Functional Specifications

Parking Access and Revenue Control System (PARCS) Replacement Project

Houston Airport System
Houston, Texas

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PROJECT FUNCTIONAL SPECIFICATIONS

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PARKING ACCESS AND REVENUE CONTROL SYSTEM (PARCS)

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D.   This Section contains the requirements for replacement of the existing Parking Access and Revenue Control System (PARCS) at the William P. Hobby Airport (HOU) and George Bush Intercontinental Airport (IAH). The PARCS replacement shall not only utilize the industry's latest technological advancements to control access, calculate, and accurately report revenue for the parking facilities, but shall improve the overall management, system efficiency, revenue accounting, revenue security, and customer service aspects of the parking operations at the Airport. This project shall implement hardware and application software that will meet or exceed Houston's parking access and revenue control needs for at least 10 years after the system's final acceptance. These specifications will describe the functional requirements for the new PARCS and what, if any, existing equipment will be used with the new system.

E.   This project will replace the existing parking access and revenue control systems at all parking facilities for William P. Hobby Airport (HOU) and George Bush Intercontinental Airport (IAH). Some of the equipment for these facilities may be

identified as optional, therefore, Contractors shall provide separate pricing for all alternate proposal items.

1.02 REFERENCES
A. Codes and Regulations:

1. Local Codes: Comply with State and Local codes as applicable.

B. Information Security Standards and Requirements:

1. Payment Card Industry Data Security Standard (PCI DSS), Version 3.2.1 or latest version at the time of Contract Award
2. Payment Application Data Security Standard (PA DSS), Version 3.2 or latest version at the time of Contract Award
3. PCI Security Standards Council P2PE certified solution

1.03 DEFINITIONS
A. Definitions of terms used in these specifications are located in the General Requirements to be provided separate from these specifications and as follows:

1. 24/7 – twenty-four hours per day, seven days per week.

2. 24/7/365 – Twenty-four hours per day, seven days per week, three-hundred-sixty-five days per year, including the additional day per leap year that occurs during the contract.

3. Acts of God – Those events which are outside of control of humans and for which no one can be held responsible and which cannot be prevented. Acts of God include, but are not limited to, severe weather phenomena such as hail, flooding, extreme drought, hurricanes, tornados, tropical storms, fire, earthquakes, and lightning.

4. ANSI – an acronym for the American National Standards Institute

5. API – an acronym for an Application Programming Interface which is a communication protocol between different parts of a computer program intended to simplify the implementation and maintenance of software.

6. Automated Vehicle Identification – Also referred to as AVI, is a Radio Frequency Device (RFID) that emits an electronic signal that can be read by an associated reader/ antenna. The signal contains information relating to the account and transponder number.

7. Barrier Gate – An automated gate utilized by the PARCS to control ingress into and egress from a parking facility.

8. Cashier Station – a computerized PARCS device located in a staffed cashier booth at an exit lane that facilitates multiple methods of exit from a parking facility; commonly referred to as: *cashier terminal*.

9. CBEMA – Computer and Business Equipment Manufacturers Association: The CBEMA curve illustrates the acceptable under-voltage and over-voltage conditions that most equipment can sustain for a period of time.

10. Conceptual Design Document – This document and subsequent review meeting shall insure Contractor has a full and complete understanding of the Houston Airport System's parking operations and the requirements of this specification for the new PARCS.

11. Contract Documents – The Contract Documents executed by Houston Airport System and the Contractor outlining the requirements for the Work to be performed as it relates to the implementation of the PARCS.

12. Contractor – The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the Work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the Work.

13. Corporate Parking Program – A program offered to corporate accounts to provide specific parking spaces and a loyalty program for multiple vehicles associated with one corporate account. The Corporate account could be issued unique credentials for ingress and egress.

14. Crash – A system failure in which the PARCS cannot properly process revenue transactions.

15. Critical Design Document – This document shall contain detailed description of the proposed PARCS and system components including schematics, diagrams, interface control documents, etc.

16. Customer Loyalty Program – A program to provide benefit to patrons who frequently park at the airport. *Also referred to as a "Frequent Parker Program"*

17. CVPS – an acronym for the name Creating Vision in Parking Systems that provides a valet parking solution

18. DVD – Digital Video Disk – Read Only Memory: an optical disk used to store data that once created, cannot be erased or filled with new data.

