass for immediate use or future use to be activated later by the customer.

b) When necessary, conduct a secure payment transaction for the purchase, including methods of payment that do not require a credit card (to allow the unbanked to participate in mobile ticketing).

c) Receive transaction receipts via email, SMS text message, or both.

d) Easily and securely repeat prior transactions on-demand with minimal data entry, and automatically via "subscription" transactions.

e) Easily re-generate and display the barcode (with modified data as necessary) for subsequent boarding's while the purchased fare product is valid.

f) Easily access other related travel functions including but not limited to schedules

g) The mobile ticketing application shall be able to easily expand and accommodate:

- New ticket types and prices for existing participating agencies
- New services for participating agencies
- New services for new agencies
- New agencies and shared fares
- Modifications to the software and parameters to properly operate the mobile ticketing system

K. Electronic Fare Document Operations

The following requirements apply to all electronic fare documents, whether magnetic or smart card.

Processing Requirements
Upon insertion in or presentation to the appropriate fare processing module, electronic fare documents shall be immediately read. If there is no data or the data is corrupted, unrecognizable, or invalid, the farebox shall reject the document. The farebox shall validate an electronic fare document against the currently active fare set with respect to the following parameters:

- Expiration date – has the document expired?

- Validity period – is the document being used during the permitted times/days?

- Issuing agency – was the document issued by an acceptable agency?

- Document type – is the document type valid?

- Passenger fare category – is the fare category acceptable for the present time/date and class of service?

- Remaining value/rides – is there sufficient remaining value or rides to pay the fare?

- Transfer information – does the transfer comply with the conditions of use for the category of transfer?

- Passback – is the document being used for a second time on the same bus within a predetermined time?

- Bad number – is the document's serial number on the bad number list?

L. Stored Ride/Stored Value Card Processing

General
Stored value and stored ride cards shall be pre-encoded for a specific amount or number of rides and distributed off the bus. When a stored value or stored ride card is inserted or presented, the farebox shall examine the card to determine that there is adequate value or rides to pay the required fare, deduct the proper amount and re-encode the card with the remaining value or rides, print the remaining value or rides on the card if appropriate (magnetic cards only), and return the card to the passenger.

In the event that the card does not have adequate value to pay the full fare required, provision shall be made for "split payment" transactions in which a combination of cash and electronic media may be used to pay the fare.

Operation
When a stored value or stored ride card is processed, the farebox shall:
Determine that the card has been properly read. If a misread is detected, the driver's information display shall indicate "MISREAD" and a distinctive tone shall sound.

- Check whether the card is valid for the present time/date and class of service. If the card is not valid, the display shall indicate "INVALID." If the card's expiration date (if any) has passed, the display shall indicate "EXPIRED."

- Check whether the card serial number is on the bad-number list. If the number is found on the bad-number list, the display shall indicate "BAD PASS."

- Check whether the card has sufficient rides or value to pay the fare.

If the card passes all the preceding tests, the farebox shall deduct the appropriate value or number of rides, re- encode the card, sound the "successful transaction" tone, register the fare in memory, and display the amount deducted and remaining on both the driver and passenger displays.

In the event a stored value/ride card intended for reduced fares is used, an appropriate message such "STUDENT," "SENIOR," etc., shall appear on the driver's information display once the card is validated. It shall be possible to restrict use of a student fare card to weekdays.

The farebox shall record in memory the quantity of each stored ride or stored value card processed, e.g., full, senior, student, etc., as well as detail on each transaction.

Embedded Transfers
It shall be possible to cause an “embedded transfer” to be encoded on a stored value card, whether magnetic or smart card. An embedded transfer shall permit the stored value card to act as a transfer without issuance of a separate document.

M. Period Pass Processing

General
Three types of period (limited duration) passes shall be supported:

- Fixed period passes
- Post billing passes
- Rolling start period passes

Fixed period passes are previously encoded, read-only documents valid between specified calendar dates, typically a particular week or month. The farebox shall read the pass and check whether it is valid for the current date.

Post billing passes are previously encoded read-only documents used for employee billing programs. They are valid for a specified period, typically a year or longer and have specific expiration dates. The farebox shall read the pass, check whether it is valid for the current date, and record the serial number in a specific record. The serial number, time of use, and bus and route number shall be subsequently uploaded to the data system to permit the generation of a report for invoicing purposes.

Rolling period passes are previously encoded and valid for a specified period following first use, typically 7 days or 30 days. The first time the pass is used, the farebox shall encode and print on it the date of first use and the date on which the pass shall expire and no longer be valid. For all subsequent uses, the pass shall function as a read-only document.

Conditional Use Passes
A subset of passes shall be conditional use passes such as "off-peak only," "peak only," and "anytime" passes. Peak hours shall be definable by the Customer through the data system, and typically involve two time windows, one in the morning and one in the afternoon. "Off-peak only" passes shall not be valid during these time windows, while "peak only" passes shall be valid only during the time windows. "Anytime" passes shall be valid at all times.

Operation
When a pass is processed, the farebox shall:

- Determine that the card has been properly read. If a misread is detected, the driver's information display shall indicate "MISREAD" and a distinctive tone shall sound.

- Check the pass's validity period. If the pass has not yet become valid, the display shall indicate "INVALID." If the expiration date has passed, the display shall indicate "EXPIRED."

- Check for passback (same card previously used in the farebox within a pre-programmed time, typically 30 minutes). If the card's serial number is found in the passback file, the display shall indicate "PASSBACK."

- Check whether the card serial number is on the previously downloaded bad-number list (stolen or otherwise invalidated cards). If the swiped card number is found on the bad-number list, the display shall indicate "BAD PASS."

If the card passes all the preceding tests, the farebox shall sound a "pass accepted" tone, register the fare in memory, and display the pass type (such as "MONTHLY" or "WEEKLY." The card's serial number shall be added to the passback list.

In the event a reduced fare pass is used, an appropriate message such "STUDENT," "SENIOR," etc., shall appear on the driver's information display once the pass is validated. It shall be possible to restrict use of a student pass to weekdays.

The farebox shall record in memory the quantity of each pass type processed, e.g., full, senior, student, etc. Acceptance of magnetic stripe cards shall be subject to control by the driver's keypad and may require the insertion of money in the farebox, as in the case of reduced fare passes for seniors or students.

Normally the passes shall be encoded with the date of issue and the date of expiration. Passes used prior to the date of validity or after the expiration date shall not be valid. The card reader shall function as a "read only" device and shall not alter any of the encoded information on the pass.

Passback Check
The farebox shall have the ability to check for re-use of a magnetic pass within a preprogrammed time, typically 30 minutes, on the same bus (passback). If the card's serial number is found in the passback file, the display shall indicate "PASSBACK" or similar message and the pass shall be rejected. The passback list shall have a capacity of at least 50 pass numbers.

Bad Number List
The farebox logic shall have the ability to check whether the serial number of a card being processed is on a previously downloaded bad-number list (stolen or otherwise invalidated cards). If the card number is found on the bad-number list, the display shall indicate "BAD PASS" or similar message and the card shall be rejected. The bad number list shall have a capacity of at least 2,500 individual cards.

Adding Value to a Card
The farebox shall permit value to be added to a previously obtained stored value card by the insertion and validation of bills into the farebox bill validator. The driver shall have the ability to press a

prescribed key or sequence of keys to prepare the farebox for an add-value transaction, following which a passenger desiring to add value to a card shall be able to insert the card in the farebox followed by the insertion of bills. The driver display and passenger display shall indicate the amount currently on the card, the amount inserted, and the total on the card if the add- value transaction is accepted. Once the desired amount of cash has been inserted, the passenger shall have the ability to press a key, which shall cause the card to be encoded to reflect the added value and the add-value transaction to be registered in farebox memory.

Credit Card Processing
As an option, it shall be possible to process credit cards using the swipe card reader and the optional smart card reader if purchased under this contract. The smart card reader shall be certified to process major smart card-based credit cards available at the time the option is exercised. Credit cards processed using the swipe reader or the smart card reader shall be read and the credit card information stored for subsequent uploading to the data system. Real- time authorization of credit cards is not required. It shall be possible to validate credit cards against a bad number list; cards whose numbers appear on this list shall be rejected.

The Contractor shall provide turnkey credit card processing services, which shall include all necessary clearinghouse and other services needed to ensure settlement of credit card payments accepted at the farebox. Proposers shall describe their bank card processing services in detail in their proposals.

Alternatives to Magnetic Cards and Smart Cards
To reduce the likelihood of counterfeiting and copying, magnetic cards and smart cards are the preferred electronic fare media. If other ticketing technologies are proposed, bidders shall explain in detail how they would ensure security (at least to the level provided by magnetic passes) for transfers, day passes, and change cards.

N. Mobile Ticketing Functional and Performance Requirements

A. The mobile ticketing application shall support a wide range of fare product and pricing solutions, including:

- All current CARTA Transit fare products
- Reduced and concessionary fares (e.g. children, senior citizens, etc.)
- Distance-based fares
- Time of day / peak hour pricing
- Discounted pricing based upon total number and value of purchases within a period of time
- Discounted pricing for multiple tickets purchased at once
- Purchase a pass for 1 person or a group of persons traveling together
- Integrated packaging and pricing of transit products and other services such as parking

B. For general public users (i.e., users not associated with a college or corporate program), the mobile ticketing application shall support existing and new CARTA fare products suitable for read-only use, including but not limited to:

- Floating period passes in any length up to 366 days
- Fixed calendar passes, including monthly and student semester passes

- Special event tickets

C. Authorized employees of participating Corporate Partners shall have the ability to activate and use fare products made available by their employer through a Corporate Partner Web Portal.

D. Authorized students attending participating colleges shall have the ability to activate and use fare products specific to the college. (College fare products shall be available only to authorized students.) A Student Pass Administrator Web Portal, shall enable college administrators to authorize students for mobile ticket use, and to select the products available.

The fare software system shall provide sufficient controls to ensure that a fare product purchased or made available through Corporate Partner or College programs cannot be assigned simultaneously to a smart card and a mobile device.

O. Passenger Indications

Passenger Display
The farebox shall be provided with a passenger display mounted on top of the farebox in proximity to the coin and bill slots. The display shall be a backlit LCD consisting of at least four lines of 20 alphanumeric characters each, with each character a minimum of 2.95mm wide by 4.75mm tall, and shall be easily viewable by a passenger paying a fare.

When the farebox is in "ready" mode the passenger display shall cycle through various instructional messages. These messages shall automatically adapt depending on the operational status of the farebox, for example, if the coin validator or bill validator is out of service.

When a cash transaction is initiated, the display shall show the amount deposited and the amount of the fare. When a transaction involving a magnetic fare document is initiated, the display shall show relevant information, e.g., the amount of rides/value deducted and remaining when a stored ride/value card is used. In the event a magnetic document transaction fails the display shall show the reason for failure, e.g., INVALID, EXPIRED, BAD READ, etc.

The passenger display shall be equipped with two buttons, one on either side of the display. The buttons shall be of the sealed membrane type with tactile feedback. Different "labels" for the buttons shall be shown on the passenger display depending on the task to be performed.

