SECTION 11-1236

PARKING ACCESS AND REVENUE CONTROL SYSTEM (PARCS)

PART 1 - GENERAL

1.1 REFERENCES

A. List of Abbreviations:

1.	ACS	Access Control System
2.	ADA	Americans with Disabilities Act
3.	APM	Automated Payment Machine
4.	AVI	Automatic Vehicle Identification
5.	CFC	Cashier Fee Computer
6.	DSS	Data Security Standards
7.	EMV	Europay, MasterCard and Visa
8.	ENS	Entry Station
9.	EXS	Exit Station
10.	FOB	Free on Board
11.	FMS	Facility Management System
12.	FST	Factory System Testing
13.	ID	Identification
14.	KVM	Keyboard, Video, and Mouse
15.	LAT	Lane Acceptance Test
16.	NEMA	National Electrical Manufacturing Association
17.	NFC	Near Field Communication
18.	PARCS	Parking Access and Revenue Control System
19.	PCI	Payment Card Industry
20.	PTIA	Piedmont Triad International Airport
21.	POF	Pay on Foot APM
22.	PROX	Proximity Reader or Card
23.	PMCS	Preventive Maintenance Checks and Services
24.	RAID	Redundant Array of Independent Disks
25.	RCS	Revenue Control System
26.	RMA	Return Merchandise Authorization
27.	SAT	System Acceptance Test
28.	TCP/IP	Transmission Control Protocol/Internet Protocol
29.	TTS	Ticket Transfer Station
30.	UPS	Uninterruptible Power Supply

B. Fast Pass Program:
   1. Frequent parking customers register for the Fast Pass Program with personal information including:
      a. Name

b. Mailing address
c. Email address
d. Credit Card on-file Information
e. Vehicle Information

2. The Fast Pass customer receives an "AVI" eGo Transcore brand parking pass
3. The eGo pass allows entry and exit to the garage and long-term lots and will be expanded to the overflow lot with the new PARCS
4. Upon exiting the facility, the credit card on file is automatically charges and a receipt is emailed to the customer

1.2 SUMMARY

A. Section includes provision of all material, labor, equipment, services, and training necessary to furnish and install fully integrated on-line, real-time Parking Access and Revenue Control System (PARCS) functioning as described herein.

B. Related Requirements:
1. Section 00-1116 Instructions to Proposers
2. Section 27-2000 Fiber Optic Structured Cabling System
3. Appendix A – PARCS Price Form
4. Appendix B – PARCS Specification Compliance Form

C. System Description
1. The Piedmont Triad International Airport Parking System is comprised of the Parking Structure, Long-Term Lots, Employee Lots, Valet Lot, and the Overflow Lot. The Short-Term Lots and the Rental Car Lot are not in the scope of this procurement document.
2. The Parking Structure has two entry lanes and two exit lanes on the 4th level (Departures) and two entry lanes and two exit lanes on the 2nd level (Arrivals). The parking structure also has four "Free Directional Transfer" lanes on the ground floor to allow traffic to exit the parking structure to utilize the Long-Term Exit Plaza; as well as one on the fourth floor heading down to the third floor.
3. The Long-Term Lots have two entry lanes on the South side and two entry lanes on the North side. There are two exit plazas exiting to PTI Drive on the ground level. Exit Plaza 1 consists of four lanes, and exit plaza 2 consists of three lanes; however only one lane will be in the scope of this document.
4. There are two employee lots: South and North. The South employee lot has an entry/exit plaza with one lane each on Employee Lot Road, and an entry/exit plaza with one lane each on the North side adjacent to the lower level short-term lot. The North Lot has a single entry lane and a single exit lane.
5. The Valet lot has two entry/exit plazas with one lane each on S. Terminal Road.

D. Usage Volumes: Annual transaction volumes for subsystems design purposes:
1. RCS: 200,000 transactions per year.
2. ACS: 40,000 transactions per year (Fast Pass).

E. System Design:

1. FMS consisting of server, task or subsystem computers and workstations providing on-line monitoring and control of all PARCS devices via independent dedicated TCP/IP network. Through information generated by system reports, a complete FMS capable of:
   a. Correlating RCS and ACS entries and exits with vehicles present.
   b. Reconciling time parked with revenue generated.
   c. Providing independent and consolidated occupancy and activity counts for both RCS and ACS systems.
   d. Monitoring all lane equipment.
   e. Data export for instant billing and emailing of receipt to “Fast Pass” customers.
2. ACS as an extension of the FMS for regular “Fast Pass” parkers who prearrange parking and utilize their AVI to enter and exit.
   a. Fast Pass system must be maintained in new PARCS.
   b. ACS tracks entry time of each patron. Upon exit, the appropriate fee is calculated and charged to the patron’s credit card through a third-party provider. An invoice/receipt is emailed to the patron within 15 minutes.
   c. On-Line access must be provided to all Fast Pass parkers that wish to register. On-line access will allow patron to view/print activity or receipts; change/update credit card information, personal profile information, and vehicle information at a minimum.
3. ACS as an extension of the FMS for employee and valet parkers who utilize proximity cards to enter and exit.
4. RCS as an extension of the FMS for ‘transient’ parkers who pull a ticket to enter and pay a fee to exit, including a validation system to reduce or eliminate fees.

F. Lane Configuration – Parking Structure:

1. Structure Entry Levels 2 and 4 – Right Lane – equipped with:
   a. Ticket dispenser (ENS)
      1) Integrated intercom substation
      2) Integrated QR/Barcode Reader
      3) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader (Alternate)
      4) Integrated NFC Reader (Alternate)
   b. AVI reader (Fast Pass)
   c. License Plate Reader (Alternate)
   d. Auto gate with inductive loops (loops to be reused).

2. Structure Entry Levels 2 and 4 – Left Lane – equipped with:
   a. Ticket dispenser (ENS)
      1) Integrated intercom substation.
      2) Integrated QR/Barcode Reader
      3) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader (Alternate)
      4) Integrated NFC Reader (Alternate)
   b. License Plate Reader (Alternate)
   c. Auto gate with inductive loops (loops to be reused).

3. Structure Exit Levels 2 and 4 – Right lane – equipped with:
    a. Ticket verifier (EXS)
        1) Integrated QR/Barcode Reader
        2) Integrated intercom substation.
        3) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader
        4) Integrated NFC Reader
    b. AVI reader (Fast Pass)
    c. License Plate Reader (Alternate)
    d. Auto gate with inductive loops (loops to be reused).
    e. Dynamic Messaging Sign

4. Structure Exit Levels 2 and 4 – Left Lane – equipped with:
    a. Cashier Fee Computer with
        1) QR/Barcode Reader
        2) EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader
        3) NFC Reader
    b. Intercom substation in booth for cashier use.
    c. License Plate Reader (Alternate)
    d. Auto gate with inductive loops (loops to be reused).
    e. Dynamic Messaging Sign

5. Structure “Free Directional Transfer” lanes (four total).
    a. Auto gate programmed to “auto open” with inductive loops (loops to be reused).
    b. Add Alternate as described in Section 2.9 A to two left lanes:
        1) Ticket Transfer Station (TTS)
            a) Integrated Intercom Substation
            b) Integrated QR/Barcode Reader
            c) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) (Alternate)
            d) Integrated NFC Reader (Alternate)
            e) License Plate Reader (Alternate)

    c. Add Alternate as described in Section 2.9 B to two right lanes:
        1) Transfer AVI Reader (Fast Pass)
            a) AVI Reader on Pole
            b) Intercom Substation on Gooseneck Stand
            c) License Plate Reader (Alternate)

6. Structure “Free Directional Transfer” lane from fourth (P4) to third floor (P3).
    a. Auto gate programmed to “auto open” with inductive loops (loops to be reused).
    b. Add Alternate as described in Section 2.9 C.
        1) Ticket Transfer Station (TTS)
            a) Integrated Intercom Substation
            b) Integrated QR/Barcode Reader
            c) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) (Alternate)
            d) Integrated NFC Reader (Alternate)

2) AVI Reader (Fast Pass)
3) License Plate Reader (Alternate)

G. Lane Configuration – Long-Term Lots:

1. Entry South and North – Right Lane – equipped with:
   a. Ticket dispenser (ENS)
      1) Integrated Intercom Substation
      2) Integrated QR/Barcode Reader
      3) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader (Alternate)
      4) Integrated NFC Reader (Alternate)
   b. AVI reader (Fast Pass)
   c. License Plate Reader (Alternate)
   d. Auto gate with inductive loops (loops to be reused).

2. Entry South and North – Left Lane – equipped with:
   a. Ticket dispenser (ENS)
      1) Integrated intercom substation.
      2) Integrated QR/Barcode Reader
      3) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader (Alternate)
      4) Integrated NFC Reader (Alternate)
   b. License Plate Reader (Alternate)
   c. Auto gate with inductive loops (loops to be reused).

3. Exit Plaza 1 – Right lane – equipped with:
   a. Cashier Fee Computer with:
      1) QR/Barcode Reader
      2) EMV Credit Card (Mag-stripe, chip, and contactless) Reader
      3) NFC Reader
      4) Intercom substation in booth for cashier use.
   b. Ticket verifier with:
      1) Integrated QR/Barcode Reader
      2) Integrated intercom substation.
      3) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader
      4) Integrated NFC Reader
   c. License Plate Reader (Alternate)
   d. Auto gate with inductive loops (loops to be reused).
   e. Dynamic Messaging Sign

4. Exit Plaza 1 – Center-Right Lane – equipped with:
   a. AVI Reader (Fast Pass)
   b. Lane controller
   c. Intercom substation on gooseneck stand.
   d. License Plate Reader (Alternate)
   e. Auto gate with inductive loops (loops to be reused).

f. Dynamic Messaging Sign

5. Exit Plaza 1 – Left and Center-Left Lanes – equipped with:
   a. Cashier Fee Computer with:
      1) QR/Barcode Reader
      2) EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader
      3) NFC Reader
      4) Intercom substation in booth for cashier use.
   b. License Plate Reader (Alternate)
   c. Auto gate with inductive loops (loops to be reused).
   d. Dynamic Messaging Sign

6. Exit Plaza 2 – Bus Lane – equipped with:
   a. AVI Reader (Not Fast Pass)
   b. Lane Controller
   c. Intercom substation on gooseneck stand
   d. Auto gate with inductive loops (loops to be reused)

H. Lane Configuration – Overflow Lot:

1. Entry – Right Lane – equipped with:
   a. Ticket dispenser (ENS)
      1) Integrated intercom substation.
      2) Integrated QR/Barcode Reader
      3) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader (Alternate)
      4) Integrated NFC Reader
   b. AVI reader (Fast Pass)
   c. License Plate Reader (Alternate)
   d. Auto gate with inductive loops (loops to be reused).

2. Entry – Left Lane – equipped with:
   a. Ticket dispenser (ENS)
      1) Integrated intercom substation.
      2) Integrated QR/Barcode Reader
      3) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader (Alternate)
      4) Integrated NFC Reader (Alternate)
   b. License Plate Reader (Alternate)
   c. Auto gate with inductive loops (loops to be reused).