19. Dynamic Signage – signage displaying varying text and/or graphics to relay specific messages to patrons via a matrix of LED lights. Dynamic signage can be used for various applications including displaying the method of payments accepted at a specific lane, the number of available spaces in a facility/level or providing guidance to patrons.

20. EM – Emergency Maintenance Services.

21. EMV – European MasterCard/VISA credit card standard, referring to a chip embedded credit card associated with a personal PIN used for payment of parking fee due. Sometimes referred to as "*Chip and PIN*". EMV Standards are currently required as of October 1, 2015.

22. Entry Station – a computerized PARCS device located in an entry lane that facilitates multiple methods of entry including issuing a barcode parking ticket, reading an EMV (chip embedded) card, reading an AVI transponder, reading a bar code or QR code from a cell phone or hard copy document, or reading a contactless credit card.

23. ER – An acronym for the Equipment Room. May also be referred to as the MDF room.

24. Escrow Agent – An independent, third-party agent with whom the Contractor shall employ to safely store all application software, operating system, other applicable software plus all applicable system architecture and software documentation.

25. Exit Station – a computerized PARCS device located in an Unattended Exit lane that facilitates multiple methods of exit from a parking facility including ingesting and reading a barcode parking ticket, reading an EMV (chip embedded) card, reading a bar code from a cell phone or hard copy document, or reading a credit card fob via RFID. The exit station uses the data from the inserted or detected media to validate exit privileges or calculate and process the associated parking fee; fees can be paid via credit card, debit card, or cell phone, or exit is granted via access card or validated/pre-paid magnetically encoded ticket.

26. FAT – Factory Acceptance Test: a test of the PARCS Contractor's system and equipment prior to delivery to a project site to ensure that the equipment and system meets the intent of these Functional Specifications.

27. FMS – Facility Monitoring System: A system that provides operational and performance information of the system components.

28. Frequent Parker Program – A program to provide benefit to patrons who frequently park at the airport. This system will be a web-based application to allow patrons to sign up and maintain their account. This system is tied to the vehicle license plate number or AVI account and will recognize a vehicle with an approved account, open the exit gate and bill the credit card on file. *Also referred to as a "Customer Loyalty Program."*

29. GUI – Graphical User Interface: A program interface that takes advantage of a computer's graphics capabilities to make the program user-friendly and intuitive to use.

30. HAS – Houston Airport System: the owner and initiator of this project. *Also referred to as "Airport", "HAS", or "Owner".*

31. HAS IT Specifications – Houston Airport System IT specifications may be found online at "http:/www.fly2houston.com/biz/resources/building-standards-and-permits/".

32. HCTRA – Harris County Toll Road Authority: the local toll road authority that operates the local toll roads and will provide a file of valid toll accounts through a "white list".

33. IDF Room – an acronym for the Intermediate Distribution Frame room. May also be referred to as the "TR" or "Telecommunications Room".

34. IP – Internet Protocol: IP is a network layer protocol in the Internet protocol suite and is encapsulated in a data link layer protocol (e.g., Ethernet). As a lower layer protocol, IP provides the service of communicable unique global addressing amongst computers.

35. IRW – Image Review Workstation: a workstation that is used to review images from the LPR system.

36. ISO – short for International Organization for Standardization: An international organization comprised of national standards bodies from around the world. ISO is the world's largest developer and publisher of standards.

37. LAN – an acronym that stands for "Local Area Network"

38. LAT – Lane Acceptance Test: a test of a Contractor's installed equipment at the lane level to ensure that the equipment meets the intent of these Functional Specifications. LATs are conducted on all entry lanes and exit lanes.

39. LED – Light Emitting Diode: a type of light commonly used for dynamic signage.

40. LPN – License Plate Number

41. LPR – License Plate Recognition: a combination of cameras, software, infrastructure, and monitoring stations that allow for the automated recording of a vehicle's license plate number upon entry using application software utilizing OCR. The license plate number is linked to the vehicle's entry event within the PARCS. Upon exit, the license plate is checked again by the LPR system to verify that the vehicle attempting to exit is the same vehicle that is linked with the entry event of that transaction; a subsystem to a PARCS.

42. Major Deviation – Any deviation or failure of a FAT, LAT or Site Acceptance Test (SAT) procedure that affects fee calculation accuracy, transaction count accuracy, exception count accuracy, active ticket inventory accuracy (system vs. actual), revenue processing, calculations, or reporting.