Audio Signals
The farebox shall be equipped with an audio transducer which shall be used to emit different sounds to indicate the status of a transaction and other farebox operations. At a minimum, two tones shall be provided: a continuous tone (beep) to indicate that a fare has been paid with proper documents or media, and an intermittent tone (warble) to indicate a failed transaction due to an invalid card or other cause.

The farebox shall also be capable of generating spoken messages using a digitized human voice. It shall be possible to enable or disable the spoken messages via the data system. Spoken messages shall be triggered by defined farebox operating conditions, e.g., “transfer not valid” or “please swipe card again.” The farebox shall be provided with a list of standard spoken messages. The Customer shall be able to choose from this list and assign messages to relevant farebox actions.

P. Operator Control Unit

General
The farebox shall be furnished with an operator control unit (OCU) equipped with a keypad and display to operate the farebox.

The OCU shall not be integral to the farebox but shall be housed in a separate compact console constructed of high- impact plastic with no sharp edges or corners. The OCU shall be provided with appropriate hardware to permit it to be mounted on the bus dashboard, a stanchion, or the driver's side of the farebox, as may be required by the configuration of a particular bus. The installed position shall not interfere with any bus controls, block any bus indicators, or create a safety hazard. The OCU mounting shall be designed so that it may be adjusted by each operator to the optimal viewing angle. Once adjusted, the mounting hardware shall not allow the OCU to rattle or become loose as a result of shock and vibration encountered during normal bus operation.

The OCU shall be connected to and communicate with the farebox via cable.

Driver's Display
The OCU shall be provided with a backlit liquid crystal display (LCD) measuring at least three inches high by five inches wide (3”x 5”) and capable of displaying at least three lines of text. The display shall be fully "dot- addressable," consisting of at least 240 by 128 dots, and capable of showing graphics filling the full viewing area. It shall be possible to show text in a variety of fonts, sizes, and orientations. Display contrast shall be adjustable and backlighting shall be capable of being turned on or off via the driver keypad. The display shall be of sufficient brightness to be visible in all forms of ambient lighting within the bus. The display shall be protected by a panel of clear plastic with a matte finish to reduce glare.

Display Indication
The display shall be capable of indicating to the driver the status of any ongoing transaction and other information pertinent to the operation of the farebox, including:

- The amount of money inserted into the farebox in the form of coins and bills.
- The status of any transaction involving electronic fare documents.
- The current function of the redefinable function keys, described below.
- The quantities stored in the various farebox data registers.
- The function of a given numeric button on the keypad when that button is depressed.
- Confirmation for any driver input information.

A portion of the display shall be reserved for information pertaining to the current transaction, including the amount of cash inserted. This part of the display shall be known as the “driver’s digital display.” Initially the driver's digital display shall show "0.00." As coins and bills are inserted, this display shall count upward, reflecting the amount of money inserted. When the full fare is reached, or when the driver presses a button indicating acceptance of a reduced fare (student, senior, etc.), the “fare

accepted” tone shall sound, the appropriate data registers shall be incremented, and the digital display shall automatically reset to "0.00."

If a transaction is not completed, the driver's display shall automatically reset to "$0.00" fifteen (15) seconds after the last coin has been inserted. Any numeric value indicated on the display when this occurs shall be added to the "unclassified revenue" data register. It shall be possible to delay resetting by pushing a designated "hold" button.

OCU Driver Pushbuttons
The OCU keypad shall include at minimum the digits 0 through 9, the letters A through D, star (*), pound sign (#), four arrow keys, ENTER, and eight unmarked function keys. The keys shall be provided in a durable silicon rubber actuator. Where the keys are marked, they shall be hot molded with the markings with filled characters. Surface printing shall not be acceptable. Keys shall be rated for a minimum of 500,000 keypresses, or, if touch-screen technology is proposed, a minimum of 500,000 activations per specific touch point on the screen.

The function keys shall be mounted on either side of the OCU display. Different "labels" for the function keys shall be shown on the driver's display depending on the task to be performed. All driver pushbuttons shall provide tactile and audio feedback and be sealed against the intrusion of liquids and other foreign material.

The keypad shall enable the driver to classify reduced or special fares and perform other tasks connected with the operation of the farebox.
Each of the numeric and function keys on the keypad shall be capable of being programmed to:

- register a specific preset value $0.01 to $39.99;
- increment a zero-value tally counter; or
- be disabled (nonfunctional).

The fare values assigned to each numeric or function key shall be individually programmable; that is, for each fare set activated by the driver one or more of the buttons shall be capable of having a different value assigned. Each time a numeric keypad button is pressed, the driver's information display shall indicate the key number pressed and show the value assigned to that button.
When the farebox is in “ready” mode, the eight function keys shall show the most commonly used reduced-fare presets and farebox operations, with appropriate indications shown on the OCU display such as CHILD, SENIOR, or XFER ISSUE. It shall be possible to reach secondary screens by means of a single keypress.

OCU Operation
It shall be possible to press pushbuttons used to register a cash fare before, during, or after the insertion of money in the farebox to obtain the proper count. Pushbutton keys used as tally counters shall require no money to be inserted to obtain a count. Each time a pushbutton is depressed in the proper manner, a tone shall sound, indicating that a count has been made in the corresponding farebox data register. If a pushbutton is disabled, its use shall have no effect on the farebox.

It shall be possible to use the OCU display and keypad for tasks such as driver logon and logoff, creation of "route/run" records, and review of the contents of the farebox summary data registers. It shall also

be possible to use the display and keypad in connection with farebox maintenance. Prompts and menus shall be shown on the display to aid the driver or maintenance technician in performing such tasks. At a minimum, the OCU shall provide the following screens:

- Logon screen to permit driver ID, route, run, trip, fare set, and similar information to be viewed and modified.

- Maintenance screen to permit automatic sequence testing to be initiated and other maintenance tasks to be performed.

- Farebox data review screen to permit the contents of the farebox summary data registers to be viewed.

Q. Farebox Logic

The farebox shall be provided with programmable electronic logic to monitor and control operations. The farebox logic shall have the ability to record and store transactional and other operating data and upload it to a central data system.

Re-Boot Time
If external power is interrupted, the farebox logic shall (a) have the ability to automatically reload software from memory and resume normal operation ("reboot") within one-tenth of one second from the time at which normal power is restored, or (b) shall be provided with an uninterruptible power supply (UPS) to ensure continued operation. A transaction in progress when external power is lost shall resume from the point of interruption when power is restored or, if a UPS is supplied, shall continue without interruption. Modification of existing bus power shall not be required to meet this requirement. Proposers shall be prepared to demonstrate the ability of their equipment to meet these specifications prior to contract award.

Fare Registration
Upon determining that an inserted item is a valid fare medium, the coin validator, bill transport, card reader, MCPU, and/or smart card processor shall send appropriate signals to the farebox's electronic logic. As each transaction is completed, it shall advance electronic data registers in the farebox that shall record the following:

- The total value received by the farebox since it was last probed.

- The total value received by the farebox since installation or clearing of the farebox memory.

- The total value of paper currency received since the farebox was last probed.

- Count of tokens received since the farebox was last probed.

- Fare transactions by type, including transfers accepted and issued.

A separate "unclassified revenue" register shall be used to record the accumulated value of all cash displayed on the driver's digital display but not counted toward a completed transaction.

The farebox shall have the ability to identify and record the use of up to forty-eight (48) non-cash revenue items, known as TTPs (ticket/token/pass). Each time a TTP is recognized by the farebox the farebox logic shall add one count to the tally for that category of TTP. The farebox shall beep to indicate that a fare has been paid.

Summary farebox data shall be available for review via the OCU display. All data, summary and otherwise, shall be uploaded to the data system computer during data probing for use in the preparation of management reports. The farebox shall be able to retain data in the non-volatile portion of its memory for at least 15 days after being removed from power. Lead-acid batteries, which may leak, shall not be used for this purpose.

Barcode Ticket Module
The Validating Farebox shall incorporate a barcode module that is capable of reading and processing barcodes created by a Mobile Ticketing Application. The barcode module incorporated into the Validating Farebox shall:

- Be housed completely within the Validating Farebox such that installation of the Validating Farebox shall provide ease of use by the customer when scanning their barcode and provide quick and easy presentation and removal of a ticket or smart phone
- Provide no hazard from the barcode reading laser or other components
- Be commercially available
- Have firmware upgradeable
- Be high resolution (greater than 0.8 megapixels)
- Interface with the Validating Farebox via USB cable or other standard interface for power and data communications
- Be capable of reading 2D barcodes no less than 2 inches square while the media is in direct contact with the barcode reader outer lens
- Be capable of reading 2D barcodes no greater than 1 inch square from a distance of no less than 6 inches.
- Read secure 2D barcodes (including but not limited to: QR code, Data Matrix, Aztec, PDF417, or other CARTA-approved format)
- Utilize an encryption key and AES encryption algorithms to process secure 2D barcodes
- Forward validity information to the Validating Farebox logic for processing and determination of validity using standard data communications protocols
- Have a first read accuracy of not less than 99.5%

Fare Table

The farebox shall have the ability to have ten (10) fare sets programmed into its electronic logic. All the fare sets taken together shall constitute the fare table. Each fare set shall consist of a predetermined full fare plus various reduced fares. When a given fare set is used, the farebox shall count up and display the amount of inserted cash until the full fare is reached, at which time the fare shall register automatically. Alternatively, the driver may accept a reduced fare by use of the farebox keypad, as described in these specifications.

Within a given fare set it shall be possible to specify different fares for the various passenger categories for each type of fare medium in use. It shall be possible to establish different fare sets for different classes of service, such as local, express, shuttle, holiday or promotional fares. It shall be possible for the driver to switch fare sets at any time via keypad entry. Switching the fare set shall automatically cause the creation of a route/run record in farebox memory.

The fare table shall be stored in non-volatile memory in the farebox and shall be programmable via the keypad using appropriate devices and authorization codes or the via the data system as described below. Either of these methods shall be usable alone, without the use of the other. Reprogramming shall not require the physical replacement of parts within the farebox. In normal circumstances the fare table shall be maintained via the data system and automatically downloaded to the farebox whenever the farebox is probed.