3. Exit – Right lane – equipped with:
   a. Ticket verifier (EXS)
      1) Integrated QR/Barcode Reader
      2) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader
      3) Integrated NFC Reader
      4) Integrated intercom substation.

b. AVI reader (Fast Pass)
c. License Plate Reader (Alternate)
d. Auto gate with inductive loops (loops to be reused).
e. Dynamic Messaging Sign

4. Exit – Left Lane – equipped with:
   a. Cashier Fee Computer with:
      1) QR/Barcode Reader
      2) EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader
      3) NFC Reader
      4) Intercom substation in booth for cashier use
   b. Ticket verifier with:
      1) Integrated QR/Barcode Reader
      2) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader
      3) Integrated NFC Reader
      4) Integrated intercom substation.
   c. License Plate Reader (Alternate)
   d. Auto gate with inductive loops (loops to be reused).
   e. Dynamic Messaging Sign

I. Lane Configuration – Employee and Valet Lots

1. Entry Lane (All – five total)
   a. Proximity Card Reader with Intercom Substation on gooseneck stand.
   b. Auto gate with inductive loops (new presence/activation loop; reuse safety/closing loop)

2. Exit Lane (All – five total)
   a. Proximity Card Reader with Intercom Substation on gooseneck stand.
   b. Auto gate with inductive loops (loops to be reused)

J. Pay-On-Foot (POF) (One is each section of the upper and lower lobbies – four total) – (Add Alternate)

1. Credit Card only POF
   1) Integrated QR/Barcode Reader
   2) Integrated EMV Credit Card (Mag-stripe, Chip, and Contactless) Reader
   3) Integrated NFC Reader
   4) Integrated intercom Substation

1.4 DESIGN CRITERIA

A. Accuracy: Provide the following minimum accuracy levels. Calculate accuracy by dividing the accurate counts/calculations by all counts/calculation.
   2. Ticket reading: 99.5%
   3. Fee calculation: 99.5%
   4. Transaction counts: 99.5%

5. Exception counts: 99.5%
6. Revenue amounts: 100%
7. Data received and accepted by computer system as valid: 100%
8. Data transmission: Less than one message re-transmission per hour.

B. Equipment Construction: Design and construct all components and equipment with the following:
   1. Durable vandal and weather resistant cabinets, which can maintain finish, look, integrity and functionality in the environment in which installed for a period of ten years.
      a. Mounting holes accessible only from inside of cabinets.
      b. Hinged cabinet doors that swing clear of bollards, walls, columns, and any other obstructions.
      c. Modular internal components, to extent practical, for easy maintenance and replacement.
   2. Corrosion resistant connection boxes for all wiring connections.
   3. Control logic and communication capability as necessary and required herein.
   4. Compatible communication ports for all communications and connections.
   5. Crystal controlled time clock/calendar that is updated at least once daily by FMS and accurate to one minute per ninety days for all primary components.

C. User Interface: Design and construct the user interface with the following:
   1. Ergonomically designed devices and user interface for ease of use by patrons.
   2. POFs meet the latest ADA requirements, including but not limited to reach ranges, visibility of display screens, clear floor or ground space, and operable parts.

D. Communication:
   1. All applicable components are microprocessor controlled, in on-line, virtual real-time communication with FMS via TCP/IP over Cat6 or Fiber Optic cable.
   2. Network must be configured to accommodate separate LAN Segments for each: Revenue Control Network, Credit Card Network, Intercom Network, and if required; License Plate Recognition Network, and Video Network.
   3. All transaction data sent to FMS immediately, with communications hierarchy appropriate to need for action or response from another component, feature or subsystem.
   4. All transaction data is available to FMS workstations within one minute of completing transaction at any device. Delays or functional degradation resulting from data communication between devices over FMS network is not acceptable.
   5. Each primary component communicates complete transaction log to FMS. In event of communication failure, devices continue to operate in off-line mode and store a minimum of 1,000 transactions, or have sufficient system redundancy, to insure availability of transaction data upon restoration of FMS. In event of failure during communication, an error-checking and recovery routine is employed to prevent corruption of data files.

E. Future System Expansion:
   1. Readily expandable to accommodate additional parking facilities, features and configurations. Installed PARCS capable of expansions/enhancements listed below:
      a. Add additional lanes of PARCS

b. Add POF machines to PARCS.
c. Add FMS integration with additional on-site parking facilities.
d. Add LPR if not procured with this RFP

1.5 PRICE REQUIREMENTS

A. Price includes the provision of all material, labor, equipment, and services necessary to furnish and install fully integrated PARCS as outlined herein.
1. Examine site and drawings.
a. Identify in writing any constraints or conflicts regarding PARCS installation.
b. Include cost, in writing, of rectifying such constraints or conflicts in Price Proposal.

B. Add Alternatives: Provide prices for the following Alternates on Price Form:
1. Preventive Maintenance and Service Contract after Warranty:
a. A separate contract awarded for Preventive Maintenance and Service after expiration of the two-year warranty.
b. This Contract may be executed directly with a party designated and approved by manufacturer(s) to maintain and service PARCS equipment.
c. Contract would commence with expiration of two-year warranty period.
d. Provide annual pricing for an additional three years.
2. Extended Parts Warranty:
a. A contract to extend the manufacturer's parts warranty after the expiration of the two-year warranty.
b. Provide annual pricing for an additional three years.
3. Provide pricing to add four POF machines as described in section 2.2 J.
4. Provide pricing to add 2 transfer ticket verifiers and 2 transfer AVI verifiers and associated intercom substations to the ground level exit lanes from parking structure to long-term lots as described in Section 2.9
5. Provide pricing to add transfer ticket verifier, AVI reader and intercom substation to the gate located between level four and level three as described in Section 2.9
6. Provide License Plate Recognition for use in conjunction with ticketed daily and Fast Pass customers in the parking structure, long-term and overflow lots as described in Section 2.6

C. Power and Communication
1. The Owner will allow the reuse of Power and Communication conduit and Power wiring; however, offeror must perform their own site and/or drawing evaluation to ascertain whether communications and power conduits are sized correctly, located correctly, and useable for new communications cable, all necessary power terminations, and new vehicle detection loops.
2. Where new power conduit and wiring, or communications conduit and wiring is required; offeror will provide and install as needed.
3. Include all new control communications wiring between lane devices; and any additional power wiring and conduit required by Offeror's system in proposal amount not provided by owner.

4. Include all required power conditioners in proposal amount if PARCS or any component thereof requires power differing from that specified.

D. Substantial Completion: A certificate of substantial completion will be provided when the following requirements have been satisfied:
1. All systems, features, and communications, have passed the SAT per Section 3.3 of this document.
2. Certification of PCI PA-DSS compliance is provided.
3. All spare parts, stock material and manuals are on site and have been approved.
4. All test checklists, documentation and training has been completed.

E. Final Acceptance: Final acceptance of each Phase will occur upon satisfactory completion of all work, tests, demonstrations, and training specified herein as well as successful completion of thirty-day operational test per Section 3.3 of this document.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Distribute to the appropriate parties:
   a. Installation diagrams, details, and templates for setting mounted equipment.
   b. Templates and cast-in inserts to anchor freestanding equipment.
   c. Electrical wiring diagrams and details.
   d. Electrical requirements.
2. Coordinate final and precise layout of conduits, stubs, vehicle detectors, inductive loops, bollards, and anchor bolts with those responsible for installation.
3. Coordinate and assist General Contractor or appropriate party to assure PARCS will meet design intent specified herein and as shown on drawings.
4. Coordinate interfaces with any other systems by others, including but not limited to Local Area Network, Level-Count, Security, and Dynamic Signage.
5. Coordinate data communication, internet, server location, and network requirements with Owner or Owner's IT Representative.

B. Pre-Installation Meeting: Conduct meeting at project site thirty (30) days in advance of time scheduled for work to proceed to review requirements and conditions that could interfere with successful PARCS performance. All parties concerned with PARCS installation, including electrical, communications, concrete work, or others who are required to coordinate work are required to attend. Include Owner or Owner's Representative. At a minimum, cover:
1. Electrical rough-in, equipment bases, and any other required preparatory work.
2. Review schedule.
3. Review testing and acceptance procedures.

C. Resubmittals: Owner or Owner's representative will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that Contractor has addressed the concern sufficiently. Circle all Resubmittal changes/revisions/corrections. Owner or Owner's representative will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be

required; Contractor is responsible for all costs incurred, including the cost of any fees or services made necessary to review such additional resubmittals (to be reimbursed to Owner).

1.7 PROPOSAL SUBMITTALS - TO BE INCLUDED WITH RESPONSE

A. Price Form: Total PARCS cost and unit cost of each component (Appendix A).

B. Specification Compliance Form (Appendix B).

C. Product Data: (Informational Sheets)
   1. Product description for each significant hardware component including:
      a. Detail of user interface.
      b. Operating temperature and humidity ranges.
      c. Housing material and access panel location.
      d. Mounting requirements.
      e. Electric power requirements
   2. Description of the FMS software including:
      a. Standard Reports
      b. Optional Reports (Customizable and exportable)
      c. Software Options (emailing, error messaging, remote access)
      d. Communication failure/error identification and recovery.
      e. Back-up procedures.
      f. Data storage and retrieval procedures.

D. Substitutions and Exceptions:
   1. Provide an all-inclusive list of all substitutions offered/suggested to any part of this document.
   2. Exceptions: Provide an all-inclusive list of all exceptions taken to any part of this document (including substitutions).
   3. It is recognized that there are variations in equipment between manufacturers and that some manufacturers may not be able to meet all specifications in manner specified. Others provide extra features within standard unit. With submittal of proposal, submit letter summarizing any different approaches to providing specified features and/or any extra features that are provided as part of basic unit. This letter may be accompanied by catalog sheets, brochures, technical specifications, etc.

E. Describe the integration of the Fast Pass program with your software solution, including on-line access and the features and options available to the patron.

F. Installation Schedule:
   1. Provide general project timeline for installation of PARCS as specified, including milestones for shop drawing review, fabrication, shipping and delivery, transition plan, installation, training, and testing.
   2. Provide a recommended data conversion plan detailing how and in what sequence old components on the existing PARCS will be phased out, and new components phased in. Discuss how both systems can run in tandem until such time that the new PARCS takes total control.

G. List manufacturer of each primary component of system.

H. Manufacturer's Qualifications:
   1. In continuous operations in the United States for previous five years.
   2. Primary components installed in three or more FAA International Airport parking facilities of similar size and complexity. Provide the following for each installation.
      a. Name of project and Location.
      b. Contact name, telephone number and email address.
      c. Date of installation.
      d. Approximate number of lanes.
      e. Brief description of equipment and quantities.

I. Installer Qualifications:
   1. Proven ability to install PARCS equipment and provide appropriate and required service and support after installation.
   2. Continuously worked with equipment manufacturer, or another PARCS manufacturer, including providing installations and maintenance, for minimum of three years.
   3. Approved in writing by PARCS manufacturer(s).
   4. Documentation of manufacturer's installation training within previous two years.
   5. Three comparable installations in parking facilities of similar size and complexity in past three years. Provide the following for each installation.
      a. Name of project and Location.
      b. Contact name, telephone number and email address.
      c. Date of installation.
      d. Approximate number of lanes.
      e. Brief description of equipment and quantities.
   6. Manufacturer approved service center located within two hours driving distance of site. Provide address for verification.