43. MDF Room – an acronym for the Main Distribution Frame room. May also be referred to as the "ER" or "Equipment Room"

44. Minor Deviation – Any deviation or failure of a FAT, LAT or Site Acceptance Test (SAT) procedure that does not affect fee calculation accuracy, transaction count accuracy, exception count accuracy, active ticket inventory accuracy (system vs. actual), revenue processing, calculations, or reporting.

45. NEMA – National Electrical Manufacturers Association: An association that develops standards related to the generation, transmission, distribution, control, and end-use of electricity.

46. N-Factor – a term used to quantify the accuracy of the OCR for an automated license plate reading system including LPR, where "N" represents the number of characters on any given license plate. If all characters are interpreted correctly by the OCR, then it is said to be an "N read". If all but one character is read correctly then it is said to be an "N minus one" or "N-1" read, etc.

47. NEC – National Electric Code: part of the National Fire Code, the NEC is a standard for the safe installation of electrical wiring and equipment.

48. NSP – An abbreviation for the company name of New South Parking.

49. Normal Conditions - Normal conditions are considered to be equipment malfunctions, parts usage under normal wear and tear, and performance of scheduled services.

50. Normal Weather Conditions - Normal weather conditions are applicable to weather conditions that are common to the Houston,

TX region such as rain, strong thunderstorms, freezing temperatures, snow, hail, ice, 100+ degree temperatures, and high winds, among others.

51. O&M – an abbreviation that stands for "Operations and Maintenance"

52. OCR – Optical Character Recognition: a set of software algorithms that enable LPR application software to analyze a digital image of a license plate and determine the digitized values of the license plate characters through an automated process.

53. ODBC – Open Database Connectivity: In computing, ODBC provides a standard application software programming interface method for using database management systems. ODBC is intended to infer an independence from programming languages, database systems, and operating systems.

54. ODT – Operational Demonstration Test: a test of a fully installed PARCS to monitor the system during normal operating conditions and ensure that the system is functional over a defined period of time in a manner consistent with the intent of these Functional Specifications.

55. OTDR – Optical Time Domain Reflectometer: an instrument that analyzes the light loss in an optical fiber in optical network trouble shooting

56. P2PE – Point to point Encryption – a secure communication link between devices or components within those devices that prevent intermediate devices from having exposure to sensitive information that is transiting the network.

57. PA DSS – Payment Application Data Security Standard: a set of comprehensive data security requirements and parameters for computer applications that process credit card payments.

58. PIL – Pay-in-Lane Device installed in an exit lane that allows patron to pay the parking fee in cash.

59. PARCS – Parking Access and Revenue Control System: A combination of equipment, subsystems, and supporting infrastructure that allows an entity to accurately calculate, collect, track, and report revenues for parking within one or more facilities. A PARCS also monitors and controls ingress and egress to and from those facilities.

60. PC – Personal Computer: a microcomputer designed for individual use for such applications as word processing, data management, or financial analysis.

61. PCI – an acronym for Payment Card Industry

62. PCI DSS – Payment Card Industry Data Security Standard: a set of comprehensive requirements and parameters for enhancing payment card account data security to help facilitate the broad adoption of consistent data security measures on a global basis.

63. PDF – Portable Document Format: a document-encoding process developed by Adobe that maintains page layout, fonts, and graphics and can include many other features such as hyperlinks

64. PGS – Parking Guidance System: a combination of vehicle detection devices, dynamic signage, and supporting infrastructure that allow for the automated counting of vehicular ingresses and egresses to and from a parking facility. The resultant count is displayed on operational workstations as well as a series of dynamic signs to inform patrons of the location of available parking; a subsystem to PARCS.

65. PIN – Personal Identification Number: A number selected by a user to gain access to certain areas of the PARCS or to associate with a chip embedded credit card required by EMV standards.

66. Preventive Maintenance - This type of maintenance includes but is not limited to scheduled inspection, testing, necessary adjustment, alignments, lubrication, parts cleaning, replacement of consumables, communication system maintenance, server administration, database administration, and application support of the PARCS hardware and software.

67. Pre-Booking/Reservation System – This is a third-party system that provides a patron to register to reserve for a parking space prior to arrival at the airport and to pre-pay for the desired number of days of parking.