Farebox Diagnostic Reporting
The farebox and its electronic logic shall be designed to provide trouble reporting and self-testing and diagnosis.

a. *Automatic Sequence Testing*. The farebox logic shall be capable of sequentially exercising the coin validator, bill transport, MCPU, driver's display, passenger display, and audio transducer. The automatic sequencing shall be initiated by pressing the appropriate sequence of keys on the OCU or, if the OCU is unavailable, the insertion of a test plug. Each assembly shall be exercised a minimum of four times during the automatic sequence. The testing sequence shall continue until the test plug or similar device is removed. The amount of time during which the testing sequence was run shall be recorded by the farebox in terms of minutes and seconds. This time shall be available for display on the information display.
b. *Preventive Maintenance Report*. The farebox logic shall track the operation of farebox modules requiring preventive maintenance. When the number of operating cycles for a given module reaches an agency- programmable threshold, the farebox shall generate a maintenance alarm. The alarm shall be transmitted to the data system on probing for use in generating management reports.
c. *Power Supply Monitoring.* The farebox shall monitor and report the number of times the primary power source has gone to zero (0) volts and back to normal, indicating an intermittent power line, poor ground, or faulty switches.
d. *Security Door/Cashbox Alarms*. An alarm shall be recorded in the farebox memory if the cashbox door is open longer than a programmable period (typically three minutes) or if the time the cashbox is removed exceeds a programmable period (typically three minutes) from the time the farebox is probed. Both alarms shall be uploaded to the data system the next time the farebox is probed. The alarms shall indicate the time of occurrence, duration (how long the door was open, how long between cashbox removal and probing), and the amount of money then in the cashbox.

e. *Cashbox Full Indicator*. The driver display shall indicate when either the coin or the bill compartments of the cashbox reach 80% of capacity and when they reach 100% of capacity. Once the cashbox is extracted, the coin and bill compartment registers shall be automatically set back to zero.

f. *Coin/Bill Totals*. The farebox logic shall provide counts for each type of coin and token processed. This is above and in addition to the requirements for cumulative value described above. The farebox shall also provide a count of bills and magnetic fare documents processed. These counts shall be used for audit purposes and as an indicator of the need for periodic maintenance.

Route/Run Segmenter

The farebox shall be equipped with a route/run segmenter. The route/run segmenter shall permit the driver, by pressing buttons on the keypad, to make a route/run record in the farebox memory reflecting accumulations in the data registers since the last route/run record was created. The farebox shall have sufficient memory to permit the creation of approximately 250 such records, whose length shall be not less than sixty (60) numbers ranging from 3 to 6 digits each.

The information stored in the segmenter shall not be accessible through the information display but shall only be available for transmission to the data system computer, as later described in these specifications. Data shall not be available to the driver for editing in any fashion.

To create a primary route/run record: The driver shall press specific buttons in a prescribed sequence to cause the log-on screen to appear on the OCU display. The driver shall then have the ability to change route, run, trip, or other information using the OCU keypad. If the driver does not enter a new number the previously entered number shown on the display shall be used for the new route/run record.

It shall be possible to have a new route/run record created automatically at set intervals based on the real time clock in the farebox. The default time period shall be one hour increment.

To create a secondary route/run record: The driver shall press specific buttons in a prescribed sequence. The information display shall show the words "R/R No. ##," where ## indicates the record number. The creation of this record shall be confirmed by the audio transducer emitting a warbling sound.

In general, route/run records shall be automatically created whenever any of the following events takes place:

- The driver, route, or run number is altered.
- The driver pushes the prescribed buttons in the prescribed sequence to create a route/run record. Route/run records shall also be created when any of the following events take place, stamped with a special code indicating the type of event that took place:
    - Midnight
    - The farebox is placed in bypass
    - The farebox is removed from bypass
    - The cashbox is removed
    - A cashbox is inserted
    - The electronic key is used (key number shall be saved)

- The cashbox access door has been opened at other than the time of normal data probing
- The cashbox access door has been closed at other than the time of normal data probing
- The farebox is probed
- The farebox internal clock fails
- The route/record memory capacity is about to overflow
- Changing from one fare set to another.

The farebox shall contain a real time clock which shall store the time at which the route/run record was created and stored. This clock shall record hour, minute, and date. Each time a route/run record is made by the driver the farebox shall sound a tone indicating completion of the event.

Operator Logon/Logoff
Prior to the start of service, the farebox shall be disabled until the driver has logged on using the OCU. When the farebox is logged off, any inserted coins shall be directed to the coin return cup, no bills shall be accepted, no magnetic tickets shall be read, and no optional smart cards shall be processed. However, the OCU keypad and display shall be functional.
To log on, the driver shall press a prescribed sequence of keys on the OCU to cause the logon screen to appear on the display. The logon screen shall show the driver, route, run, and trip numbers and other pertinent information. The driver shall log on by entering the appropriate data using the OCU keypad and pressing a prescribed key or keys. This shall register the logon in farebox memory, following which the farebox shall be ready for service.
Driver logoff shall occur when:

- The driver presses the appropriate sequence of keys on the OCU keypad
- Four hours (programmable) elapses without activity
- The farebox is probed
- The internal power switch is turned off.

R. External Interfaces

Bus Fare Collection System Interface
The bus fare collection system shall have the ability to communicate with compatible external devices for the purpose of exchanging data and in support of integrated operational functionality. To the extent practical, the external communication architecture shall be designed in conformance with open systems standards and shall be free of non-standard, proprietary technology. The farebox and OCU shall be provided with an asynchronous serial communications port compliant with the SAE J-1708 and J-1587 standards in addition to communications ports utilized by Contractor-provided devices.

The bus fare collection system shall have the ability to communicate with the following on-board devices through J1708/1587, provided such devices have the necessary communications interface or are capable of being provided with such interface:

- Electronic destination signs
- Computer-aided dispatch/automatic vehicle locator (CAD/AVL) system.

Data System Interface
The data system shall have the ability to interface to the following customer-provided systems:

- Local area network (LAN) via Ethernet
- Wide area network (WAN) via TCP/IP

S. **Farebox Construction**

Mechanical Detail
The farebox and its mounting fixtures shall be designed and built to discourage vandalism and theft. Finishes shall resist corrosion. All exterior surfaces shall be clean and smooth with all corners rounded. There shall be no exposed bolt heads, nuts, sharp edges or cracks on the outside surfaces.

a. *Top Cover*. A top cover made of durable materials shall be provided on the upper portion of the farebox to house the entry bezels for coins, bills, and magnetic documents and allow maintenance access to the interior of the farebox. The surface of the cover shall be free of chips, blisters and other imperfections that may lead to chipping of paint or unattractive appearance. The top cover shall have affixed to it, by means of high yield adhesive, multi-color decals showing how to use the various fare media entry bezels. The top cover shall be secured to the farebox by means of a continuous hinge and a high security lock.

b. *Upper Portion of Farebox*. The upper portion of the farebox shall consist of a sheath made of stainless steel having an orbital satin finish, not less than 14 gauge. It shall be suitably reinforced for rigidity and have no external and/or removable fasteners that would provide access to the interior of the farebox. The upper portion of the farebox shall contain apertures to permit retrieval of returned coins and the viewing of magnetic fare document stock.

c. *Lower Portion of Farebox*. The remainder of the farebox housing shall consist of a cabinet made of stainless steel with a satin finish. The material shall be not less than 14 gauge, reinforced for rigidity. The compartment housing the cashbox shall have a door attached by a full length hinge and secured by a four point locking bar, actuated by a high security lock mounted adjacent to the door. The door shall have an aperture in the front through which a portion of the cashbox protrudes to indicate that the cashbox is present and ready to receive revenue. There shall be no gaps which would allow the door to be easily pried or broken open. Breaking into the farebox shall entail damage so extensive so as to be easily noticeable.

Keys and/or locks that are captive to the lower portion of the farebox and used to interface with the cashbox shall be securely fastened and removable only in an authorized manner. Guides shall be employed within the cashbox compartment to assure that the cashbox is properly aligned. Wires and cables which are run through the lower portion of the farebox to the upper

portion shall be run in a protected channel and/or raceway. No wires shall be visible inside the cashbox compartment.

d. *Base Plate*. The bottom of the farebox shall have a base plate to permit mounting to the bus floor. The dimensions and construction of this base plate shall provide the necessary lateral stability for the farebox without secondary anchorages. The base plate shall be affixed to the floor by means of carriage bolts from the interior of the bus, with the washers and nuts on the underside of the floor. The base plate shall be made of cast aluminum, suitably ribbed for added strength.

   The lower part of the farebox shall be suitably designed and reinforced to prevent deformation in service, deterioration or loosening that would subject the farebox to increased vibration, wear, metal fatigue or other stress.

   The upper and lower portions of the farebox shall be securely fastened together by means of high yield bolts, accessible only from the interior of the farebox. The completed assembly shall measure not more than forty- one inches (41") high, or thirty-six inches (36”) high if the short model farebox is purchased, as measured from the bus floor, and not more than ten (10") inches in cross section.

e. *Modules*. The principal internal components of the farebox, including the coin validator, bill validator, bill transport, swipe card reader, MCPU, smart card processor, barcode media reader, and main logic board, shall be modular in construction, consisting of self-contained units with polarized quick-connect electrical fittings to permit rapid removal and replacement.

   The coin validator shall be a self-contained module which may be removed and replaced within two (2) minutes by a trained technician.

   The bill transport shall be a self-contained module which may be removed and replaced within one (1) minute by a trained technician. It shall be built of sheet steel for rigidity, provided with captive fasteners and be self-aligning upon insertion. It shall be capable of being locked within the farebox. There shall be no protrusions on which bills may snag, which could cause a jam.

   All major modules including the coin validator, bill validator, bill transport, coin escrow, cashbox, circuit boards, upper case, and lower case shall be marked with unique serial numbers.

Electrical Details

a. *Printed Circuit Boards:* Farebox electronics shall be of the solid state type, assembled on glass/epoxy printed circuit boards. These boards shall be modular (plug connected) and removable for inspection and/or maintenance. The components mounted on the board shall be soldered in place except for items intended for ready removal, which shall be seated in high quality sockets. Where electronic circuit boards are to be inserted and/or removed by means of board guides, they shall be provided with lifting tabs. All circuit boards shall be provided with polarized plug connectors. No harness wiring shall be directly connected by means of solder to any board which is intended to be removed for maintenance or inspection. All printed circuit boards shall be conformal coated to resist the effects of moisture. All circuit boards shall be factory pretested under power for a minimum of 72 hours prior to final inspection within the farebox. All segments of the electronic displays shall be tested for a minimum of 72 hours.

b. C*onnectors*: The farebox shall be connected to external bus power by means of a polarized, snap connect plug on the underside of the farebox. All major electrical/electronic subassemblies and devices shall be connected to the farebox by polarized positive plug connectors. Electrical contacts shall be made of durable materials. Wires and multi-conductor cables, where used, shall be color coded and/or marked to permit positive identification. Connectors shall be of the positive engagement type and be resistant to unplugging under conditions of vibration.
c. *Switches and Fuses*: Fuses or other protective devices shall be employed to protect the electronics, motors and other components from overload and damage. A master disconnect switch shall be provided inside the farebox to disconnect the farebox from external power. This switch shall be of the on-off type and shall be clearly marked.
d. *Power Supply*: The farebox power supply shall be large enough to provide adequate power to the various farebox components and for any optional equipment that may be supplied with this procurement. The farebox electronics shall provide under- and over-voltage protection. The complete loss of power to the farebox shall not cause any data contained in electronic memory to be lost or altered. The electronic memory shall be capable of retaining data without bus power for a minimum of 15 days.
e. *Protection*: The farebox electronics shall be protected against electromagnetic interference (EMI), vibrations, ultraviolet light, or other environmental conditions that would cause the farebox to become inoperative and/or lose data.
f. *Counting Precedence*: The farebox logic shall be designed to give the counting of inserted coins or bills precedence over any other function. The farebox processor shall be active at all times, requiring no manual intervention to start.
g. *Ventilation*: Electrical and electronic components shall be arranged to permit adequate ventilation to prevent heat buildup.
h. *Access*: Maintenance access to the electronics, power supplies, and other electrical components shall not require removal of the cashbox from the farebox nor the removal of the farebox from the bus.