J. List of sub-contractors, identifying nature of work performed.

K. Financial Information:
   1. MARK AS CONFIDENTIAL TO PROTECT FROM PUBLIC RECORDS ACT
   2. Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:
      a. Current Assets (cash, accounts receivable, accrued income, inventory, and prepaid expenses)
      b. Net Fixed Assets
      c. Current Liabilities (accounts payable, accrued expenses, advances, accrued payroll)
   3. Name and address of firm preparing attached dated financial statement.
   4. Will the organization whose financial statement is attached act as guarantor of the contract for construction?

L. Contract Requirements
   1. Provide contract payment requirements (a minimum 10% retainage will be required until final acceptance).
   2. Provide copy of licensing agreements

M. List of manufacturer's recommended spare parts for this installation, including:
   1. Part name.
   2. Part number.
   3. Unit price.
   4. Quantity.

N. Warranty:
   1. Submit copy of warranty (per Section 1.11 of this document) and explanation of any instances which may impact warranty coverage.
   2. Warranty to be for a period of two years from date of final acceptance.
   3. Submit RMA procedures.

O. Add Alternates: Provide detailed descriptions, inclusions and exclusions of Add Alternates as outlined in Section 1.5 B above.

P. Additions: Provide detailed descriptions and pricing for options available from your PARCS manufacturer which will benefit the Airport's operations for their consideration in your proposal.

1.8 INFORMATIONAL AND CLOSEOUT SUBMITTALS – AFTER PROJECT AWARD

A. Shop Drawings:

   1. Dimensioned drawings showing plans, elevations, sections, and large-scale details indicating coordination and relationships with other construction.
   2. Wiring diagrams detailing wiring for power, signal, and control systems, and differentiating clearly between wiring installed by manufacturer, installer, and others; such as electrical sub-contractor.
   3. Clearly indicate work that is "not in scope".

B. Samples: Submit samples of tickets, reports, and other items to be selected by Owner within 30 days of contract.

C. Operating Documentation: Minimum of 30-days prior to initiation of field test and training, deliver two hard copies and one electronic copy of operations manuals, maintenance, and administration manuals.

D. Copies of all licenses, registrations, documentation, disks, and other media as may have been included with those commercially available software packages provided with system. In addition, ensure that all licenses, registrations, and warranties have been transferred to Owner prior to final software turnover.

E. At least 30 days prior to scheduled training sessions, deliver a Training Plan. Include at a minimum, a description of all training courses including identification of instructional outcome, duration of course, and type of presentations.

F. Testing Plan and Documentation: Provide a test plan for review and approval by Owner or Owner's authorized representative 30 days prior to start of first test. Include demonstrations of

compliance with specifications, contractual compliance, disaster recovery testing and documentation, definitions of all test objectives, participant responsibilities, documentation for tests, and procedures for dealing with failures during test. Provide checklist which details tests for every functional requirement of each entry and exit lane, specified supplies/spare parts, training, operating and maintenance manuals and provide space for sign-offs by Offeror and/or Owner's authorized representative.

G. Spare Components: Deliver recommended spare components, complete and ready to use, prior to commencement of operational testing and maintain inventory of spare components at this level as components are used for repair during warranty period.

H. Stock: Furnish the following operating stock items prior to commencement of operational testing. Owner must approve color and artwork of tickets and ACS ID devices.
1. 200,000 RCS Tickets
2. 1,000 ACS Proximity credentials
3. 200 ACS AVI Transcore eGo tags or 1,500 ACS AVI credentials if your solution is not compatible with eGo Tags
4. Three (3) spare ribbons/toner cartridges, etc. for each printer requiring ribbon, toner, etc. as appropriate.
5. Twenty-four (24) rolls of receipt paper per machine providing receipts; or 5,000 receipt tickets per machine providing receipt tickets.
6. Ten (10) spare straight gate arms and two (2) spare articulating gate arms.
7. 20 drive pins or 100 breakaway connectors.

I. Lock and Key Requirements:
1. Keys
   a. Provide two (2) sets of keys for each lock cylinder.
   b. All equipment of the same type has the same key and equipment of different types have different keys. i.e. Every Entry Station utilizes the same key.
   c. Keys are unique to this project; other equipment supplied by the same manufacturer in the region uses different keys.
   d. "Web-Based" or electronic keys are not acceptable. Mechanical keys only.
2. If a special tool is required to perform any function on the PARCS during the normal course of business and/or maintenance, provide three of these tools.

J. Contractor is responsible for all permits and licenses and compliance with all codes and regulations.

1.9 DELIVERY, STORAGE AND HANDLING

A. Provide shipping insurance, FOB Destination.

B. Assume care, custody, and control of all PARCS equipment and components.

C. Materials, devices, and equipment that arrive damaged will be replaced at no cost to Owner.

D. Deliver equipment to site and store in manufacturer's original containers to prevent damage and marked for easy identification.

E. Airport will provide secure storage area for use by contractor.

1.10 SITE CONDITIONS

A. Equipment will operate and function as intended under the local climate and weather conditions, including but not limited to temperature extremes, wind, salt, dust, and precipitation.

B. Power and Wiring

1. Reuse existing power wiring and conduit as specified.
2. Offeror will provide and install new communication wiring (and conduit as needed) to islands as shown on drawings and as specified. Communication wiring longer than 300 feet will be fiber optic.
3. Offeror will provide and install all necessary device control wiring, communications wiring and additional power wiring required by system. Include special electrical power and grounding.
4. Offeror will provide surge protection devices at both ends of all non-fiber optic communication wiring longer than 30 feet.
5. Offeror will provide and install any power conditioning that is required for the operation of the system. Power provided by General Contractor for this Project is 120 VAC +/- 10% and 60 Hz from circuits dedicated to PARCS.
6. Offeror will provide and install all electronics and communications equipment for communication network. Terminate and connect all communications cabling excluding owner provided fiber optics.
7. Offeror will provide and install on-line, regulating computer grade UPS for Servers, task computers, workstations, and networking equipment with 30 minutes of back-up battery power.

1.11 WARRANTY

A. General: Equipment and installation (100% parts and labor) for two years from date of final acceptance. System maintained and serviced against all malfunctions due to manufacturing or installation defects at no cost to Owner during warranty period, including preventive maintenance per manufacturer's recommendations or as necessary to keep equipment in good working order.

1. Warranty period commences after Offeror has demonstrated satisfactory performance of completed PARCS as specified in Section 3.3 of this document.
2. Maintain a log of all maintenance, preventive maintenance and repair work performed under warranty and provide to Owner or Owner's representative on monthly basis and at end of warranty period.

B. Warranty response period:

1. Maintenance Service includes both on-site service and remote service support.
2. Provide three (3) methods of notification to be used for emergency contact information (e.g., telephone, email, SMS text message). Acknowledge receipt of any emergency service request within 30 minutes of notification.
3. Monday through Friday, 8:00 am to 5:00 pm excluding holidays.
4. If initiation of trouble call occurs prior to 10 a.m. Monday through Friday; same day on-site response is required if repairs cannot be implemented remotely, excluding holidays.
5. Response time from initiation of trouble call until on-site response by qualified service technician cannot exceed twenty-four hours.
6. Resolution of the situation within three (3) business day after notification is required in all situations. A temporary solution is acceptable in the event replacement parts are not available in inventory.
7. Factors beyond the control of the Contractor, such as unexpected delays in parts, accidents, severe weather, or unusual traffic, are to be thoroughly documented and reported to Owner immediately.
8. Repair or replace all defective or damaged items under warranty by end of three calendar business days on which notice was given.

C. If Contractor is not available, Designated Maintenance staff may affect repairs.

1. Pre-qualify Maintenance staff to perform repairs and identify types of repair each trained individual is qualified to perform without impacting terms of warranty.
2. If Maintenance staff repair required use of a spare part, pickup and repair or replace spare part by end of three calendar business days.

D. Replace items taken from spare parts inventory during warranty period at no additional cost to Owner by end of three calendar business days.

E. Preventive Maintenance:

1. Provide a schedule and task list for preventive maintenance services to be provided.
2. Include maintenance services such as cleaning interior and exterior of all equipment, lubricating, checking all connections, and to assure basic unit operations.
3. Provide detailed log of preventive maintenance activities, issues found, and resolutions; including date and time maintenance was performed.

F. Install all software updates, patches and upgrades applicable to this system during warranty period at no additional cost.

PART 2 - PRODUCTS

2.1 FACILITY MANAGEMENT SYSTEM

A. User Interface:
1. Capable of operating across Owner's Local Area Network (LAN), accessible, with proper user ID and password, to all authorized users' workstations with installed FMS software modules on Owner's LAN.

2. Provide field programmable functions of each device from FMS (password protected), including rate structures (from FMS only), with all programming changes reported in daily log.
3. Maintain a secure connection while active, and automatically log-off after programmable period of inactivity.
4. Remote access to FMS over standard TCP/IP connection (may use web browser-based applications).
5. User-interface modules utilize client/server technology or equivalent. The following general requirements apply to all components or modules:
   a. Windows-based graphical user interface.
   b. Allow for both standard and custom report formats.
   c. Adequate security to allow for different classifications of users.

B. Computer System:
1. Provide and install lockable server rack. Rack must be off the ground and protected from dust and debris.
2. Provide FMS servers, task computers, workstations and all ancillary equipment with sufficient processing power, memory capacity, and communication bandwidth to meet functional performance demands of PARCS software without loss of responsiveness to user input or slowing of any end node device or workstation. Owner reserves the option to purchase Server, Task Computers, Workstation Computers, and Networked Printers.
3. FMS server, task computers, network switch, KVM, UPS, or other equipment to be installed in the server rack must all be rack-mounted. No tower computer or other non-mounted equipment will be acceptable in the server rack.
4. No firewall is required. The firewall is provided by; and maintained by Trustwave.
5. Provide three separate workstations with monitor, keyboard, mouse, and two networked laser printers in parking office. Monitor size of minimum 24”. Owner reserves the option to purchase Server, Task Computers, Workstation Computers, and Networked Printers.
6. Meet performance recommendations of software vendor and accommodate for growth and expansion as specified herein without any specified function being slowed or delayed by performance of any other function or task.

C. Data Storage:
1. Reside and operate on an ANSI SQL-compliant relational database server product.
2. Automatically perform a nightly back-up to a separate internal or external hard-drive.
3. Incorporate integrity controls to enforce three types of integrity:
   a. Entity integrity ensures no duplicate keys within a table and all non-null tables are populated.
   b. Relational integrity ensures no orphan keys, that all transactions properly deleted children entities, and properly modified adult references.
   c. Domain integrity ensures all attribute value ranges are enforced.
4. All transaction records including but not limited to RCS and ACS stored as actual data, not in report format.
5. Archive data in a format readable by report generator.
6. On-line data storage capacity to store a minimum of 24 months of system data.
7. Archive data automatically every six months with first archive after first 18 months, so that server always has most recent 12 months of data.

a. Be on separate internal or external hard-drive.
b. Archive or restore transaction database in less than one hour.
c. Use redundant on-line storage such as Level 1 RAID Technology.

8. Either periodically or on demand, FMS downloads and sends electronically, revenue reports for integration into Owner's financial department via TCP/IP connection to designated computer network in Microsoft Excel or approved equivalent.