68. QA/QC – Quality Assurance/Quality Control: The quality processes and quality checks used to ensure the PARCS and its components comply with the Contract requirements.

69. QR Code – A QR code is a form of a bar code that can store more data than a standard binary bar code.

70. RFI/EMI – Radio Frequency Interference / Electromagnetic Interference: Radio Frequency and Electromagnetic Interference are phenomena that occur when the radio frequency of electromagnetic field of one device disrupts, degrades, or impedes another device.

71. RFID – Radio Frequency Identification: the technology utilized by Automatic Vehicle Identification systems, such as EZTag™, or HID for identifying a patron's credential. A RFID system consists

of an antenna, a transceiver (which reads the radio frequency and transfers the information to a processing device), and a transponder, also called a tag (which is an integrated circuit containing the RF circuitry and information to be transmitted).

72. SAP – an acronym for the SAP accounting software system.

73. Site Acceptance Test (SAT): A test of a Contractor's installed equipment at the site or facility level over a defined period of time to ensure that the equipment meets the intent of these Functional Specifications.

74. SNMP – Simple Network Management Protocol: SNMP forms part of the internet protocol suite and is used in network management systems to monitor network-attached devices for conditions that warrant administrative attention.

75. SCS – Structural Cabling System – The design and installation of the cabling system that supports hardware connectivity and is in compliance with telecommunications standards and specifications.

76. SQL – Structured Query Language: a database computer language designed for the retrieval and management of data in relational database management systems, database schema creation and modification, and database object access control management.

77. Swapped Ticket – The occurrence when a patron "swaps" the original parking ticket obtained upon entry to a parking facility with a second, more current parking ticket and attempts to exit using the more current parking ticket.

78. TCP/IP – Transmission Control Protocol/Internet Protocol: The Internet Protocol Suite (commonly known as TCP/IP) is the set of communications protocols used for the Internet and other similar networks.

79. TIA – Telecommunications Industry Alliance: Associations that helps develop standards for the telecommunications and electronics industries.

80. TR room – an acronym for the Telecommunications Room. May also be referred to as the IDF Room.

81. UL – Underwriters Laboratories, Inc.: UL is a U.S. not-for-profit, privately owned and operated product safety testing and certification organization. Based in Northbrook, Illinois, UL develops standards and test procedures for products, materials, components, assemblies, tools and equipment, chiefly dealing with product safety. UL is one of several companies approved for such testing by the U.S. federal agency OSHA. OSHA maintains

a list of approved testing laboratories, known as Nationally Recognized Testing Laboratories.

82. UPS – Uninterruptible Power Supply: A UPS is a device that maintains a continuous supply of electric power to connected equipment by supplying power from a separate source when utility power is not available; also known as a continuous power supply or a battery backup.

83. Unusual Conditions – Unusual conditions are those conditions other than normal conditions that are out of the control of the Contractor. These events include willful or careless damage to the equipment including patron accidental damage as well as Acts of God.

84. Validation Program – The offering of discounted parking through a paper or electronic credential that may be presented to either a cashier or read by a bar code or magnetic striped card reader in an Unattended Exit Lane.

85. VPN – Virtual Private Network: a network that is constructed by using public wires to connect nodes. For example, the Internet may be used as the medium for transporting data. These systems use encryption and other security mechanisms to ensure that only authorized users can access the network and that the data cannot be intercepted.

86. Work – Services or goods to be provided by the Contractor per the Contract.

1.04   SYSTEM DESCRIPTION

A.   The procurement is for two separate systems that will be integrated to work as a single system. Vendors may provide response to one or both systems as part of their submittal. The two systems are:
1.   Parking Access and Revenue Control System (PARCS)
2.   Pre-Booking/Reservation System (This requirement is described at the end of this document)

The two systems shall be integrated and operate as a single coherent system.