The farebox circuits shall be designed to draw minimum power from the bus battery. The farebox shall have three power levels:

- "Process" mode – when a fare transaction is in progress, the power draw shall not exceed 180 watts peak, 25 watts typical.

- "Ready" mode – the farebox is logged on and ready to collect revenue. During "ready" mode the farebox passenger display shall cycle through a series of instructional messages, the lights illuminating the various fare entry bezels shall be on, and the backlighting on the driver's display shall be extinguished. "Ready" mode shall be activated after a predetermined time, e.g., 3 minutes after the last transaction or when the farebox is probed. Power draw in "ready" mode shall not exceed 29W.

- "Standby" mode – the farebox is logged off; all lights are extinguished. Power draw in "standby" mode shall not exceed 12W.

The farebox circuitry shall include at least two open data ports for subsequent installation of communications links with other on-board devices. One of these ports shall comply with the SAE J-1708 standard.

T. Data Port

The farebox shall be provided with a non-contact data port to permit high-speed communication between the farebox and the data system via a data probe during routine servicing. Such communication shall include the uploading of farebox transaction and operating data to the system computer and the downloading of the fare table and other configuration parameters from the data system computer to the farebox. Either infrared or wireless technology is acceptable. The data port shall be an integral part of the farebox. If infrared technology is used, the data port shall be positioned to permit easy interface by a probe operator. The port shall be protected against the entry of dirt and water by means of a solid membrane. The data port shall have guides to assure proper alignment of the probe. All fareboxes provided shall be equipped with such a data port, tested and ready for use.

If a wireless communication system is proposed, the contractor shall be responsible for all tasks necessary to ensure that the probing system is operational and fully functional, including site survey, licensing, installation and testing. The vendor shall provide full redundancy of the wireless communication path and comply with all agency and other applicable policies regarding network security and data access. Bidders proposing wireless systems shall describe in their proposals a minimum of three previous installations where they provided such compliance, including customer contact information. Vendors shall also be prepared to provide details and certification of such compliance prior to contract award.

Ensuring the integrity of data received from the fareboxes is of paramount importance. Given the relative novelty of wireless technology in transit applications and concerns about hacking, interference, “data sniffing” and the like, rigorous testing of wireless technology will be required prior to system acceptance.

U. Cashbox

General
The cashbox shall be rectangular to fit within the cashbox compartment in the lower portion of the farebox. The cashbox shall have two separate compartments, one for coins/tokens and one for bills.
The cashbox shall have a useful interior volume of not less than 580 cubic inches and shall be capable of holding approximately $500 in mixed coins and a minimum of 600 items of U.S. paper currency in unfolded "street" condition (not "brick" or mechanically stacked or compressed) or paper equivalent.

The separation of bills from coins shall be positive. When empty, the cashbox shall weigh no more than 18 pounds. It shall be provided with a handle to permit it being carried by a person with a gloved hand. Removal of the cashbox from the farebox shall require opening of the cashbox access door in the lower portion of the farebox by activation of the electronic lock described later in these specifications.

Construction
The cashbox shall be made of stainless and plated steel, 20 gauge minimum. It shall be of welded construction with no exposed external fasteners. The parts of the cashbox that come in direct contact with the farebox shall be abrasion-resistant. Rough service shall not cause the cashbox to become distorted.

The cashbox shall be designed and fabricated in such a manner as to prevent extensive tolerance buildup and resultant vibration that could be detrimental to proper operation of the cashbox. The cashbox shall function in a dependable manner in the transit environment.

The mechanism and operation of the cashbox shall be positive and at no time during the collection or transfer of revenue expose the interior of the cashbox or its contents. The cashbox shall fit into the farebox in a unique position and shall be placed into the ready position to collect revenue by a single continuous motion.

The farebox shall remain inoperable until the cashbox is properly inserted and ready to accept revenue and the cashbox access door is closed and locked. The cashbox shall not have lids, covers or other elements that may be detached from the cashbox. The operation of the cashbox shall be such that it shall be locked and sealed unless it is in a farebox or receiver for revenue transfer. There shall be no unauthorized means of gaining entry to the cashbox or other than physical destruction of the cashbox, which shall be immediately noticeable through visual inspection.

The locks and keys used on the cashbox shall be of the high security type as defined in this specification. The operation of any keys within the locks shall not require excessive torque that would damage either the key or the lock.

The mechanism employed to open and/or close the cashbox shall be positive and smooth in operation. Internal locking mechanisms shall be constructed of strong and durable materials. The term "internal locking mechanisms" refers to all components, including levers, slides, cams, etc., that are required to release the cashbox from the farebox or lock it in place in the farebox. The interior of the cashbox shall afford gravity discharge of the contents during revenue transfer, while maintaining separation of coins and bills. There shall be no ledges or other areas where coins, bills or other fare media may lodge or impede the operation of the cashbox.

A permanent serial number shall be inscribed on the cashbox in such a way that it shall be visible when the cashbox is in the farebox and the access door is closed and locked.

V. Security

The highest degree of security shall be employed in the design and manufacture of the farebox and the cashbox. No seams and/or openings shall be permitted by which deposited money may be removed in an unauthorized manner.

Locks and Keys
All locks and keys used on the farebox shall be of the high security type defined as follows: A high security lock is pick resistant and of the multi-tumbler type. It employs hidden and/or complex keyways to require the insertion and/or removal of the key in a uniquely correct position. Making an unauthorized duplicate of the key for a high security lock by means of impressions or similar technique presents a high degree of difficulty.

Security keys shall be registered by the Contractor to CARTA. Only authorized and registered CARTA personnel shall have the ability to order new or additional keys from the Contractor.

The lock and key used for the cashbox shall be of the rare earth magnetic type, MIWA or approved equal. This key shall not resemble a common house key in overall appearance and shall not be removable from the farebox without incurring damage.

The lock and key used for access to the farebox shall be a high security pin and tumbler lock.

Four (4) sets of Keys shall be provided with the option to order additional as needed.

Baffles
The farebox design and in particular the chutes and mechanisms directing coins and bill to the cashbox shall employ baffles and/or special geometry to prohibit access to or "fishing" of the cashbox upon removal of the coin or bill module from the farebox enclosure.

Cashbox Identification
The farebox shall be fitted with a device to automatically read a four (4) digit serial identification number on the inserted cashbox. The method employed shall not require electrical contacts, plugs or other physical connections between the farebox and the cashbox. Reading of the cashbox ID number shall be automatic and continuous while the cashbox is installed. The cashbox ID number shall be stored in the farebox memory for subsequent data transmission. The data system shall have the capability of inventorying the numbers of all cashboxes in the system.

Electronic Lock – Cashbox Access Door
Each farebox shall have a cashbox access door built into its lower portion that shall protect and conceal the cashbox inside. The door shall have a full-length hinge on one side and four catch points on the opposite side. The door shall have a small opening on it so that the presence of a cashbox may be observed. The door shall fit to the farebox using a labyrinth arrangement to deter prying. The door shall be fitted with an internal electronic locking device that shall permit the door to open upon successful transmission of data or receipt of a proper security signal from other devices.

The farebox logic shall have the ability to retain a specific five digit security code number. This number shall be modifiable at any time by downloading from the data system under authorized conditions. It shall be possible to change the security code in the farebox by means of the data system or by a portable electronic key.

When a data system probe is interfaced with the farebox, a coded number shall be transmitted to the farebox. If this number exactly matches the number previously stored in the farebox, the farebox shall release the locking pins on the door. The door shall then open, permitting the cashbox to be removed.

The data system shall be designed so that the security code may be entered using the data system. After proper entry of the security code, the data system shall display a menu with the options "LOCKS ENABLED" or "LOCKS DISABLED." If "LOCKS ENABLED" is selected, the cashbox access door shall unlock when the farebox is probed and data is extracted. If "LOCKS DISABLED" is selected, the farebox and the data computer shall exchange data, but the cashbox door shall not unlock. Closing the cashbox access door and holding it in the closed position for approximately one-half (0.5) second shall cause the locking mechanism to engage the door pins and lock the door. If the door is slammed, with rebound, the mechanism shall not engage.

Portable Electronic Key

A portable electronic key shall be provided to enable CARTA staff to open the cashbox access door in an authorized manner as an alternative to the data probe. Each time a portable electronic key is used, the farebox shall record the key's serial number for subsequent uploading to the data system.

The portable electronic key shall consist of two major parts, a probe and a belt-mounted electronics module. The probe shall be made of metal shaped to fit a person's hand in a comfortable manner. At one end of the probe shall be the optics, windows and bezel needed to interface with the farebox. The probe shall be connected by cable to the belt-mounted electronics module, which shall contain the required electrical interfaces and battery. The connecting cable shall be a six-foot, four-conductor coiled telephone cord, with quick release push plugs at each end.

The battery that powers the portable electronic key shall be a commonly available nine-volt alkaline type. To conserve battery life, the probe shall be fitted with a momentary contact switch that shall be pressed to activate the portable key. An audio transducer on the belt-mounted electronics module shall alert the operator to a "low battery" condition. The electronics module shall also contain the memory needed to receive and retain the unique code number used to unlock the cashbox access door. The portable electronic key shall be of all metal, water-resistant construction. It shall be sufficiently protected to withstand use in an outdoor service lane in all types of weather.

W. Magnetic Document Stock

The Contractor shall supply pre-printed and pre-encoded magnetic fare document stock conforming to the specifications below and in the quantities indicated for all documents to be printed and/or processed in the MCPU.

Size and Type
Ticket stock intended for use in the MCPU shall be:

- Die-cut to credit card size (2.125" by 3.375") and shall have dimensions as defined in ANSI/ISO standard 7813-1987 for identification cards, except that stock used for transfers shall have a thickness of .007 inches ±.001 inches and all other stock shall have a thickness of .010 inches ±0.001 inches.

- Two types of document material shall be provided: polyester stock for use in long-duration items such as passes, ID cards, etc.; and paper stock for short-duration items such as transfers. Unless otherwise specified document stock shall be white.

- Magnetic material shall be applied either by coating, extruding, or tape transfer processes. It shall be impossible to separate the stripe from the document stock intentionally without visually degrading the document surface. Operation in the equipment shall not cause the stripe ends to lift, nor shall any portion of the stripe separate from the document stock during normal handling or use.
- Abrasiveness of the magnetic material shall not cause magnetic head wear at a rate greater than that caused by standard credit card tape.

- It shall be possible to issue multiple types of cards from the same internal stock, including transfers, day passes, change cards, and receipts.