D. Licensing

1. Supply all required operating system and application software licenses in sufficient quantities to accommodate number of users and equipment in installed system.
2. Provide five remote desktop licenses and software for remote access to FMS on existing computers provided by Owner or Owner's Representative.
3. Provide Anti-Virus Software and licenses for all PARCS servers, task computers, workstations, or other devices requiring AVS for the duration of the two-year Warranty period.

E. Security

1. Utilize protocols and passwords that prevent unauthorized access to software and hardware and manipulation of data and reports, including individual transactions.
2. Include minimum of 4 levels of access authorization to all operational, administrative and reporting functions and provide the following security features:
   a. Define individual user and group based security.
   b. Ability to assign a unique user ID and password for each person authorized to use system.
   c. Ability to establish an expiration period for passwords and periodically change that password for each authorized user ID.
   d. Ability to disable a user ID following successive log-on failures exceeding a programmed limit.
   e. Ability to view and report user and group level security rights and create user-defined fields.
   f. Ability to de-activate codes for former users and internal and external customers.

3. Password protected FMS subsystems to restrict access to individual functions of each subsystem:
   a. Revenue Control System Monitoring, Control, and Reporting.
   b. Access Control System Monitoring, Control, and Reporting.
   c. Occupancy Monitoring and Reporting.
   d. Equipment Monitoring and Reporting.
   e. Ad-Hoc Report Generator.

F. Occupancy Monitoring: Provide the following functions.
1. Every vehicular entry and exit lane serves as a counting location, equipped with vehicle detection devices.
   a. Each entering vehicle subtracts a count of one from the number of available spaces.
   b. Each exiting vehicle adds a count of one to the number of available spaces.

c. Provide directional logic (e.g. a vehicle entering through an entrance lane or through an exit lane is counted as an inbound vehicle).

2. Track and display the number of available, occupied, and total parking spaces on FMS.
3. Provide anti-coincidence packages to accurately monitor entering and exiting vehicles that occur simultaneously.
4. Provide two programmable thresholds for each parking area:
   a. One threshold to trigger "full status". When full status is reached count system operates in one of two modes, selectable by user.
      I) Mode one signals an alarm and relies on human intervention to activate appropriate dynamic signs and gate status changes.
      II) Mode two automatically activates appropriate dynamic signs and gate status changes but allows for manual overriding of "full status".
   b. Second threshold triggers "open status". The two operating modes described above also apply to “open status” threshold.
5. Ability to automatically disable ticket dispensing function when facility is full, but allows for manual override.
6. Ability to activate all electronic signs, individually controlling each facility or zone within a facility, including "FULL" signs and lane control lights provided by PARCS Contractor, as well as "FULL" or capacity signs provided by others.
7. Ability to maintain and display separate counts for each facility or zone within a facility, each with total occupancy or spaces available, total RCS and ACS occupancy and total RCS and ACS spaces available and up to four other user definable categories.
8. Ability to maintain for each entry and exit lane:
   a. Counts of illegal/opposite direction entry/exit for each lane.
   b. Manual vends whether form FMS or manual switch in lane.
9. Ability to store lane, facility and zone counts at hourly intervals in daily files for specialized reports to analyze lot utilization and activity levels.

G. Equipment Monitoring: Provide the following functions.
   1. Monitor operational status of all entry and exit lanes and APMs.
   2. Warning alarms displayed and tracked through FMS for the following conditions:
      a. Lane status; open or closed.
      b. Gate failure.
      c. Gate up.
      d. Low-ticket supply.
      e. Ticket in throat.
      f. Illegal entry or exit (reverse direction through lane).
      g. Back-out ticket.
      h. Ticket jam.
      i. Vehicle detected in lane for longer than 30 seconds without initiating transaction.
      j. Count status.
      k. Passback violation.
      l. APM tampering.
      m. APM door status, open or closed.
      n. APM receipt paper status.

   3. Visual abnormal status alarms at each computer workstation.

4. When an alarm is turned off, visual signals stop at all workstations.
5. A daily log report identifying all system alarms.

2.2 REVENUE CONTROL SYSTEM (RCS):

A. FMS Interface: Provide the following functions in concert with the FMS.
1. Remote programming of all devices that process RCS transactions.
2. Testing of fee structure prior to upload to the active parking system.
3. Uploading and consolidating reports from all devices processing RCS transactions.
4. Retrieval and review of all transactions, based on user-defined parameters.

B. Reports: Provide the following reports which can be displayed on a monitor, printed on a printer, converted to an ASCII file and are sortable chronologically and by shift or lane.
1. Daily Event Log - A listing of changes to system and users who made changes, including print communication messages, facility lane equipment alarms, remote gate opening, and system log on/offs.
2. Daily Transaction Report – A daily summary of all transactions processed at each APM, cashier lane, or exit lane, including entry time, transaction time, payment amount and type.
3. Field sortable entry lane counts.
4. Field sortable exit lane counts.
5. Revenue Alarms Report – Provide report to include at a minimum remote gate vends and manual gate open counts.
6. Monthly Lane Volume Report - Provide entry and exit counts by date. This report is used for management planning and statistical information.
7. Monthly Duration Report - Provide duration of stay based on patrons' elapsed parking time and patron time of entry. This report is utilized in rate structure and facility usage analysis, management planning, statistical information, rate analysis, and revenue analysis.
8. Ticket Sequence Report – Provide a complete sequence of transactions related to individual tickets (i.e., information about how and when a ticket was issued tied to how and when fee was paid and ticket was processed).
9. Monthly Ticket Value Report - Provide ticket stratification based upon value of all transactions processed. Provide breakdowns for each rate structure. This report is used for revenue analysis, rate analysis, management planning, and statistical information.
10. Outstanding Ticket Report – Provide a listing of tickets that have been issued but are not yet processed at an exit.
11. Back-out/Stolen Ticket List – Provide a chronological list of back-out tickets issued by ticket dispenser for selectable times.

C. RCS Credential: Encoded at time of production by ticket dispenser Bar-code.

D. Rate Structure:
1. A minimum of twenty different fee structures.
2. Each fee structure can program a minimum of forty fee increments.
3. Automatic adjustment for daylight saving time and leap year in fee calculations.
4. User defined maximums (12-hour, 24-hour, etc.)

5. Provide for:
   a. Day, evening, and night rates.
   b. Weekend rates.
   c. Flat rates.
   d. Event rates.
   e. Holiday rates.
6. User defined grace time parameters
   a. Exit grace time – enter and exit without incurring a fee.
   b. Transfer grace time – enter parking structure and exit to Long-Term lot without incurring garage rate fee.
   c. Elapsed grace time – to allow for elapsed time from payment at a central location, retrieve vehicle and drive to exit lane.

E. Credit and Debit Card Processing:
1. Accept the following types of credit card payments:
   a. VISA
   b. Mastercard
   c. American Express
   d. Discover
   e. Bank Debit Cards with Credit Card logo
2. Utilize credit and debit card acceptance hardware, software, and other system components that are PCI PA-DSS and EMV compliant:
   a. PCI-DSS Compliant Systems: For all devices and systems that are in scope of PCI-DSS compliance as defined within the latest version of PCI-DSS, provide verifiable proof that all such devices are either:
      1. A currently validated PA-DSS Application, suitable for new installations, as listed on the PCI-SSC website.
      2. Part of a Level-1 Audited Service Provider payment system. Suitable proof must be a listing on the VISA or MasterCard Service Provider web site, or an audited and signed Attestation of Compliance (AOC) showing a successful Service Provider Audit performed by a Qualified Security Assessor (QSA).
   b. All devices that accept a payment card must accommodate P2PE EMV payments. Devices that are not EMV ready will not be accepted:
      1. Device is fully ready to accept P2PE EMV payments and will operate in mag-stripe mode until upgraded to chip and pin mode.
   c. Provide a list of all available options for Payment Processors and Gateways that may be selected to support EMV processing.
   d. All attended devices (where an employee facilitates the transaction) must have a PIN-Pad included. All unattended (automated) devices must be ready to accommodate, and may have a PIN pad, but it is not required.
3. Configure system such that information from each credit card transaction is encrypted and sent directly to clearinghouse to provide on-line real time approvals (a terminal based solution – no credit card server will be accepted).
4. Maximum authorization time from patron confirmation to clearinghouse authorization is five (5) seconds.
5. Confirm and provide record formats required by Owner's financial institution.

F. Validation System
   1. Allow up to 999 validation accounts to be programed within FMS. Each account to include a unique account number and allow validations based on use, time, or dollar value.
   2. Allow all validations to be reported and sortable by time, date, origin, and use.
   3. Patrons with a validated ticket bypass POF, proceed directly to exit and insert validated ticket at EXS.
   4. Off-Line Machine Readable Encoding Validation – Provide three units.
      a. Ticket is inserted into a portable desktop device to add validation to ticket.
      b. Device encodes ticket with validation and adds tracking information for billing and reporting purposes.

G. Entry Station (ENS)
   1. Independently and in concert with FMS, issue time and date stamped barcode ticket.
   2. Machine readable encoding that is compatible with all other RCS components.
   3. Capable of operating while disconnected from FMS.
   4. Minimum capacity of 5,000 tickets with hands-only (no tools) ticket loading.
   5. Independent ticket dispensing mechanism that is removable as a single unit.
   6. Include the following integrated components:
      a. Easily readable display screen with welcome message such as “Please Press Button for Ticket” and “Please take ticket”.
      b. Back-out or voided ticket vault.
      c. Intercom with push-button, speaker, and microphone.
   7. Capable of maintaining a minimum processing rate, in combination with gate and other in-lane equipment, including typical patron delays, of 400 transactions per hour.
   8. Operational Descriptions:
      a. Ticket dispenser is not active without a vehicle detected on Presence/Activation loop.
      b. Ticket dispenser is activated upon detection of vehicle on Presence/Activation loop.
      c. Ticket dispenser is disabled by detection of an ACS credential, and the issuance of a ticket by the ticket dispenser (even if the ticket remains untaken) disables the ACS reader.
      d. Upon activation, a patron can press the button which will send a signal to the ENS to issue a machine readable time and date encoded ticket.
         1) Upon removal of the ticket from ENS a signal will be sent to open the barrier gate.
      e. Back-out Ticket Taken: Ticket is removed from ENS; however, vehicle backs out of the lane instead of entering. Ticket is voided in the system, barrier gate comes down, and Ticket dispenser resets for next transaction.
      f. Back-out Ticket Not Taken: Ticket is left in the ENS; however, vehicle backs out of the lane instead of entering. Abandoned ticket is ingested back into ENS, voided in the system, and discarded into the ticket vault.
      g. Full Status
         1) RCS manually or automatically disables ticket dispenser at all entry stations when count system considers facility to be full.
         2) Easily readable display screen message such as “Sorry, the facility is full”.

3) RCS manually or automatically reactivates ticket dispensing function when count drops below a programmable threshold.
4) ACS patrons are allowed access even when ticket dispensing is disabled.