B.   The objectives of the PARCS project include, but are not limited to:

1.   The PARCS shall be designed with an open architecture to provide integration to third-party applications.
2.   Contractor shall reuse existing infrastructure when possible, including such items as existing conduit, dynamic signs, etc. Loops though, shall be installed new.
3.   Provide mechanisms to strengthen internal controls and minimize theft and loss of revenue

4. Achieve a PCI DSS and PA DSS compliant environment and use P2PE with chip-card processing to an off-site 3rd party to reduce PCI scope.
5. Provide flexibility in offering new capabilities to promote parking and other HAS services in a web-enabled environment.
6. Accurately track required financial and statistical information
7. Accurately calculate appropriate fees
8. Accurately document the revenues generated by the parking operations
9. Increase efficiency of operations and maintenance
10. Provide flexibility in the timing and formatting of the pertinent operational and management reports
11. Integration with a third parking Pre-Booking/reservation program. A mobile phone application shall be provided that allows patrons to confirm a reservation prior to arriving at the airport.
12. Provide flexibility in rate configurations for all parker types, and to vary rates by time of day and day of week
13. Ensure flexibility and scalability for any future need to update, upgrade, and/or expand the system readily (additional lanes and parking products as well as additional facilities)
14. Provide an intuitive and user-friendly interface for the Owner and its personnel
15. Provide electronic coupons and/or validations that may be presented by the patron in all lanes, including processing in self-service lanes,
16. Accept coupons and/or validations issued by HAS or an authorized representative
17. Provide business intelligence tools for better managing parking system and forecasting results of potential modifications or additions of programs. Vendor shall integrate with AWS Red Shift.
18. Provide Loyalty programs specified and designed by user, e.g. fee adjustments for frequent users, Reserved Parking Program and Frequent Parker Program.
19. Provide system that is integrated with a third-party revenue optimization / yield management system.
20. Provide Valet System that works with new PARCS equipment to be installed or integration with existing CVPS valet system. The Valet System shall include mobile devices that support mobile valet check-in. Valet system shall also generate tickets on demand. Mobile devices shall be provided for all four valet sites.
21. Simplified maintenance procedures for lane equipment and back-office / IT infrastructure.
22. Provide a Command Center to overview activities in every lane and allow intercom communications and image reviewing for License Plate Recognition
23. Provide a PARCS that is integrated into the SAP system which the airport uses.
24. Integration with current PGS at both William P. Hobby Airport and George Bush Intercontinental Airport that allows for LPR based variable pricing given the location of the parked vehicle or based upon the current utilization of a parking facility.
25. Provide AVI readers integrated with HCTRA's EZ-Tag.
26. Increase efficiency of operations through reduction of person-hours required for parking occupancy validation.

27. Ensure flexibility and scalability for any future need to update, upgrade, and/or expand the system (additional parking facilities, additional signage for existing facilities, or integration with additional systems (i.e. new parking website)).
28. Provide an intuitive and user-friendly interface for the Airport and its personnel.
29. Simplified maintenance procedures for all equipment.
30. Provide a Pre-capture LPR solution in all garages at lanes where paid parking (entries and exit) is allowed.
31. Provide factory certified training to airport technicians for 1st level and 2nd level maintenance of equipment.
32. Provide equipment with IP connections and limited/no serial connections.
33. Provide equipment for mobile payment and contactless payment.
34. Add Pay-in-Lane Devices at certain Exit Lanes.
35. Reuse existing Daktronics Dynamic signs.
36. Provide a test bed environment with one of each device that will serve as a means of testing new software patches and upgrades prior to installation in the lane equipment.
37. Migrate historical data from existing Amano McGann system to new PARCS.
38. PARCS shall issue credential with a pre-paid balance that can be used to pay parking fee in the lane and the parking fee is decremented from the credential.
39. Vendor shall provide HAS with a public memo to summarize all work to be performed to be released to the public. The memo shall be provided to HAS within 45 days of Contract Award.

C. This project consists of the primary scope of work for the installation of a Parking and Access Revenue Control System (PARCS) in both William P. Hobby Airport and George Bush Intercontinental Airport.

D. A maintenance contract for warranty services and ongoing maintenance in subsequent years will be negotiated with the selected vendor. The maintenance contract will be negotiated at the same time as the construction contract. The warranty will be directly with the City of Houston or Parking Operator.

E. During the life of the new PARCS, the Owner or Owner's Representative may add facilities that will provide additional public parking. The proposed PARCS shall be upgradeable, scalable, and modular in design such that it can support all the future needs of these facilities. The system shall be designed with excess capacity that shall process as many as 150% of the existing and proposed volume of transactions without any degradation in system performance even during peak periods.