- If limited-use (LU) contactless cards are proposed, all functional capabilities stated within this specification for magnetic cards shall apply.

- All proposed fare media shall be service proven. If novel fare media are proposed, e.g., limited-use contactless cards ("paper smart cards"), proposers in their submittals shall fully explain their methods and experience in delivering and supporting the proposed fare medium.

Flatness
Ticket stock shall be flat and not have any curl in the "X" or "Y," or diagonal planes. Variation from true level shall be less than 1/16th of an inch on any corner of a single card, as measured on a flat surface, at 65 degrees F. and 80% RH.

Resistance to Moisture
Ticket stock provided shall be dimensionally stable in high ambient moisture conditions. The ticket material or coating shall be such as to prevent one ticket from sticking to another while in the cassette or experiencing curl due to moisture.

Static Printing
Transfer stock shall be printed on one side with information relating to direction of insertion and identifying information, as well as a small number indicating time and place of manufacture. Contractor shall submit proposed art work to the Customer for approval. Art work shall be for single color printing and comply with Contractor requirements for color, ink coverage, borders, and the like.

Packing
Transfer stock shall be packed in boxes with not less than 1,500 cards per box. Boxes shall be clearly marked as to contents and date and source of manufacture. All ticket stock shall be printed with an identifying number.

X. DATA COLLECTION AND REPORTING SYSTEM

General
The Contractor shall furnish and install a Data Collection and Reporting System (DCRS) at the CARTA location. The DCRS shall communicate with the fareboxes to extract transaction and event data and download operating parameters and related information. The DCRS shall communicate with the vault to extract cashbox identification from cashboxes inserted in the receiver. The DCRS shall be complete and fully functional, with all necessary items of hardware and software installed and tested, and shall be furnished with such software licenses as may be required. The DCRS shall provide one or more data probes linked to a computer capable of extracting and storing data from the bus fareboxes during routine servicing. The data system shall be capable of generating comprehensive management reports for use by CARTA.

A global positioning system (GPS) will be provided that is capable of processing raw geographic data (latitude/longitude coordinates) into a form suitable for transit use, e.g., bus stop number.

Composition
The farebox shall be capable of receiving GPS messaging and shall also include this data for each transaction. The data shall then be sent to the central computer system (CCS) through the probing computer and network manager to be integrated into the System data for inclusion in reports.

The DCRS shall be capable of managing all messaging including auto-load, hotlisting, fare media processing from the CCS and as required in this Specification.
The DCRS shall consist of the following:

1. The specified number of data probes with junction box, supporting poles, lock-boxes to secure the probe when not in use, interconnecting cabling, and an isolation box for transient voltage protection.
2. Computer system consisting of a computer with display and keyboard and other hardware and software as described in these specifications.
3. Cashbox ID computer.

The Contractor shall also provide support equipment, maintenance documentation, hardware and software documentation and operational training.

Y. Data Probe and Cabling

Data Probe
If an infrared data probe is proposed, it shall permit bi-directional communications between the farebox and the data system by means of non-contact technology. The probe shall be a handheld device positioned and touched to a mating data port on the farebox, requiring no plugs or physical electrical contact.

The case of the data probe shall be a hardened aluminum extrusion or casting, containing the necessary hardware for communication between the probe and the farebox. The probe shall be configured with a window of infrared-transparent plastic behind which is a communications link composed of an LED and photosensor. A slot shall be provided within the extrusion to support the probe printed circuit board. A strain relief shall be provided to support the data cable.

The data probe and cabling shall be rugged enough to withstand the rigors of extended operations under extreme temperature and humidity variations and shall be impervious to degradation due to diesel fuel, gasoline, oil, transmission fluid, road salts and sunlight. The data probe shall be capable of being dropped from a height of three (3) feet onto a concrete surface with no resulting loss of operation.

An LED lamp shall be provided in an easy-to-see location on the probe to aid in the proper orientation and operation of the data probe. The LED shall pulse at a rate of once per second to indicate that the data computer is operational and the data probe is ready for use. Once the probe is interfaced with the farebox data port, the LED shall flicker while data is being exchanged and then glow steadily for five seconds to indicate that transmission has been completed.

Data Probe Cable
The data cable shall be custom made with three (3) twisted wire pairs, a shield, and a heavy polyurethane jacket flexible at low temperatures and resistant to salt, moisture, abrasion and fuel. Cable length shall be twenty-five (25) feet. The cable shall be supported in the center by a retractor mechanism designed to hold the cable out of the way when not in use. The retractor may be attached to a supporting pole or to an existing structure. A lockable box shall be provided to hold the data probe when not in use. The Contractor shall furnish and install all hardware required.

Fare Table
The data system shall have the capability of changing the fare tables in the fareboxes per the procedure previously described. Each fare table assigns the value of a full fare as well as any reduced fares (student, elderly, etc.). Each individual fare amount may be between $0.01 and $39.99. It shall be possible to change the values through the farebox keypad or data system without removing or replacing any of the farebox electronic components. In addition, the following shall be transmittable:

- Current time and date (any valid time and date)
- Electronic lock code (any 5 digit number)
- Holidays (up to eight valid dates)
- Start/stop times for AM and PM peak periods
- Keypad attributes (tally, tally/clear display, and value increments from 0.01 to 39.99)
- Fare table store option (should the data system transmit the fare structure to each farebox probed)
- Lock code action (should the farebox unlock the cashbox access door upon probing)
- Transfer acceptance parameters
- TTP (ticket/token/pass) acceptance parameters and other attributes

Configurable Parameters
The data system shall have the ability to enable or disable various functions such as ticket types, or other designated parameters as previously defined in this document.

Individual Farebox/Bus Reports
For individual farebox reports, the printed report shall show the following categories of data at minimum:

- Current revenue (since last probing)
- To-date revenue
- Unclassified revenue
- Total full fare riders (ridership data shall be supplied for each fare table in use)
- Key 1 – number of riders
- Key 2 – number of riders
- Key 3 – number of riders
- Key 4 – number of riders
- Key 5 – number of riders
- Key 6 – number of riders
- Key 7 – number of riders
- Key 8 – number of riders
- Key 9 – number of riders
- TTP 1 through 48 – number
- Total tokens

- Total stored ride/value cards
- Total passes
- Total bills
- Total coins denomination
- Payroll
- Timekeeping

Z. Transactional Database and Reporting

The farebox and data system shall be equipped with the software necessary to support a transactional database in which selected farebox transactions and/or events shall be individually time-stamped and recorded in farebox memory for uploading to the data system during routine probing. At the option of Customer, the transactional database shall be capable of recording:

- Events only (e.g., farebox probed, cashbox door open, route/run record created)
- Events and non-cash fare transactions
- Events and both cash and non-cash fare transactions.
- Mileage data, revenue, and deadhead.

The transactional database shall have the ability to capture the serial number of the card used in each transaction and report it to the data reporting system. It shall be possible to track all uses of a given card, category of card, or employer account for any time period, route, etc. This information may be used for audit and security purposes, especially where high-value cards or credit card acceptance is implemented.

Each transaction shall be individually recorded in such a way that it is possible to determine day, time, route, and run for each fare paid.

To maintain the security of the database, all database transactions shall be logged. Data shall be stored in a format that is not alterable by general database tools. The software driver for the ODBC interface shall be configured in read-only mode and shall not allow the user to modify revenue data directly. Needs to be queryable or exportable to a useable format. Needs to have customizable queries.

The transactional database shall be capable of storing the following types of transactions:

- Cash fare. Includes fare type (full fare, pushbutton or TTP) plus time (minutes and seconds)
- Period pass. Includes serial number, time
- Stored value card. TTP, fare deducted, remaining value, serial number, time
- Stored ride card. TTP used, remaining rides, serial number, time
- Transfer accepted. Route, direction, serial number, time
- Transfer issued. Key used to issue, time
- Non-magnetic ticket or token processed. TTP used, time.

For period pass transactions, the database shall be capable of storing the following information at minimum:

- Pass serial number
- Pass type
- Passenger category
- Employer account number if applicable
- Other data fields shall be provided to permit recording of peak/off-peak usage.

2.2 SCOPE OF WORK - DOCUMENTATION

The Contractor shall supply complete documentation of hardware, software, and operating system. Such documentation shall consist of, at a minimum, schematics, service manuals, and operating manuals.

A. Operations and Maintenance Manual – Fareboxes

The Contractor shall provide an operations and maintenance manual for the fareboxes. The operations portion of this manual shall explain the functions and features of the farebox in detail and provide instruction on the various operations and remedial actions to be taken by the driver. The Contractor shall also provide pocket size driver's reference brochures describing how the farebox shall be operated, with simplified flow charts of actions to take when pulling out (logging onto the farebox), changing fare tables, and responding to problems such as coin and bill jams.
The maintenance portion of the manual shall contain but not be limited to:

- Description of operation
- Installation procedures
- Complete parts identification diagram and list
- Troubleshooting procedures
- Inspection procedures
- Diagnostic procedures
- Written diagrams
- Electrical schematics with board and cable identification
- Adjustment procedures.

B. Manuals/Drawings – Vaults

The Contractor shall provide manuals and drawings identifying the various parts and assemblies in the vault equipment, including parts identification and repair procedures.

2.3 SCOPE OF WORK – TRAINING

A. Farebox Maintenance Training

The Contractor shall provide a comprehensive farebox and related equipment maintenance and repair training program to be conducted at CARTA’s facility. The instructor provided by the Contractor shall be well versed in the maintenance and repair of CARTA’s equipment. The Contractor's instructor shall make use of visual training aids such as viewgraphs and video tapes (if available) to further reinforce the material presented. Handouts to students are required.

The Contractor shall provide a three-day farebox training program including the following:

- Basic construction and operating features of the farebox and related equipment
- Examination and disassembly of major assemblies, including but not limited to:
  - Bill Transport
  - Coin Validator
  - Electronic chassis
  - Lower stanchion and cashbox
  - Electrical wiring harnesses
  - Troubleshooting procedures
  - Field-level repair of farebox and related equipment.

Each student shall be required to tear-down and build-up a farebox in the class.

B. **Revenue Collection System**

The Contractor shall provide training classes on the maintenance, troubleshooting and repair of the revenue collection system. This training shall be conducted at CARTA's facility immediately following installation of the equipment.

C. Cashbox and Vault Operations

The Contractor shall provide to CARTA the services of a qualified and experienced instructor to conduct classes for supervisory and maintenance personnel in the proper insertion and removal of the cashbox from the farebox.

D. Operations Training

The Contractor shall provide to CARTA experienced and qualified instructors who shall conduct one day classes at CARTA's training facility. This training program shall be for supervisory personnel, who in turn shall be responsible for the actual training of the drivers. The training program shall cover the operations of the farebox and shall make use of one of the fareboxes provided under this Contract for illustrative use.

E. Passenger Training

The Contractor shall provide CARTA with sample educational materials suitable for use in a public relations campaign aimed at educating riders about the new fareboxes.