H. Cashier Fee Computer (CFC)

1. All cashiered lanes to be dual-use such that they can operate in a cashiered mode through the CFC when a cashier is present or in an un-manned mode through the EXS when a cashier is not present.
2. Provide CFCs, as indicated on the Drawings, in cashier booths with the following components and capabilities:

a. Cashier computer with integrated EMV credit card functionality
b. Ticket reader/validator that accepts ISO standard readable cards, barcode parking tickets, and validations
c. EMV Ready credit card reader capable of reading both mag-stripe and chip based credit cards.
d. PIN pad for customer use for PIN-based transactions
e. Cashier monitor (minimum 20”) with standard mouse and QWERTY keyboard.
f. Capability to process all acceptable payment methods
g. Receipt printer that is capable of producing receipts for all transactions. Duplicate receipt function shall be a user selectable feature that can be disabled if desired.

1) Upon successful payment, print a receipt that includes:

a) Owner approved header
b) Attendant name or number
c) Transaction number
d) Lane or machine number
e) Discounts or surcharges
f) Entry date/time and Exit date/time
g) Duration of stay
h) Parking fee
i) Amount of tax for the parking fee
j) Total fee paid
k) Payment type – cash or credit
l) Credit card type, if paying with credit card
m) Last 4 digits of credit card number, if paying with credit card

2) User configurable for receipts to be auto issue or by request.
3) Receipts to be FACTA-compliant.

h. Customer fee displays that are easy to read, LED type
i. Dual cash drawer operation with removable, lockable inserts.
j. Cashier drawer only opens for those transactions that require cashier intervention (e.g. cash transactions). For those transactions that do not require cashier intervention (e.g. credit card transaction, grace ticket, full validation transaction, etc.) the cashier drawer remains closed.

k. Stand-alone functionality that allows the CT to operate independently when there is a temporary network communication failure, regardless of where the communication interruption occurs. Alarm for CFC offline condition to be displayed on the PARCS GUI.

l. Provide offline transaction storage capacity for all transactional information, including storing encrypted credit card data, for a minimum of 1,000 transactions. Automatically close the cashiered lane if the transaction threshold is reached and remain closed until reestablishment of communications. CFC will automatically upload all transaction information to the PARCS servers once communication is restored.

m. Journal tape printer for each CFC that is capable of printing out transactional information for each transaction processed at the device from a system workstation. Transactional information on the journal tape includes:

1) Date and time of transaction
2) PARCS device number
3) Sequential transaction number
4) Ticket number
5) Entry date/time and exit date/time
6) Parking fee
7) Tax amount
8) Total Fee
9) Cash given, if cash was used
10) Change given, if cash was used
11) Credit card type, if credit card was used
12) Last 4 digits of the credit card, if credit card was used
13) Credit card authorization code, if credit card was used

3. CFC Operational Description
   a. CFC is not active without a vehicle detected on Presence/Activation loop
   b. CFC is activated upon detection of vehicle on Presence/Activation loop.
   c. CFC is disabled by detection of an ACS credential, and the insertion of a ticket disables the ACS reader.
   d. Upon detection of a vehicle on the activation/presence loop, CFC will be activated and ready to accept a ticket or a manual entry.
   e. For fully paid or validated tickets, send signal to open gate and send data to FMS.
   f. For tickets that are not fully paid/validated or if grace period has expired, display fee due to customer. Cashier inputs cash or credit card is swiped and change (if required) is displayed and drawer opens.
   g. Upon payment of fee, send signal to open gate and send data to FMS.
   h. Prompt for receipt, or programmable auto receipt issued. No receipt issued for zero fee transactions.

I. Exit Station (EXS)
   1. Independently and in concert with FMS, read ticket data to determine ticket validity, payment due and any encoded validation.
   2. Include the following integrated components:

a. EMV Credit Card Reader
b. Receipt Printer.
c. Processed ticket vault.
d. Easily readable display screen with message such as “Please Insert Ticket”.
e. Visual instructions displayed to patrons.
f. Intercom with push-button, speaker, and microphone.

3. Capable of maintaining a minimum processing rate, including typical patron delays and in combination with gate and other in-lane equipment, of 100 transactions per hour.
4. Maximum elapsed time from insertion of validated ticket until gate opens is five seconds.
5. Operational Description
   a. EXS is not active without a vehicle detected on Presence/Activation loop
   b. EXS is activated upon detection of vehicle on Presence/Activation loop.
   c. EXS is disabled by detection of an ACS credential, and the insertion of a ticket disables the ACS reader.
   d. Upon detection of a vehicle on the activation/presence loop, display screen visually prompts patron to insert ticket into EXS.
   e. For fully paid or validated tickets, send signal to open gate and send data to FMS. Retract ticket into EXS and retain for audit purposes.
   f. For tickets that are not fully paid/validated or if grace period has expired, prompt patron to pay remaining fee via credit card or contact staff via intercom.
   g. Upon payment of fee, prompt for receipt on demand (Programmable for auto-receipt by FMS). No receipt issued for zero fee transactions.

J. Pay-on-Foot Station (POF)
1. Independently and in concert with FMS, read ticket data to determine ticket validity, payment due and any encoded validation.
2. If payment is due, display amount due and request payment via credit card.
3. Upon receipt of payment, issue machine encoded ticket, with programmable elapsed grace period.
4. Provide concise instruction with pictograms where appropriate for user-friendly operation.
5. Provide clear instructions to patron throughout transaction process.
6. Include high security lock system with appropriate alarm contacts for tampering.
7. Capable of maintaining a minimum processing rate, including typical patron delays, of 100 transactions per hour.
8. Operational Description
   a. Patron inserts ticket into POF.
   b. For valid tickets, fee is displayed. Patron inserts credit card and payment is processed.
   c. Amount paid, transaction number and other data are printed on ticket in readable form and encoded on ticket. All data is sent to FMS.
   d. Patron is advised visually to take ticket and proceed to vehicular exit.
   e. Receipts are issued only upon patron request for all fee paid transactions (Programmable for auto-receipt by FMS). No receipt issued for zero fee transactions.

f. If POF cannot read ticket or it is otherwise identified as voided; ticket is returned to patron, and a visual message advises patron that transaction cannot be processed and to press intercom for assistance.

2.3 ACCESS CONTROL SYSTEM (ACS):

A. FMS Interface: Provide the following functions in concert with the FMS.
1. Provide an on-line, computer-based access control system for those authorized by Owner to have access to parking facility without being processed through ticket system, for example; an employee or “Fast Pass” customer.
2. Distributive, networked or centralized processing may be employed, so long as required multi-lane control features such as anti-passback, occupancy and activity tracking are maintained. Employ proximity readers for employee and valet lots; and AVI readers for “Fast Pass” customers as specified herein for access for the following distinct user groups:
   a. Authorized employees requiring Pre-Paid and fast ingress and egress to parking facilities.
   b. “Fast Pass” customers that have registered to be billed automatically based upon usage.
3. Individually recognize and process up to ten-thousand (10,000) ACS users at all reader locations.
4. Have at least sixteen (16) preprogrammed access levels capable of being changed without reprogramming of ACS.
5. Provide anti-passback control. With this feature, users enter and exit in proper sequence (i.e., entry, exit, entry, exit, etc.).
   a. Selectable option to allow either "hard" (out of sequence user is rejected and an alarm is generated at ACS controller and FMS) or "soft" mode (out of sequence user is allowed access but reported.)
   b. In both hard and soft modes, each out of sequence event is reported as an exception transaction in daily ACS access log.
   c. Password protected, manual or automatic, "resynchronization" of all users to one access before anti-passback control resumes.
6. Link users to each other to allow one entity to be identified with and/or pay for a group of users. Provide up to one-hundred (100) such ACS groups.
7. Ability to group ACS cards and limit access to a preset maximum number of cars in facility at any given time, and/or allow and track overages to be invoiced separately.
8. Nesting feature:
   a. Ability to require parkers that are assigned to park in a specific level or area (nest area) to use ACS credential to enter and exit nest area in order to exit facility.
   b. Required sequence: In facility, in nest, out of nest, out of facility.
   c. Programmable “transfer” time for parker to enter and exit nested area through main facility.
9. Central ACS controller requirements:
   a. Issue and reprogram ID devices.

b. Allow authorized supervisor to create, store, send and receive user programming to ACS readers. Password protected access to programming, with multiple levels of access to all information regarding blocks and/or suites of cards.

c. Provide a data base for ACS management including the following:
   1) Provide at least twenty (20) programmable record fields for each person issued an ACS credential and at least twelve (12) programmable record fields for each user's vehicle(s).
   2) Allow parker record files to be retrieved, displayed, and/or printed based on selectable criteria, such as current ACS status, access group, access level, and/or ID numbers (except data that is password protected).
   3) Allow searching, sorting and printing of database by any field for routine and special forms such as invoices or mass-mailings.
   4) Consolidating and retaining data to allow for report generation. The following are minimum required reports, viewable on a workstation monitor and/or printable on demand:
      a) Activity Usage Reports – Provide a chronological list of ACS usage, including date, time, credential, and location of entries and exits; capable of being sorted by any field.
      b) Count Reports – Monitor and report counts of ACS vehicles present on an hourly basis by group, access level.
      c) Percentage of Occupancy – For selectable times during 24-hour period for all categories of ACS parkers.
      d) In/Out Status Report: Shows status of all ACS cards at any given time, sortable by name/card #/status.
      e) Active User Report – A listing of all active users that have access to the facility.
      f) Activity Exceptions Report – A field-sortable listing of all activity exceptions to include at a minimum hard-passback, soft-passback, shared account, debit card, hotel quest pass and nesting violations.
      g) User Changes Report – Provide report of changes to user accounts to include at a minimum debit card rate changes and status changes (e.g. card placed in neutral with no charges applied at exit).

d. Monitor and report the collection of fees from parkers on monthly, semi-annually, or annual prepayment, decrementing, or end of month billing.

e. Provide for posting of payments and automatic lockout of ACS users within programmable grace period after expiration of a prepaid account.

f. Invoicing Package
   1) Include ACS ID device number(s), account number(s) and rate associated for each ACS ID device being invoiced.
   2) Provide a monthly report listing total number of ACS ID device numbers invoiced and total dollar amount invoiced.
   3) Provide a password protected customer interface for customer registration, editing personal information, making payments, and viewing payment history.
   4) Include an Accounts Receivable package for all normal accounting functions associated with ACS revenue:
      a) Invoice report.

b) Accounts receivable ledger with supporting subsidiary ledgers for each account.
c) Accounts receivable aging report for selectable time periods.
d) Account history reports, indicating invoices and payments by customer.

g. Provide automatic on-line real-time monitoring of ACS usage with 2 years' storage of transaction data for audit and analytic purposes.
h. Monitor and report all alarm conditions to FMS.
i. Password protection and Daily Log reports for all administrative actions.