F. The parking and other control equipment components provided by the Contractor shall operate as a complete system. Each equipment component shall perform its function in relation to other components. As such, each component shall be compatible with all related components. All components shall be compatible with the geometric circumstances of the facility or place where they are installed.

G.   The Contractor shall bring any deficiencies or discrepancies in these specifications that they believe may exist to the attention of the Owner or Owner's Representative in their Proposal. No deficiency or discrepancy in these Functional Specifications shall relieve the Contractor of the responsibility to provide a satisfactorily performing, reliable system.

H.   HAS IT Specifications may be found online at: "http/www.fly2houston.com/biz/resources/building-standards-and-permits/" Other common specifications are:

   270526 Telecommunications Grounding and Bonding
   270528 Interior Communication Pathways
   270543 Exterior Communications Pathways
   270553 Identification and Labeling of Communication Infrastructure
   271100 Communication Cabinets and Equipment Rooms
   271500 Horizontal Media Infrastructure

1.05   SUBMITTALS

A.   Contractor shall submit to the Owner or Owner's Representative adjustments or modifications to plans and specifications for any necessary civil/site work.

B.   All submittals shall be submitted to the Owner or Owner's Representative.

C.   All Owner or Owner's Representative comments, responses, and approvals of Contractor submittals shall be transmitted by the Owner or Owner's Representative to the Contractor. Contractor shall incorporate said comments and responses and resubmit the document to the Owner or Owner's Representative for review and approval. Should the Contractor's resubmittal not incorporate the appropriate comments or otherwise fail to meet the requirements, this cycle shall continue until the Contractor produces an acceptable submittal that is approved by the Owner or Owner's Representative in writing.

D.   Submittal schedule (with submittal timing) for all submittals, including those proposed by the Contractor that is not listed in the Contract Documents, to be included in the Contractor's Proposal.

E.   Submittals shall include the following and are further described in the following table:

   1.   Proposed interface file specifications and all software documentation for all database files used in the system that shall contain identification and plain English descriptions of all databases, tables, records, fields, field attributes (type, length, permissible values, etc.), and relationships among data.

   2.   Product data for review and approval for all field equipment prior to the manufacture or procurement of the equipment. Product data shall include; equipment dimensions, cut out locations for electrical and communications connection points, and manufacturer cut sheets of all

Contractor-supplied and third-party components incorporated in the various devices (including manufacturer, model number, etc.).

3. Sample set of reports that are fundamental and readily available with the PARCS as part of the Proposal. After coordinating with the Owner or Owner's Representative on report layout for all standard and custom reports, the Contractor shall submit a sample format of each report for final approval 45 calendar days prior to the FAT.

4. Submit manuals 45 calendar days prior to the respective system or subsystem's installation unless otherwise noted. The Owner or Owner's Representative shall review the structure and contents of the manuals. The Owner or Owner's Representative will return comments to the Contractor within 14 calendar days, and the Contractor shall incorporate all comments into a revised user's manual before installation. The Contractor shall submit the revised manuals for approval prior to commencing system installation. The Contractor shall submit the following manuals in both hardcopy and electronic (PDF or Microsoft Word) format:

   a. PARCS user manuals
   b. PARCS subsystems manuals
   c. Maintenance manual
   d. Cashier's manual
   e. Audit manual
   f. Training manuals – including workbooks, lecture notes/overheads, and manuals to be used in live training sessions to include the following:
      (1) Supervisor Manual
      (2) Audit Manual
      (3) Systems Administration Manual
      (4) Valet User Manual
      (5) Manual for validation and coupon programs
      (6) Failover/fallback manual
      (7) LPR User Manual
      (8) Dashboard Manual

5. Contractor shall work with HAS and its representative in the development of a suitable Phasing Plan for the transition from the existing system to the new PARCS. A draft phasing plan has been included as a part of this RFP. The Phasing Plan shall be a plan for implementation, training and testing and shall include provisions for the new PARCS to operate concurrently with the old systems until implementation is complete. Phasing Plan to include the following:

   a. Milestone dates in the form of a Gantt Chart Schedule
   b. Narrative description of phasing to install head-in servers and software, install new network equipment as needed, decommission each lane, install new field devices, perform LAT, and activate for public use

c. Approach for transitioning 5 years of data from the existing databases to the new PARCS database.
    d. Communications and power transition approach
    e. A lane switchover approach
    f. Number of nodes and drops expected for the designed network.
    g. Training timing as system is activated
    h. Decommissioning strategy for existing PARCS that maintains all critical systems and functionalities throughout the switchover process
    i. Contractor recommendations that benefit the overall project schedule and switchover process