2.4 SCOPE OF WORK – INSTALLATION AND SPARE PARTS

A. Fareboxes

The Contractor shall install the fareboxes in accordance with the following requirements: The Contractor shall supply all labor, supervision and materials required for the proper installation of the fareboxes in

vehicles owned by CARTA. All installation shall be performed at CARTA's location. The removal of existing fareboxes, storage and security of these units shall be the responsibility of CARTA.

Installed fareboxes shall be positioned for maximum ease of passenger movement and driver operation and compliance with accessibility requirements. The installed position shall allow for complete, unrestricted opening of all farebox maintenance and cashbox doors. Handrails or other equipment which may interfere with these access doors shall be identified by the Contractor at least 30 days prior to farebox installation so that CARTA shall have adequate time to reposition that which interferes with the farebox equipment prior to actual farebox installation by the Contractor.

The Contractor shall supply and install all the necessary wiring, protective devices and mounting hardware necessary for the proper installation and operation of the fareboxes. All new undercarriage wiring shall be suitably protected against the road elements and fastened so as not to interfere with normal bus operation and/or maintenance. No "butt connectors" shall be utilized under the bus.

B. Spare Parts

Spare Parts Requirements
The Contractor shall include in the price proposal spare parts as a **separate price schedule** and note the most utilized products.

C. Parts Availability

Contractor Designed Parts
The Contractor agrees to make available such parts, components, devices and/or assemblies used in the equipment and which is designed, made or otherwise controlled by the Contractor for a period of not less than ten (10) years from the date of equipment acceptance.

Commercial Parts
For those parts which are purchased by the Contractor from commercial sources and over which the Contractor has no control, the Contractor agrees to monitor the availability of such parts. If a part is to be discontinued and no longer available from the original source, the Contractor shall notify CARTA not less than six (6) months from the date of discontinuance to enable CARTA to purchase whatever parts are anticipated to be required for the remaining useful life of the equipment.

D. Maintenance Test Stands

The Contractor will provide maintenance test stands to allow CARTA staff to test all farebox components. This will include complete farebox wiring harness; plug in receptacles for all modules including the coin mechanism, bill transport, circuit board testing etc., as well as lights and diagnostics.

The Contractor will provide devices for testing and calibrating the farebox coin mechanisms and bill transports to maintain specification accuracy**.**

The Contractor will provide a list and price of ordinary and special tools needed to maintain the fare collection system.

2.5 SCOPE OF WORK – PHASE 2

A. Retail POS Terminals

CARTA would like to provide the capability for those who use the Retail POS Terminal (Terminal) to charge their transaction to a bank card. This feature will not be required for all users. The Terminal shall be capable of accepting bank cards from customers who which to purchase value for their smart cards or magnetic cards using a bank card either internally to the device or through other means. The Contractor is responsible for providing all associated software applications to perform this process and to ensure it is secure. It shall be possible to turn this feature on or off. CARTA intends to have a POS terminal at our main office and possibly at transfer center locations in the future.

B. Full Service Ticket Vending Machine

The Contractor shall install and connect the machines according to installation instructions provided. Subsequent to installation and connection, the Contractor shall test the FSTVM's and their connections to the CCS in accordance with the approved Master Program Schedule. The Contractor shall furnish all hardware for the proper installation. The Contractor shall comply with the requirements of layout, positioning, conduit assignment, and other features as detailed on the drawings of the project that will be provided by CARTA. CARTA may purchase a minimum of one and maximum of four full service ticket vending machines.

Installation and Interface Plan
As part of the Preliminary Design Review, the Contractor shall submit to CARTA for review and approval an installation and interface plan. Such plan shall indicate the method of installation and connections, the installation schedule, and any support required of CARTA Not less than 60 days prior to delivery of the first FSTVM. The Contractor shall submit for CARTA's review and approval drawings of the equipment installation, indicating details on the equipment installation, and electrical and communications connections.

Site Preparations
Data and power conduits for the machines will be installed by other project contractors. Conduits will be terminated in flush-mounted junction boxes. The Contractor shall install equipment so that all junction boxes and stubbed conduits are covered by the FSTVM.

Mounting
Mounting shall be in a secure, robust, vandal, and burglar-proof manner. Equipment cabinet mounting shall be stainless steel anchor bolts using epoxy or other materials approved by CARTA at the Preliminary Design Review. An integral base with suitable means for leveling the machines upon installation to accommodate the platform slope shall be provided by the Contractor. Access to the anchor bolts shall be through the hinged service front door or other access panels, in a manner that shall prevent unauthorized access. The FSTVM shall be fully supported by its anchors. It shall be possible to remove and replace the machine without damage to the platform, anchor bolts, or the equipment.

Electrical and communications wiring and cabling shall enter from underneath the machine, through its base. The machine shall be installed over the junction box such that no wiring or cabling is exposed outside the cabinet or base.

C. Cloud-Based Portal

CARTA would like to have a cloud based portal developed in the future. This shall be a fully integrated, comprehensive solution that allows CARTA total control over its fare management system. CARTA staff shall have the capability to run reports on key metrics plus the ability to create ad hoc reports.

The portal should also have the capability to give CARTA alerts on what buses need to be serviced as well as ridership data on each route.
The portal should be branded for CARTA and allow riders to purchase, register and manage passes at their convenience 24/7. Riders should not be required to create a profile in order to use the portal. The portal should be compatible on a computer, tablet, and cell phone.

The portal should allow partners to sell and manage smart cards for their riders. Partners should be able to create user groups and allow permissions.

3.0 PROPOSAL CONTENT REQUIREMENTS

Anything that any Offeror would like to modify, seek clarifications on, or otherwise deviate from, however modest, MUST be presented during the question and answer phase so it can be considered and determined by CARTA before the submission date for all proposals, so that all prospective Offerors will have a common and uniform basis upon which to submit their proposals.

A. GENERAL PROPOSAL REQUIREMENTS:

Proposals should be prepared simply and economically, providing a straightforward, concise description of the Offeror's capabilities to complete the contract.

1. The proposals must address all requirements of this RFP. Information must be current, up-to-date and completely address the RFP requirements.
2. Emphasis is on clarity of content—avoid jargon and rhetoric.
3. The proposals must be typed using a 12-point font size and employ margins of one inch or more.
4. Typed, bound, and presented in sections separated by tabs. The tabs will not count towards the page limit. Tab sections are specified below in Part 3, Section B.
5. Proposal copies and all supporting documentation must be exact replicas of the original proposal document. Each copy of the proposal must be bound in a single volume.
6. The Proposal must contain no more than forty (40) pages with the option to include appendices as needed to support the requirements of the RFP. Pages in the Proposal must be consecutively numbered. The numbering should not include the cover letter, table of contents, tabs, and blank pages, as they do not count toward the page limit requirement. Please mark blank pages as "This Page Intentionally Left Blank." CARTA prefers Proposals with double- sided pages.

B. REQUIREMENTS FOR EACH TECHNICAL PROPOSAL:

Each proposal shall include a Submission Letter, un-tabbed and unnumbered, which shall be signed and dated by a representative authorized to bind the Offeror. As part of its proposal, the Offeror shall provide, at a minimum, the following material and essential requirements in Tabs 1 through 9. Each technical proposal shall provide the following information, separated by corresponding numbered tabs:

Tab 1: Submission Form and Cover Letter. The proposal must be signed by a duly authorized officer.

Include contact information for that person or persons who will be authorized to represent the Proposer.

Tab 2: Capability and Experience.
A detailed list of items to include in this section is found in the Selection Criteria section following.

Tab 3: Technical Specifications.
Provide a clear and concise description of the equipment and services to be provided by your company under the contract. Describe the overall design to be used in carrying out this project. The information provided relating to the farebox system will be utilized to evaluate the proposal. Technical specifications must include a preventative maintenance program.

Tab 4: Warranty

Tab 5: Installation Schedule

Tab 6: Training Schedule

Tab 8: Required Forms

C. REQUIREMENTS FOR COST PROPOSAL:

- 76 electronic validating bus fareboxes each furnished with 2 cashboxes each.
- Installation of 76 fareboxes
- Data collection and reporting systems, to include necessary hardware, software and communication equipment
- All licenses for software, firmware and updates
- Certifications of warranty for hardware
- Installation and testing of the data system
- All manuals for operators, maintenance, and IT
- Training of administrative, operations and maintenance personnel
- Spare parts

4.0 SELECTION CRITERIA/SELECTION PROCESS

The following criteria will be used in evaluating the proposals:

1. **Farebox Quality: 30%**
   The proposer's technical submittal regarding farebox construction and system design, as well as documented reliability, maybe used in this evaluation. Other design and performance elements of the components which comprise those systems will be evaluated. Route data, ridership information, tests results and maintenance factors may be considered in determining final points.

2. **Capabilities/Experience: 30%**
   The Proposer's capabilities and experience, as well as those of manufacturers of key subsystems and components. At a minimum, the Proposer will want to include the following:

- A brief history of the Proposer's experience of transit fareboxes.
- The experience of the factory at which the fareboxes will be built, with specific references to production capacity, quality control, and quality assurance.
- A description of the company's product evaluation and testing cost control and partnering arrangements.
- Capabilities for customer technical assistance, including expertise and experience, any third-party certifications, typical response times for both emergency and non-emergency situations.
- Other current and pending farebox orders, identifying the number of fareboxes, the customer, and dates of first and last production and deliveries.
- Capabilities for provision and service of replacement parts, including availability and delivery times under emergency and non-emergency situations;
- Established programs for the training.
- Listing of at least five (5) references. Listing the name, address, telephone number of customer's representative that are compatible to type and quantity to this solicitation.
- Procedures for the development and updating of technical manuals and publications.

3. **Delivery: 20%**
   The Selection Committee will look at the proposed date of delivery and project completion, including training schedule.

4. **Proposed Warranty: 10%**
   Farebox construction and system design as well as documented reliability may be used in this evaluation as well as other design and performance elements of the components which comprise those systems. At a minimum, test results, safety and maintenance factors and cost of operation for the product design and system components proposed may be considered in determining final point for this factor.

5. **Proposed Preventative Maintenance Program: 5%**
   The information provided by the Proposer in its technical submittal relating to the product provided will be utilized to evaluate the proposal. Farebox construction and system design, as well as documented reliability, may be used in this evaluation as well as other design and performance elements of the components which comprise those systems.

6. **Training Schedule: 5%**
   Training of staff in the proper uses, functions, and appropriate maintenance of the system is deemed a deliverable, and the training schedule provided by the Proposer will be considered in the evaluation.

The Selection Committee will make a recommendation to the CARTA Executive Director. The Executive Committee will approve or disapprove the recommendation. The selected firm may be contacted for additional information concerning the submittal and contractual information.

BCDCOG retains the right to reject all proposals and to re-solicit if deemed to be in its best interests. Selection is also dependent on the execution of a mutually acceptable contract with the successful responder.

The selection of the successful proposal may not be the lowest cost but the best value for the COG.

Each proposal shall state that it is valid for a period of not less than ninety (90) days from the date of receipt.