B. Readers
1. Housed in a weather proof, harsh environment enclosure rated NEMA-3R or greater.
2. Where required to be pole mounted, mounted on an aluminum pole and installed per manufacturer's suggestions.
3. Operational Description
a. ACS reader identifies ACS credential device in lane and searches for authorization through ACS Controller. If authorized, a signal is sent to open the gate.
b. Where ACS lanes are also equipped with Entry Stations or Exit Stations, activation of reader automatically disables dispenser/verifier. Likewise, the initiation of a ticket entry/exit transaction automatically disables ACS.
4. Proximity Card System
a. Passive credential design capable of being read within 2 inches of reader.
b. Minimum accuracy of card reader: 99.9%.
c. Read and process credential within one second of presentation to reader.
d. In combination with gate and other in-lane equipment, Ability to maintain processing rate of 600 transactions per hour for at least four continuous hours of operation, including normal patron delays.
e. Checking protocol that identifies multiple reads of same card within a few seconds (due to users "waving" card in front of reader), correcting false anti pass-back reads.
f. Protection from common and/or local sources of interference - Unaffected by neighboring electronic systems or electronically controlled devices.
g. When paired in-lane with any RCS device, card reader mounted to face plate of RCS device (ticket dispenser, exit validator, POF etc.).
h. When not paired in-lane with RCS device, mounted to same enclosure with the intercom substation on gooseneck stand.

5. AVI System (Fast Pass)
a. Access system consisting of antennas, readers, and local controllers (as required by vendor's system architecture) that automatically reads vehicle's credential data as the car approaches the entrance or exit and transmits a signal to ACS controller. ACS controller confirms or denies authorization and activates gate for authorized users.
b. Whether or not physical vehicle access is granted, system records transaction of data triggered by approach of AVI equipped vehicle. Distributive, networked, or centralized processing may be employed, so long as required multi-lane control features such as anti pass-back, occupancy and activity tracking are maintained.

c. Use a radio frequency (RF) signal to identify authorized users via ACS credential in/on the vehicle as it passes through the RF field at each ACS monitoring location. Mounting options, including externally mounting credential, hang-tag, or handheld devices to be described and quoted. The following are minimum hardware design requirements:
   1) Credential must have a guaranteed service life of five years.
   2) Programmable with a unique identification code. Upon receipt of RF signal from antenna, device returns a signal that carries its unique ID.
   3) Minimum read range between 15 - 20 feet at 5 MPH with a 99.5% minimum accuracy rate for active devices independent of rate of transmission.
   4) Read and process credential within one second of presentation to reader.
   5) In combination with gate and other in-lane equipment, ability to maintain processing rate of 800 transactions per hour, including normal patron delays.
   6) Adjustable read zones to prevent reading and crosstalk from any devices in adjacent lanes or from vehicles queued in line of vehicles.
   7) Interference protection from common or local sources of RF radiation.
   8) Unaffected by neighboring electronic systems or electronically controlled devices.
   9) No additional facility modifications such as fences, blocks or mounted absorption material.

d. Ability to be tuned to any frequency within operational band by changing settings of reader without modifying or replacing credential.

e. Operate under conditions of either rain or snow at winds below gale force. Protected by and operational against common dirt or dust born particles.

f. System may be either low frequency RF operating in VHF frequency band or high frequency RF operating within UHF band as allowed by jurisdictional authorities.

g. Employ error checking communications protocol that prevents partial device numbers from being transmitted to host computer.

2.4 CONTROL GATE

A. Provide an effective barrier to vehicles entering or exiting facility.

B. Closed gate arm height of approximately three feet unless noted otherwise on drawings.

C. Use articulating gate arms in areas of limited headroom.

D. Employ breakaway design that can be easily replaced when broken away from housing.

E. Incorporate in one housing all necessary components for functioning of unit.

F. Provide circuit breaker protected gate motor and components designed for heavy-duty use.

G. Provide corrosion resistant parts.

H. Provide gate controller that prevents damage when gate motion is blocked in any position and cannot be opened or closed by force applied to gate arm.

I. Allow for adjustment of gate arm travel.

J. Gate Controller features:
   1. Microprocessor controlled over-the-network activation and communication for gate status and functions from FMS.
   2. Directional logic with electronic outputs to alarms, counters and to report atypical lane activity to FMS.
   3. Ability to test gate operability and controller programming on-site without use of special diagnostic equipment.
   4. "AUTO-MANUAL" switch, and "ON-OFF" switch for gate.
   5. Contains power supplies, dust-proof relays, and other circuit components to control gate.

K. Control Gate Usage Restrictions:
   1. Provide minimum of two (2) warning signs permanently mounted and easily visible from each side of gate warning pedestrians, bicycles, and motorcycles of the dangers of the gate arm.
   2. Incorporate both text and graphics to convey hazards to pedestrians, bicycles, and motorcycles.
   3. Provide gate in accordance with UL 325 standards.

2.5 VEHICLE DETECTION

A. Incorporate/employ anti-tailgating logic, vehicle inductive profiling, and self-tuning technology.

B. Maintain peak sensitivity regardless of temperature, rain, or other environmental conditions.

C. Fit within entry and exit controllers, or gate housings, or in remote lane/ramp controller cabinet.

D. Provide indicator lights on front panel indicating presence of vehicle, lack of presence, or loop fault.

E. Require no special tools or meters for adjustment following initial installation

F. Provide multiple loop tuning to prevent crosstalk or interference between loops in close proximity of each other.

G. Inductive Loops as sensing device (where not reused):

   1. Cut-into paving surface and filled with manufacturer’s approved sealant (see drawings).
   2. Be formed by three to four turns of 20-gauge/16-gauge XLPE single-conductor wire.
   3. No splices are permitted.
   4. Contain loop leads:
      a. Limited to a length of 100 feet.
      b. Have a four-twist minimum per foot and located at a minimum of 18 inches from electrical power lines.
      c. Be contained in separate conduit to prevent interference from electrical signals.
      d. Light in color (Red or Orange) for presence loop
      e. Dark in color (Black, Blue, or Green) for safety loop

f. Light in color (Red or Orange) for secondary presence loop (if applicable)
g. Dark in color (Black, Blue, or Green) for down-stream loop (if applicable)

5. 20-gauge XLPE single conductor wire:
   a. #20 AWG multi-strand copper wire
   b. 0.040” Nominal XLPE (cross-linked polyethylene) Insulation
   c. 0.120 Nominal O.D. for use in 1/8” saw cuts
   d. Only used in Concrete drive lanes

6. 16-gauge XLPE single conductor wire:
   a. #16 AWG multi-strand copper wire
   b. .080” Nominal XLPE (cross-linked polyethylene) Insulation
   c. 0.220” Nominal O.D. for use in 1/4” saw cuts
   d. Used in Concrete or Asphalt drive lanes

7. Backer Rod:
   a. Closed cell polyethylene foam
   b. Installed prior to sealing saw cuts
   c. Holds loop wires and lead-in wire securely in saw cuts
   d. Prevents wires from floating to surface when sealant is applied
   e. Use 2” piece in every 2’ of saw cut
   f. Used in concrete or asphalt
   g. 0.375” Nominal O.D. for use in 1/8” saw cut
   h. 0.500” Nominal O.D. for use in 1/4” saw cut

8. Products’ Vendors: Subject to compliance with requirements, vendors whose products may be incorporated into the Work include, but are not limited to the following:
   a. Reno A&E, 4655 Aircenter Circle, Reno, NV 89502
   b. National Loop Company, 70 Cohoes Avenue, Green Island, NY 12183
   c. Interstate Wire Co., 10355 Sanden Dr., Dallas, TX 75238
   d. RAI Products, 421 Rountree Rd. Charlotte, NC 28217

2.6 INTEGRATED LICENSE PLATE RECOGNITION (ADD ALTERNATE)

A. Primary use is to verify vehicle entry times and dates to confirm accurate parking fees are assessed.
   1. When a ticket is generated at an entry station a digital image of the vehicle’s rear license plate is captured, linked to the RCS transaction, and stored in the computer database.
   2. When the ticket is presented at the exit, the system retrieves the LPR entrance record and compares it to the LPR image at the exit.
   3. If entry times match, the transaction is completed as usual and the license plate number is removed from the inventory.
   4. If a discrepancy is found an alarm is generated and sent to an Image Review Workstation for staff intervention.
   5. The image alarm response time may be set for a programmable period for intervention or to allow processing the transaction based on the ticket information to avoid undue

delays when staff is unavailable. A report will be maintained of the number of non-matching plates allowed to exit without staff intervention.

6. The appropriate fee can be calculated by system software and the transaction can be completed.
7. All LPR data is stored in the FMS until transactions are completed.

B. Secondary use may involve the procurement of additional cameras at gated or gateless nest or other areas using vehicle license plates as primary or secondary access credentials.

C. LPR System Performance Requirements:

1. Capture 100% of all non-exception vehicles (as defined within this section) that enter and exit the facility.
2. Operate in N-0 mode; however, achieve an N-1 Factor rating of 96%, meaning that the LPR system reads a minimum of six (6) of seven (7) license plate characters correctly, ninety-six percent (96%) of the time for all non-exception vehicles as defined within this section. Missing, misread, or additional characters as determined by the LPR system, are counted against the read accuracy (i.e. if a license plate contains six standard characters “ABC123”, then N=6. Therefore, in order for the system to achieve an N-0 read, the system reads “ABC123” exactly). Additional characters added before or after the license plate characters count against the read rate. (i.e., “1ABC123” does not constitute an N-0 read).
3. Exception vehicles do not count against the accuracy of the LPR system. For the purposes of the LPR performance requirements an exception vehicle is defined as:
   a) Any vehicle whose license plate is obstructed, obscured, or encroached upon by a foreign object.
   b) Vehicles that contain excessive graphics and advertising such that it is impossible for the LPR system to determine which graphics belong to the license plate and which graphics do not.
   c) Vehicles with no license plate.
   d) Vehicles with temporary, cardboard (non-reflective) “Dealer Plates.”
4. Ambient lighting conditions have no effect on the accuracy of the LPR system regardless of the time of the day and night. Provide any necessary shading or lighting elements required to mitigate the effect of the ambient lighting conditions on the LPR system performance.
5. Provide a means, subject to approval by Owner, to remotely score the LPR system to ensure it meets the performance requirements. Provide all software needed to test the LPR system’s performance, downloadable to a standalone PC used for testing.

D. Cameras

1. Operational in all light and weather conditions.
2. Perform all optical character recognition.
3. RF shielded camera cables.
4. Internal heating elements.
5. Rated at 30 frames per second.
6. Anti-theft mounting /removal brackets.

7. Equipped with IR lens for license plate and color image for verification.
8. Capable of multiple images with multiple flash and shutter settings.
9. Pulsed LED illumination.

E. Processor and System Software
1. Automatically capture, interpret, process, display and store license plate images
2. Unlimited storage capacity.
3. “Fuzzy logic” plate matching capability.
4. Provide real-time displays of:
   a) License plate image.
   b) License plate character data.
   c) Image of vehicle.
   d) Date and time.
5. Ability to automatically identify misread plates.
6. Ability to add notes to images.
7. Ability to manually enter plates for querying purposes.
8. Ability to cross-link, query and input data from external sources.
9. Ability to audit all queries by date, time, and user password.
10. Ability to save frequent query requests.
11. Ability to schedule updates (i.e.: hot lists).
12. Data format in either .csv or text file.
13. Ability to export and print all data.
14. Provide audio and visual alerts.