5.0 FEDERAL CONTRACT PROVISIONS

1. General

The work performed under this contract will be financed, in part, by grants provided under programs of the Federal Transit Administration. Compliance with and citations to federal law, regulation, and guidance references include, but are not limited to, the Master Agreement FTA MA (17), dated October 1, 2015; FTA Circular 4220.1F, dated November, 2008, updated March 13th, 2013; "Best Practices Procurement Manual", updated March 13, 1999 with revisions through October 2005; 49 CFR Part 18 (State and Local Governments) and 49 CFR Part 19 (Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations) and any subsequent amendments or revisions thereto.

2. Federal Changes

Contractor shall at all times comply with all applicable Federal Transit Administration (FTA) regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Master Agreement between Purchaser and FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

3. Conflict of Interest

No employee, officer, board member, or agent of CARTA shall participate in the selection, award, or administration of a contract supported by Federal Transit Administration (FTA) funds if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when the employee, officer, board member, or agent, any member of his or her immediate family, his or her partner, or an organization that employs, or is about to employ any of the above, has a financial or other interest in the firm selected for award.

4. Lobbying

Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, PL 104-65 (2 U.S.C. §1601,et seq.). Contractors who apply or bid for an award of $100,000 or more shall file the certification required by 49 CFR part 20, “New Restrictions on Lobbying.” Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S. C. 1352. Each tier shall comply with Federal statutory provisions of the extent applicable prohibiting the use of Federal assistance funds for activities designed to influence congress to a State legislature on legislation or appropriations, except through proper official channels. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds

with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient.

5. Civil Rights

(1) **Nondiscrimination** - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6101 et seq., section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12101, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any business, employee or applicant from employment, participation, program benefits, business opportunities or employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

(a) The third party contractor and all lower tiers shall comply with all provisions of FTA Circular 4702.1B, “Title VI Requirements and Guidelines for Federal Transit Administration Recipients”, Oct 1st, 2012.

(2) **Equal Employment Opportunity** - The following equal employment opportunity requirements apply to the underlying contract:

(a) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(b) Equal Employment Opportunity Requirements for Construction Activities. For activities determined by the U.S. Department of Labor (U.S. DOL) to qualify as “construction,” the Contractor agrees to comply and assures the compliance of each subcontractor at any tier of the Project, with all applicable equal employment opportunity requirements of U.S. DOL regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 *et seq.*, which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order No. 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000(e) note, and also with any Federal laws, regulations, and directives affecting construction undertaken as part of the Project.

(3) **Nondiscrimination on the Basis of Age** – The Contractor agrees to comply with all applicable requirements of the Age Discrimination Act of 1975, as amended, 42 U.S.C. §§ 6101 *et seq*., and with

implementing U.S. Health and Human Services regulations, "Nondiscrimination on the Basis of Age in Programs or Activities Receiving Federal Financial Assistance, 45 C.F.R. Part 90, which prohibit discrimination against individuals on the basis of age.

The Age Discrimination in Employment Act (ADEA) 29 U.S.C. §§ 621 through 634 and with implementing U.S. Equal Employment Opportunity Commission (U.S. EEOC) regulations, "Age Discrimination in Employment Act," 29 C.F.R. Part 1625, which prohibits discrimination against individuals on the basis of age.

(4) **Nondiscrimination on the Basis of Sex** - The Contractor agrees to comply with all applicable requirements of Title IX of the Education Amendments of 1972, as amended, 20 U.S.C. §§ 1681 *et seq.*, and with implementing U.S. DOT regulations, "Nondiscrimination on the Basis of Sex in Education Programs or Activities Receiving Federal Financial Assistance," 49 C.F.R. Part 25, that prohibit discrimination on the basis of sex.

(5) **Access for Individuals with Disabilities** - The Contractor agrees to comply with 49 U.S.C. § 5301(d), which states the Federal policy that elderly individuals and individuals with disabilities have the same right as other individuals to use public transportation services and facilities, and that special efforts shall be made in planning and designing those services and facilities to implement transportation accessibility rights for elderly individuals and individuals with disabilities. The Contractor also agrees to comply with all applicable provisions of section 504 of the Rehabilitation Act of 1973, as amended, with 29 U.S.C. § 794, which prohibits discrimination on the basis of disability; with the Americans with Disabilities Act of 1990 (ADA), as amended, 42 U.S.C. §§ 12101 *et seq*., which requires that accessible facilities and services be made available to individuals with disabilities; and with the Architectural Barriers Act of 1968, as amended, 42 U.S.C. §§ 4151 *et seq*., which requires that buildings and public accommodations be accessible to individuals with disabilities. In addition, the Contractor agrees to comply with applicable Federal regulations and directives and any subsequent amendments thereto, except to the extent the Federal Government determines otherwise in writing, as follows:

(1) U.S. DOT regulations "Transportation Services for Individuals with Disabilities (ADA)" 49 C.F.R. Part 37;

(2) U.S. DOT regulations "Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting from Federal Financial Assistance," 49 C.F.R. Part 27;

(3) Joint U.S. Architectural and Transportation Barriers Compliance Board (U.S. ATBCB) U.S. DOT regulations, "Americans with Disabilities (ADA) Accessibility Specifications for Transportation Vehicles," 36 C.F.R. Part 1192 and 49 C.F. R. Part 38;

(4) U.S. DOJ regulations "Nondiscrimination on the Basis of Disability in State and Local Government Services,"28 C.F.R. Part 35;

(5) U.S. DOJ regulations "Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities." 28 C.F.R. Part 36;

(6) U.S. GSA regulations "Accommodations for the Physically Handicapped," 41 C.F.R. Subpart 101-19;

(7) U.S. Equal Employment Opportunity Commission, “Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act,” 29 C.F.R. Part 1630;

(8) U.S. Federal Communications Commission regulations “Telecommunications Relay Services and Related Customer Premises Equipment for the Hearing and Speech Disabled,” 49 C.F.R. Part 64, Subpart F;

(9) U.S. Architectural and Transportation Barriers Compliance Board regulations, “Electronic and Information Technology Accessibility Standards.” 36 C.F.R. Part 1194;

(10) FTA regulations, "Transportation of Elderly and Handicapped Persons," 49 C.F.R. part 609; and

(11) Federal civil rights and nondiscrimination directives implementing the foregoing Federal laws and regulations, except to the extent the Federal Government determines otherwise in writing.

(6) **Access to Services for Persons with Limited English Proficiency**. The Contractor agrees to comply with Executive Order No. 13166,"Improving Access to Services for Persons with Limited English Proficiency," 42 U.S.C. § 2000d-1 note, and U.S. DOT Notice, "DOT Policy Guidance Concerning Recipients’ Responsibilities to Limited English Proficiency (LEP) Persons," 70 *Fed. Reg*. 74087, December 14, 2005, except to the extent that the Federal Government determines otherwise in writing.

(7) **Environmental Justice**. The Contractor agrees to comply with the policies of Executive Order No. 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," 42 U.S.C. § 4321 note; and DOT Order 5620.3, “Department of Transportation Actions To Address Environmental Justice in Minority Populations and Low-Income Populations,” 62 *Fed. Reg*. 18377 *et seq*., April 15, 1997, except to the extent that the Federal Government determines otherwise in writing.

(8) **Drug or Alcohol Abuse-Confidentiality and Other Civil Rights Protections**. To the extent applicable, the Contractor agrees to comply with the confidentiality and other civil rights protections of the Drug Abuse Office and Treatment Act of 1972, as amended, 21 U.S.C. §§ 1101 *et seq*., with the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970, as amended, 42 U.S.C. §§ 4541 *et seq*., and with the Public Health Service Act of 1912, as amended, 42 U.S.C. §§ 290dd through 290dd-2, and any amendments thereto.

(9) **Other Nondiscrimination Laws**. The Contractor agrees to comply with applicable provisions of other Federal laws and regulations, and follow applicable directives prohibiting discrimination, except to the extent that the Federal Government determines otherwise in writing.

(10) The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

7. Contracting with Disadvantaged Business Enterprises

The newest version on the Department of Transportation’s Disadvantaged Business Enterprise (DBE) program became effective July 16th, 2003.

a. This contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs. The national goal for participation of Disadvantaged Business Enterprises (DBE) is 10%. The agency's overall goal for DBE participation is 10 %. A separate contract goal has not been established for this procurement.

b. The contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this DOT-assisted contract. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as CARTA deems appropriate. Each subcontract the contractor signs with a subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)). The successful bidder/offeror will be required to report its DBE participation obtained through race-neutral means throughout the period of performance.

c. The successful bidder/offeror will be required to report its DBE participation obtained through race-neutral means throughout the period of performance.

d. The contractor is required to pay its subcontractors performing work related to this contract for satisfactory performance of that work no later than 30 days after the contractor's receipt of payment for that work from the CARTA. In addition, the contractor may not hold retainage from its subcontractors.

e. The contractor must promptly notify the CARTA, whenever a DBE subcontractor performing work related to this contract is terminated or fails to complete its work, and must make good faith efforts to engage another DBE subcontractor to perform at least the same amount of work. The contractor may not terminate any DBE subcontractor and perform that work through its own forces or those of an affiliate without prior written consent of the CARTA.

6**. Clean Air Act**

The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 *et seq*. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

7. Clean Water

(a) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq . The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(b) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

8. Environmental Protection

The Contractor agrees to comply with all applicable requirements of the National Environmental Policy Act of 1969, as amended, (NEPA) 42 U.S.C. §§ 4321 through 4335 (as restricted by 42 U.S. C. § 5159, if applicable); Executive Order No. 11514, as amended, "Protection and Enhancement of environmental Quality," 42 U.S.C. § 4321 note; FTA statutory requirements at 49 U.S.C. § 5324(b); U.S. Council on Environmental Quality regulations pertaining to compliance with NEPA, 40 C.F.R. Parts 1500 through

1508; and joint FHWA FTA regulations, "Environmental Impact and Related Procedures," 23 C.F.R. Part 771 and 49 C.F.R. Part 622; and other applicable Federal environmental protection regulations that may be promulgated at a later date. The Contractor agrees to comply with the applicable provisions of 23 U.S.C. § 139 pertaining to environmental procedures, and 23 U.S.C. § 326, pertaining to Purchaser's responsibility for categorical exclusions, in accordance with the provisions of joint FHWA/FTA final guidance, "SAFETEA-LU Environmental Review Process (Public Law 109-59)," 71 Fed. Reg. 66576 *et seq*. November 15, 2006 and any applicable Federal directives that may be issued at a later date, except to the extent that FTA determines otherwise in writing.

9. Energy Conservation

The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency that are contained in the state energy conservation plans issued in compliance with the Energy Policy and Conservation Act.

10. Buy America

The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, and microcomputer equipment and software. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification (below) with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive.

11. Fly America

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S. Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

12. Debarment and Suspensions

This contract is a covered transaction for purposes of 49 CFR Part 29. As such, the contractor is required to verify that none of the contractor, its principals, as defined at 49 CFR 29.995, or affiliates, as defined at 49 CFR 29.905, are excluded or disqualified as defined at 49 CFR 29.940 and 29.945.
The contractor is required to comply with 49 CFR 29, Subpart C and must include the requirement to comply with 49 CFR 29, Subpart C in any lower tier covered transaction it enters into.