2.7 INTEGRATED SIGNAGE

A. Dynamic Message Sign (DMS)
1. Provide Dynamic Message Signs at exit lanes.
2. DMS to be Daktronics, Signal-Tech or approved equivalent.
3. Monochrome LED with variable message and graphics.
4. Changeable messages easily programed and controlled through GUI.
5. Pre-programmed messages:
   a. Cashier on Duty
   b. Closed
   c. Pre-paid Only
   d. Open
   e. Fast Pass Only
   f. Credit Card Only
   g. Cash or Credit

2.8 INTERCOM SYSTEM

A. Fully digital, microprocessor based, modular design utilizing VoIP (Voice over Internet Protocol).

B. Programming server for all intercom features performed through networked workstation or from intercom master station.

C. Programmed configuration of intercom stations and system features stored in non-volatile memory.

D. System includes all software and hardware required for programming system, including:
   1. Individually programmable volume and microphone sensitivity control for each intercom station.
   2. Substations programmed to call intercom master station.

E. Master station desktop model with LCD-Display. Required features:
   1. Provide single-duplex conversation with any other selected individual station.
   2. Integrated microphone and loudspeaker.
   3. Firmware/feature upgrades available via download through intercom server with no local modification on station required.
   4. Minimum audio frequency range for audio components: 200-7000Hz.

F. Substation requirements:
   1. Microphone, loudspeaker, and in-use LED, all housed in one unit with front pushbutton control.
   2. Feature upgrades via download through intercom server with no local modifications required.

2.9 TRANSFER STATIONS

A. Ticket Transfer Station
   1. Independently and in concert with FMS, read ticket data to determine ticket validity, transfer ticket data from garage to long-term lot in FMS, print and encode transfer data on ticket.
   2. Include the following integrated components:
      a. Easily readable display screen with message such as “Please Insert Ticket”.
      b. Visual instructions displayed to patrons.
      c. Intercom with push-button, speaker, and microphone.
   3. Capable of maintaining a minimum processing rate, including typical patron delays and in combination with gate and other in-lane equipment, of 100 transactions per hour.
   4. Maximum elapsed time from insertion of validated ticket until gate opens is five seconds.
   5. Operational Description
      a. TTV is not active without a vehicle detected on presence/activation loop
      b. TTV is activated upon detection of vehicle on presence/activation loop.
      c. Upon detection of a vehicle on the presence/activation loop, display screen visually prompts patron to insert ticket into TTV.
      d. Upon ticket verification, print and encode data onto ticket, send signal to open gate when patron takes ticket, send transfer data to FMS upon detection of vehicle proceeding through the transfer point.

B. AVI Transfer Reader (Fast Pass)

1. Independently and in concert with FMS, utilize ACS AVI Reader (Fast Pass) to read credential data to determine validity, transfer credential data from P4 Garage level to covered levels of Garage in FMS, and send signal to open the gate.

2. Capable of maintaining a minimum processing rate, including typical patron delays and in combination with gate and other in-lane equipment, of 800 transactions per hour.

3. Maximum elapsed time from reading the credential data until gate opens is three seconds.

4. Operational Description
   a. AVI Reader is not active without a vehicle detected on presence/activation loop
   b. AVI Reader is activated upon detection of vehicle on presence/activation loop
   c. Upon detection of a vehicle on the presence/activation loop, AVI Reader will scan for credential.
   d. Upon credential verification, send signal to open gate, send transfer data to FMS upon detection of vehicle proceeding through the transfer point.

5. TTV is disabled by detection of an AVI credential, and the insertion of a ticket disables the AVI reader.

C. Ticket Transfer Station with AVI Transfer Reader

1. As described in 2.9 A and B above combined.

2. TTV is disabled by detection of an AVI credential, and the insertion of a ticket disables the AVI Reader.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Meetings: Meet with Electrical Contractor, before any rough-in work begins to:
   1. Review building plans as related to PARCS equipment.
   2. Discuss details and/or precautions to assure that all PARCS equipment functions properly.
   3. Determine that all required conduits and wiring are properly laid out.

B. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including equipment bases; accurate placement, pattern, and orientation of anchor bolts; critical dimensions; and other conditions affecting performance of the Work.

C. Examine location of all field and office equipment to determine if there are any constraints or conflicts before equipment installation.

D. Examine roughing-in for electrical systems to verify actual locations of connections before parking control equipment installation.

E. Additional Wiring: Provide all additional conduit and wiring which is needed for total system performance but which was not noted on Contract Documents at no additional cost to Owner.

F. Verify equipment layout in accordance with manufacturer's recommendations to allow proper movement of air through and around equipment.

G. Test, adjust and interface circuits prior to installation of PARCS equipment.

H. Coordinate with Owner or Owner’s Representative location and type of internet connection for credit card processing system within 30 days after award of contract.

3.2 INSTALLATION

A. Install PARCS in accordance with manufacturer's recommendations and approved Shop Drawings.

B. When possible, install lane equipment so that farthest extending part of equipment is recessed a minimum of four inches (4”) from face of curb to protect equipment and vehicular mirrors.

C. Installation and Start-Up: Contractor is responsible for installation of all control and communication wiring, Contractor supplied equipment and its interfacing and interconnection with Owner supplied equipment. Contractor authorizes and/or accepts responsibility for application of power to equipment and initiation of operation and for running all initial diagnostics and system generation programs necessary to provide complete working system.

D. Contractor is responsible for all software and communications by all computers and peripheral devices.

E. Provide dust and noise protection in strict accordance with equipment manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

A. Develop an Acceptance Testing Plan to demonstrate the functionality of the system. Provide sections for Factory System Testing, Lane Acceptance Testing, and System Acceptance Testing.
   1. Include demonstrations of compliance with specifications, contractual compliance, definitions of all test objectives, participant responsibilities, documentation of tests and procedures for dealing with failures during test.
   2. Detail tests for every functional requirement of each entry lane, exit lane and APS.
      a. Include checklist for specified supplies, spare parts, training operation and training manuals.
      b. Provide space for acceptance by Contractor and Owner or Owner’s representative.
   3. Confirm that all specified features are provided and fully operational before Acceptance Testing.
   4. Notify Owner or Owner’s Representative in writing at least one week prior to each official test session. If a test is not successful, correct noted deficiencies and advise Owner or

Owner's Representative, at least two days in advance, that test session is ready to resume.

5. Owner or Owner's Representative will witness tests.
6. Provide all test and diagnostic equipment including RCS and ACS credentials, currency, credit cards, stock items, and all consumables required for each test.

B. Passing Acceptance testing, even if performed in the presence of the Owner or Owner's Representative, does not relieve the Contractor of the responsibility to provide a system in accordance with the Specifications.

C. Promptly correct all problems encountered at no cost to the Owner.

D. Factory System Test (FST): Conduct a FST to verify the functional performance of all systems, subsystems, and components of the PARCS; including Fast Pass System, to ensure adherence to these functional specifications, prior to installing any equipment at the Airport.

1. Demonstrate the performance of the PARCS at a location mutually agreed upon by the Owner and the Contractor. Generally, the FST takes place at the Contractor's manufacturing facility, central distribution center, or local service center.
2. Configure a lane of each type with all applicable components, or stand-alone device if the device is not part of an entry/exit lane (e.g. server, workstations, etc.), to simulate the configuration as installed at the Airport.
3. Provide all ancillary items necessary to complete the FST including setting up a credit card test bed for testing purposes; supply credit cards of all types for testing; provide all ticket and ticketless media needed for each transaction type; and provide all keys to access equipment housings.
4. All systems, subsystems, and components of the PARCS must successfully complete the FST prior to the shipment of any equipment to the project site.
5. Installation of any PARCS equipment at the Airport that has failed the FST is prohibited.
6. Successful completion of the FST is accomplished when all systems, subsystems, and components have passed their test procedures and all test documents have been signed by the Owner and the Contractor. Minor deviations are not to be considered grounds for failure of the FST. Major deviations found during the FST result in the retest of the equipment, software, or subsystem before the FST is considered successfully complete.
7. Provide the Owner a plan for the FST in accordance with the submittal guidelines.
8. Provide test procedures for each lane type or device type and test procedures (refer to section 3.3 G below) to include:

    a. narrative describing the general procedures to be followed;
    b. definition of all minor and major deviation types;
    c. checklist of all items necessary to conduct the test (e.g. unpaid tickets, license plates, exceptions tickets, credit cards, transponders, equipment keys, etc.);
    d. checklist for the components of each lane or device;
    e. signature page for all FST participants' signatures;
    f. systematic instructions for testing each functionality;
    g. tests for verifying reports;
    h. area within each test section to denote "pass" or "fail"
    i. section for listing and describing test deviations.

9. Owner will have four (4) designated representatives observe the FST.

E. Lane Acceptance Test (LAT): Test all equipment and systems at each location to confirm that the components installed are fully operational as specified. Substantial completion includes the following.
   1. All PARCS equipment included in project or phase passed LAT.
   2. All communications from equipment to FMS and workstations passed LAT.
   3. All electronic signage interfaces complete and passed LAT.

F. System Acceptance Test (SAT): Confirm that all the physical, operational and management features and capabilities of the individual lane components are present in the integrated system.
   1. Before the start of test, verify that:
      a. The major subsystems and the entire PARCS are fully operational as an integrated system and operating properly.
      b. All spare parts, stock items, and manuals are on site and approved.
      c. All training is complete to Owner's satisfaction.
      d. All test checklists and training evaluation forms have been submitted.
   2. FMS produced all required reports and passed LAT.
   3. Conduct interim SAT at the completion of each phase if phasing of the installation is required.
   4. Maintain detailed records and a logbook of all SAT tests, events and issues to be provided to the Owner upon completion of the SAT.

G. Sample System and Lane Test Sequences:
   1. FMS: A critical test sequence is to induce fail-over testing for each of the servers constituting the redundant PARCS server cluster. In each sequence of the test, the secondary and/or tertiary servers must provide successful transfer of data from induced failure of the primary operational server.
   2. RCS:
      a. Entry Station
         1) Attempt to utilize the entry station without a vehicle present, and confirm the ticket will not be issued.
         2) Normal Transaction
            a) Activate entry station by presence on entry loop/sensor.
            b) Verify that "Please Press Button for Ticket" is displayed.
            c) Press button and verify that ticket is dispensed.
            d) Take ticket and verify that gate opens and closes upon clearing sensor.
            e) Verify accurate time/date/location code on ticket.
            f) Verify the ticket # was issued in FMS.
         3) Back-out with Ticket Taken
            a) Activate entry station by presence entry loop/sensor.
            b) Verify that "Please Press Button for Ticket" is displayed.
            c) Press button and verify that ticket is dispensed.
            d) Take ticket and verify that gate opens, then back-off of entry loop/sensor.
            e) Verify that gate closes.

f) Verify ticket is rejected at APM and CFC and identified as a back-out ticket.

4) Back-out ticket with Ticket Left in Throat
   a) Activate entry station by presence on entry loop/sensor.
   b) Verify that “Please Press Button for Ticket" is displayed.
   c) Push for ticket, but leave ticket in dispenser and back-off the approach sensor.
   d) Verify that ticket dispenser retracts ticket, ticket is physically voided, and dropped into back-out ticket receptacle.
   e) Verify that gate does not open.
5) Car Remains on Loop/Sensor
   a) Activate entry station by presence on entry loop/sensor.
   b) Verify that “Please Press Button for Ticket" is displayed.
   c) Remain on loop/sensor.
   d) Verify that after 30 seconds system reports an inactive vehicle.

b. Normal transactions at a CFC

1) Attempt to utilize the CFC without a vehicle present, and confirm the ticket will not be accepted by the ticket verifier.
2) Activate CFC by presence on entry loop/sensor.
3) Insert ticket into acceptor, correct fee is displayed.
4) Present cash or credit card.
   a) If cash, the amount paid is entered, the correct change is displayed
   b) If Credit Card, the card is inserted into the EMV Reader (if debit the customer enters their PIN) the fee is satisfied when authorized.
5) After the parking fee is satisfied the receipt is printed (on demand) through the CFC receipt printer, and a signal is sent to raise the gate.
6) When the vehicle crosses the closing loop, the barrier gate closes and the station resets for the next transaction.
7) The transaction data is sent to the PARCS server.

c. Special transaction procedures are required in addition to or in place of the normal transaction procedure above. The special transaction exit procedures are detailed below:

d. Invalid Credit Card Presented for Payment

1) After the parking fee is displayed, an invalid credit card is inserted and the display shows the fee due and the appropriate message while processing.
2) Once authorization is declined, the credit card is returned and the message “Card Not Accepted”, or another Owner approved message, is displayed along with the fee due. The cashier informs the customer that their credit card is invalid and requests a different credit card.

e. Exit Within Grace

1) Upon inserting the grace ticket, a zero-dollar fee is displayed on the customer fee display and the CFC.
2) A message is displayed on the CFC to inform the cashier that the ticket is a grace ticket and a button appears to confirm the transaction.
3) After the cashier presses the button confirming the transaction, the barrier gate rises and the transaction continues as a normal exit transaction.

f. Lost Ticket Transaction

1) The customer informs the cashier that they have lost their ticket and the cashier presses a lost ticket button on the CFC.
2) The correct fee is calculated and displayed on the customer fee display and CFC and the transaction continues as a normal exit transaction.
3) An exception ticket is generated for the lost ticket and retained for audit purposes.

g. Unreadable Ticket Transaction

1) Ticket is inserted into the ticket reader/validator by the cashier and the ticket cannot be read and is returned through the ticket slot. The message “Ticket Unreadable”, or another Owner approved message, is displayed on the CFC.
2) Cashier presses an unreadable ticket button on the cashier terminal.
3) The cashier enters the ticket number (or date/time of entry). The correct fee is calculated and displayed on the customer fee display and CFC and the transaction continues as a normal exit transaction.
4) An exception ticket is generated for the unreadable ticket and retained along with the original unreadable ticket for audit purposes.

h. Attempt to Exit with Back-out or Stolen Ticket

1) Back-out Ticket is inserted into the ticket reader/validator slot by the cashier, the ticket is identified as a back-out ticket, appropriate alarm is generated by the system, and the message “Invalid Ticket”, or another Owner approved message, is displayed on the CFC.
2) Cashier presses an invalid ticket button on the CFC and proceeds per Airport policy.
3) An exception ticket is generated and is retained along with the stolen ticket for audit purposes.
4) After payment is received the transaction continues as a normal exit transaction.

i. Exit with a Validation

1) After fee is displayed, a validated ticket or barcode is inserted into the ticket reader/validator slot or presented to the barcode reader and the appropriate discount is applied to the parking fee due based on type of validation.

2) The display updates to show the reduced fee due.
3) If the entire fee due is validated, then the barrier gate rises and the transaction continues as a normal transaction.
4) If the validation does not satisfy the entire parking fee, the customer must present an acceptable form of payment to the cashier and the transaction continues as a normal exit transaction.

j. POF APM
1) Normal Transaction
a) Insert a valid credential and Confirm that machine calculates and displays the payment amount.
b) Confirm that machine displays the parking time.
c) Confirm that machine displays the permitted means of payment.
d) Confirm that after payment, credential is re-encoded with current system time and returned to patron.
e) Confirm that a printed receipt is offered and printed as an option.
2) Invalid Transaction
a) Insert a back-out/invalidated credential.
b) Confirm that machine indicates that credential is invalid.
c) Confirm that machine returns credential to patron.
d) Confirm that machine instructs patron to proceed to cashier or to push button for assistance.

k. Exit Station
1) Attempt to utilize the exit station without a vehicle present; the ticket should not be accepted by the device.
2) Normal Transaction
a) Activate exit station by presence over primary approach sensor. Verify that “Please Insert Credential " is displayed.
b) Insert a validated credential into the throat and verify gate opens and credential is vaulted.
c) Proceed over exit sensor and verify gate closes upon clearing exit sensor.
d) Verify that exit station resets for next transaction.
e) Verify valid exit at FMS computer.
3) Invalid Transaction
a) Activate exit station by presence over primary approach sensor. Verify that "Please Insert Credential” is displayed.
b) Insert an invalid credential into the throat and verify that gate does not open.
c) Remove invalid credential and verify exit station is reset for the next transaction.
d) Verify an invalid exit at FMS computer.
4) Grace Period
a) Activate exit station by presence over primary approach sensor. Verify that “Please Insert Credential " is displayed.
b) Insert a credential that is within the programmed grace period into the throat and verify gate opens and no fee is displayed.

c) Proceed over closing sensor and verify gate closes upon clearing closing sensor.
d) Verify that exit station resets for next transaction.
e) Verify valid exit at FMS computer.

5) Credit Card Transaction
a) Activate exit station by presence over primary approach sensor. Verify that “Please Insert Credential" is displayed.
b) Insert a valid unpaid credential in to the throat and verify correct fee is displayed.
c) Insert credit card into the EMV CC Reader and verify approval within five (5) seconds.
d) Confirm the barrier gate opens and receipt is offered and prints upon request.
e) Proceed over closing sensor and verify gate closes upon clearing closing sensor.
f) Verify that exit station resets for next transaction.
g) Verify valid exit at FMS computer.

3. ACS:
a. Proximity Card System
1) Attempt to read the prox card without a vehicle present and confirm the card is not read and the barrier will not raise.
2) Normal Transaction
a) Activate vehicle detection loop.
b) Wave credential within six inches of reader.
c) Confirm that credential is accepted and gate opens for passage.
d) Confirm that credential use data is logged to database.
3) Pass-back Test
a) Activate vehicle detection loop.
b) Wave credential within several inches of reader.
c) Confirm that credential is accepted and gate opens and closes after vehicle passes.
d) Repeat process.
e) Confirm that credential is not accepted.
f) Confirm that Pass-back data is logged to database.
4) Back-out test
a) Activate vehicle detection loop.
b) Wave credential within several inches of reader
c) Confirm that credential is accepted and gate opens and closes after backing off activation loop.
d) Repeat process, Credential should still be accepted since it did not proceed through the barrier.
5) Invalid Transaction
a) Activate vehicle detection loop.
b) Wave system invalidated credential within several inches of reader.
c) Confirm that credential is not accepted and gate does not open.
d) Confirm that attempted use of credential is logged to database.
b. AVI System (Fast Pass)

1) Present the AVI credential to the reader without a vehicle present and confirm the credential is not read and the barrier gate will not raise.
2) Normal Transaction Entrance
   a) Activate vehicle detection loop.
   b) Approach reader with valid credential.
   c) Confirm that credential is accepted and gate opens for passage and closes after clearing loop.
   d) Confirm that credential use data is logged to database.
3) Normal Transaction Exit
   a) Activate vehicle detection loop.
   b) Approach reader with valid credential.
   c) Confirm that credential is accepted and gate opens for passage and closes after clearing loop.
   d) Confirm that credential use data is logged to database.
   e) Confirm fee is accurately calculated, charged to credit card, and receipt received via email.
4) Pass-back Test
   a) Activate vehicle detection loop.
   b) Approach reader with valid credential.
   c) Confirm that credential is accepted and gate opens and closes after vehicle backs off activation loop.
   d) Repeat process. Confirm credential is not accepted and pass-back is reported in FMS.
5) Invalid Transaction
   a) Activate vehicle detection loop.
   b) Approach reader with invalid credential.
   c) Confirm that credential is not accepted and gate does not open.
   d) Confirm that attempted use of credential is logged to database.
6) Back-out test
   a) Activate vehicle detection loop.
   b) Approach reader with valid credential.
   c) Confirm that credential is accepted and gate opens and closes after backing off activation loop.
   d) Repeat process, Credential should still be accepted since it did not proceed through the barrier

4. Intercom System
   a. Verify that all intercoms activate and interact audibly w/appropriate stations when buttons are depressed.
   b. Verify associated barrier opens upon receiving vend signal from intercom.

H. Thirty-Day Operational Test and Final Acceptance
1. After Substantial Completion and opening of the facility, the Owner or Owner's representative will conduct an operational test for thirty days.
2. Provide a qualified and experienced technician on-site within one hour during the thirty-day test.
3. Performance Standards:

a. All mechanical components are operational without downtime. For each downtime period of eight hours, one day will be added to the test duration.
b. All electronic components are operational without downtime or programming problems for the complete monthly reporting cycle. For each down time of four hours but less than eight hours or programming problems that delay report cycle, two days will be added to the test duration.
c. All reports correlate 100% with cash and credit card receipts in each CFC, EXS, and APM.

3.4 TRAINING

A. Develop and implement a comprehensive training program for authorized personnel.

B. Design the curriculum so that each group is trained in the full repertoire of system commands that they may have to use in course of performing designated functions.

C. Schedule training no more than two weeks prior to use of equipment.

D. Include lectures, visual presentations, hands-on operation of equipment and any materials necessary to perform job. Provide each trainee with a complete set of training materials and operating manuals during training session, to be kept for use on job at completion of training.

E. Training categories (Owner to identify names and numbers of personnel for each category):
1. Attendants:
a. Operate CFC, including ability to process normal and exception transactions, and to understand all messages displayed.
b. Clear ticket and paper jams.
c. Reset system after a power failure.
d. Perform collections.
e. Replenish cash.
f. Change receipt paper and ribbons.
2. Supervisors:
a. Same basic training as Attendant, plus:
b. Understand all system messages provided by FMS, including but not limited to alarm messages, indications of attempts to compromise PARCS and explanations of atypical lane activity displayed by count system, access, or revenue control system.
c. Correlate tickets issued with vehicles present, time parked with revenue generated.
d. Operate FMS and understand purpose and data contained within all reports produced by FMS.
e. Process exception transactions occurring at CFC, EXS, and APMs.
3. Maintenance personnel:
a. Same basic training as Attendant, plus:
b. Perform primary maintenance on all major components of system.
c. Replenish all system supplies.
d. Replace internal elements such as ticket transport units or printers.

e. Perform recommended PMCS items.
f. Lubricate and clean internal components.
g. Remove and replace gate arms and adjust gate arm travel.
h. Be certified by contractor to trouble shoot all systems and perform primary maintenance.
i. At conclusion of maintenance training session(s), submit to Owner or Owner's Representative a list naming qualified Owner/Operator maintenance personnel. Detail the level of maintenance/repair functions each of Owner/Operator personnel are qualified to perform.

4. Managers/System Administrators:
   a. Same basic training as Supervisors, plus:
   b. Utilizing data from FMS, perform statistical analysis and checks and balances over actions of Supervisors and subordinates.
   c. Two months after Final Acceptance, provide additional training utilizing real data.

END OF SECTION