13. Termination or Cancellation of Contract

The Contractor agrees:

(1) To comply with the requirements of 49 U.S.C. chapter 53 and other applicable Federal laws and regulations now in effect or later that affect its third party procurements,
(2) To comply with U.S. DOT third party procurement regulations, specifically 49 C.F.R. § 18.36 or 49 C.F.R. §§ 19.40 – 19.48, and other applicable Federal regulations that affect its third party procurements as may be later amended,

(3) To follow the most recent edition and any revisions of FTA Circular 4220.1F, "Third Party Contracting Guidance," except as FTA determines otherwise in writing, and
(4) That although the FTA "Best Practices Procurement Manual" provides additional third party contracting guidance, the Manual may lack the necessary information for compliance.

Termination for Convenience: CARTA, by written notice, may terminate this contract, in whole or in part, when it is in the best interest of the project. If this contract is terminated, the Owner shall be liable only for payment under the payment provisions of this contract for services rendered before the effective date of termination.

Termination for Default [Breach or Cause]: CARTA may terminate this contract in whole or in part, for CARTA's convenience or because of the failure of the Contractor to fulfill the contract obligations. CARTA shall terminate by delivering to the Contractor a Notice of Termination specifying the nature, extent, and effective date of the termination. Upon receipt of the notice, the Contractor shall (1) immediately discontinue all services affected (unless the notice directs otherwise), and (2) deliver to CARTA all equipment (property of CARTA), data, drawings, specifications, reports, estimates, summaries, and other information and materials accumulated in performing this contract, whether completed or in process.

Opportunity to Cure: CARTA in its sole discretion may, in the case of a termination for breach or default, allow the Contractor [an appropriately short period of time] in which to cure the defect. In such case, the notice of termination will state the time period in which cure is permitted and other appropriate conditions. If Contractor fails to remedy to CARTA's satisfaction the breach or default of any of the terms, covenants, or conditions of this Contract within [ten (10) days] after receipt by Contractor of written notice from (Recipient) setting forth the nature of said breach or default, CARTA shall have the right to terminate the Contract without any further obligation to Contractor. Any such termination for default shall not in any way operate to preclude CARTA from also pursuing all available remedies against Contractor and its sureties for said breach or default.

If the termination is for failure of the Contractor to fulfill the contract obligations, CARTA may complete the work by issuing another contract or otherwise and the Contractor shall be liable for any additional cost incurred by CARTA.

If, after termination for failure to fulfill contract obligations, it is determined that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of CARTA.

14. No Federal Government Obligations to Third Parties

The Purchaser and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

15. False or Fraudulent Statements or Claims

(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. §3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its activities in connection with this Project. Accordingly, upon execution of the underlying contract or agreement the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may apply, the Contractor also acknowledges that if it makes a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986, as amended, on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

16. Access to Records and Reports

Where the Purchaser is not a State but a local government and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C. F. R. 18.36(i), the Contractor agrees to provide the Purchaser, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C. F. R. 633.17 to provide the FTA Administrator or his authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311.

Where the Purchaser is a State and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at $150,000.

Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.

Where any Purchaser which is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through other than competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.

The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11). FTA does not require the inclusion of these requirements in subcontracts.

17. Drug Free Work Place & Drug and Alcohol Testing

The contractor agrees to establish and implement a drug and alcohol testing program that complies with 49 CFR Parts 653 and 654, produce any documentation necessary to establish its compliance with Parts 653 and 654, and permit any authorized representative of the United States Department of Transportation or its operating administrations, the State Oversight Agency of South Carolina, or CARTA to inspect the facilities and records associated with the implementation of the drug and alcohol testing program as required under 49 CFR Parts 653 and 654 and review the testing process. The contractor agrees further to certify annually its compliance with Parts 653 and 654. To certify compliance the contractor shall use the "Substance Abuse Certifications" in the "Annual List of Certifications and Assurances for Federal Transit Administration Grants and Cooperative Agreements," which is published annually in the Federal Register.

18. Resolution of Disputes

Disputes - Disputes arising in the performance of this Contract which are not resolved by agreement of the parties shall be decided in writing by the authorized representative of the Owner. This decision shall be final and conclusive unless within ten (10) days from the date of receipt of its copy, the Contractor mails or otherwise furnishes a written appeal to the authorized representative of the Owner. In connection with any such appeal, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its position. The decision of the authorized representative of the Owner shall be binding upon the Contractor and the Contractor shall abide be the decision.

Performance During Dispute - Unless otherwise directed by the Owner, the Contractor shall continue performance under this Contract while matters in dispute are being resolved.

Claims for Damages - Should either party to the Contract suffer injury or damage to person or property because of any act or omission of the party or of any of his employees, agents or others for whose acts he is legally liable, a claim for damages therefor shall be made in writing to such other party within a reasonable time after the first observance of such injury of damage.

Remedies - Unless this contract provides otherwise, all claims, counterclaims, disputes and other matters in question between the Owner and the Contractor arising out of or relating to this agreement or its breach will be decided by arbitration if the parties mutually agree, or in a court of competent jurisdiction within the State in which the Owner is located.

Rights and Remedies - The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

19. Privacy

To the extent that the Contractor, or its subcontractors, if any, or any to their respective employees administer any system of records on behalf of the Federal Government, Contractor agrees to comply with, and assure the compliance of its subcontractors, if any, with the information restrictions and other applicable requirements of the Privacy Act of 1974, as amended, 5 U.S.C. Sect. 552, (the Privacy Act). The Contractor also agrees to include these requirements in each subcontract to administer any system of records on behalf of the Federal Government financed in whole or in part with Federal assistance provided by FTA.

PROPOSAL COVER SHEET

Legal Name of Organization_____

Authorized Signer: _____

Title: _____

Mailing Address:_____

Physical Address (If Different):_____

Telephone Number: _____

FAX Number: _____

Contact Person Name: _____

Contact Person Title: _____

Entity Type: ( ) Corporation ( ) Sole Proprietor

( ) Partnership ( ) Other

Is Responder a HUB? ( ) Yes ( ) No

Certifying Agency: _____

ATTACHMENT A

CERTIFICATION REGARDING LOBBYING

(To be submitted with all bids or offers exceeding $100,000; must be executed prior to Award)

The undersigned _____certifies, to the best of his or her knowledge and belief, that:
(Contractor)

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any persons for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding to any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying", in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq* .)]
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

   This certification is a material representation of fact upon which reliance is placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transactions imposed by 31, U.S.C. 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

   [Note: Pursuant to 31 U.S.C. 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than $10,000 for each such expenditure or failure.]

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Section A 3801 *et seq*., apply to this certification and disclosure, if any.

_____ _____

Date Signature of Contractor's Authorized Official

_____

Name and Title of Contractors Authorized Official

ATTACHMENT B

CERTIFICATION REGARDING DEBARMENT, SUSPENSION,
INELIGIBILITY and VOLUNTARY EXCLUSION
LOWER TIER COVERED TRANSACTION

(To be submitted with all bids or offers exceeding $25,000.)

(1) The prospective lower tier participant (Bidder/Contractor) certifies, by submission of this bid or proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) The prospective Bidder/Contractor also certifies by submission of this bid or proposal that all subcontractors and suppliers (this requirement flows down to all subcontracts at all levels) are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(3) Where the prospective lower tier participant (Bidder/Contractor) is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this bid or proposal.

The lower tier participant (Bidder/Contractor),_____ , certifies or affirms the truthfulness and accuracy of this statement of its certification and disclosure, if any.

SIGNATURE_____

TITLE_____

COMPANY_____

DATE_____

ATTACHMENT C

Certification Regarding Drug-Free Workplace

A. The grantee certifies that it will or will continue to provide a drug-free workplace by:

1. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violation of such prohibition.

2. Establishing an outgoing drug-free awareness program to inform employees about

a. The dangers of drug abuse in the workplace;
b. The grantee's policy of maintaining a drug-free workplace;
c. Any available drug counseling, rehabilitation, and employee assistance programs; and
d. The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.

3. Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph 1.

4. Notifying the employee in the statement required by paragraph 1 that, as a condition of employment under the grant, the employee will:

a. Abide by the terms of this statement;
b. Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such violation.

5. Notifying the agency in writing, within ten calendar days after receiving notice under subparagraph 4b from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position, title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification numbers(s) of each affected grant.

6. Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph 4b, with respect to any employee who is so convicted:

a. Taking appropriate personnel action against such an employee, up to and including termination consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
b. Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

7. Making good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs 1, 2, 3, 4, 5, and 6.

B. The grantee may insert in the space provided below the site(s) for the performance of work down in connection with the specific grant:

Place of Performance: Check ( ) if there are workplaces on file that are not identified here.
( ) Not Applicable.

Name of Applicant Organization:

Name & Title of Authorized Signatory:

Signature: _____ Date: _____

ATTACHMENT D

CERTIFICATE REGARDING CONFLICT OF INTEREST

By signature of this Certificate, Respondent covenants and affirms that:

1. No manager, employee or paid consultant of the Respondent is a member of the Policy Board, or an employee of CARTA;

2. No manager or paid consultant of the Respondent is married to a member of the Policy Board, or an employee of CARTA;

3. No member of the Policy Board, the President or an employee of CARTA owns or controls more than a 10 percent share in the Respondent's organization;

4. No spouse of a member of the Policy Board, or employee of CARTA receives compensation from Respondent for lobbying activities.

5. Respondent has disclosed within the proposal response any interest, fact or circumstance, which does or may present a potential conflict of interest;

6. Should Respondent fail to abide by the foregoing covenants and affirmations regarding conflict of interest, Respondent shall not be entitled to the recovery of any costs or expenses incurred in relations to any contract with CARTA and shall immediately refund CARTA any fees or expenses that may have been paid under the contact and shall further be liable for any others costs incurred or damages sustained by CARTA relating to that contract.

_____

Name of Individual or Organization submitting application.

_____

Name and Title of Authorized Signatory.

_____

Signature Date

ATTACHMENT E
PRICE SCHEDULE

Name of Proposer: _____

Signature of Authorized Individual: _____

Title of Authorized Individual: _____

Date of Proposal: _____

The Proposer shall use this price proposal form; however, the Proposer is also free to offer an alternative form of pricing.

DESCRIPTION	Quantity	Unit Price	Total Price
Electronic Validating Farebox complete with one (1) Operator Control Unit , and one (1) cashbox	76		
Single Garage, Single Lane Data System complete with all hardware and probing equipment			
Cashbox ID components, computer and software			
Farebox Installation	76		
Training Cost			
Total			

Add On's/ Options

Spare Parts		Include in separate form	
Portable Electronic Key - Spares			
Thermal coated plastic media, magnetic striped encoded passes			
Thermal coated paper media magnetic striped suitable for transfers			
Retro-fit existing Odyssey and Cents-A-Bill Fare boxes to meet standards in scope			