6. Disaster Recovery Plan: The final documentation shall include a disaster recovery plan. The plan shall provide the step-by-step procedures for disaster recovery for each point of failure. These procedures shall be comprehensive.

    a. The first steps shall be in diagnostics. The remaining steps shall provide procedure for resolution to bring the system back to full operational status.
    b. Should disaster occur immediately following, or as a result of, a patch or software update the disaster recovery process shall return the system to the software version in effect prior to the patch or update being applied.
    c. Points of failure shall include each component and sub-component in complex units.
    d. The disaster recovery plan shall include requirements for and location of spares.

7. Testing procedures shall test all system functionalities that are described in these Functional Specifications as well as any other functionalities performed by the system (e.g. standard functionalities for the PARCS) that are not specifically described within these Functional Specifications. The test procedures document shall be submitted for review and comment a minimum of 45 calendar days prior to a required test. Fourteen (14) calendar days after receipt, review comments will be returned to the Contractor by the Owner or Owner's Representative. The Contractor shall incorporate the Owner or Owner's Representative's review comments into the Test Procedures. This revised document shall be resubmitted for verification that all comments have been incorporated. Ten calendar days after receipt, review comments will be returned to the Contractor by the Owner or Owner's Representative. The approved document shall be bound and termed the Test Procedures Document. One bound copy shall be an original, containing original signatures of the test observers and this copy shall become the Owner's record copy. No test shall commence until the finalized Test Procedures Document is received by the Owner or Owner's Representative. The Contractor shall develop all test procedures for the tests that are listed below:

    a. Factory Acceptance Test (FAT)
    b. Lane Acceptance Test (LAT)

        c.   Site Acceptance Test (SAT)
        d.   Operational Demonstration Test (ODT)

    8.   A clear plan for the credit card processing subsystem shall be submitted as part of the proposal. This plan shall include:

        a.   Integration with a 3rd Party Chip-Card Processor
        b.   Identification of how PCI DSS compliance is achieved
        c.   P2PE certification
        d.   Credit card processing system flowchart
        e.   Example rates of 3rd party processing costs from similar installations.

F.   The following items shall be submitted with your proposal outlined in sequential order as follows:

1. Phasing Plan discussion
2. Network Diagram with expected number of network drops and nodes
3. Experience in at least one of the top 30 airports in the US (based on number of travelers per year)
4. Sample Set of Standard Reports
5. Discussion of advantages/disadvantages of deploying LPR cameras to capture front and rear license plates
6. Proposed data archiving method
7. Product Data (See Submittal Requirement for complete list)
8. PA DSS Report of Validation
9. Credit Card Processing Subsystem Plan
10. Identification of Generation of PARCS Software
11. Software Interface Documentation
12. Preventive Maintenance Plan
13. List of Clearinghouses for which the Proposer has a certified interface
14. Color Illustration (See Submittal Requirement for complete list)
15. Resume of Proposed Maintenance Staff
16. Detailed Job Description for all Maintenance Staff Positions

G.   The following tables contain a listing of required Contractor submittals and the timing for the respective submittal:

Contractor Submittal	Submittal Timing
Phasing Plan	Proposal
Sample set of standard reports	Proposal
Proposed data archiving method	Proposal
Third-party Escrow Agreement	Proposal
Discussion of installing LPR cameras to capture front and rear license plates	Proposal
Product Data - Entry Station	Proposal
Product Data - Unattended Exit Unattended Exit Station	Proposal
Product Data – EMV/Chip-Card Reader	Proposal
Product Data – Contactless Card Reader	Proposal

Product Data - Entry/Exit Vehicle Detection Devices	Proposal
Product Data - Barrier Gate	Proposal
Product Data - LPR camera	Proposal
Product Data – Unattended Exit Station Intercom	Proposal
Product Data - Intercom base station	Proposal
Product Data - Entry Station display screen	Proposal
Product Data - Unattended Exit Station display screen	Proposal
Product Data – Pay-in-Lane	Proposal
Product Data – Network Switches - Lanes	Proposal
Product Data - Network Switches – Data Center	Proposal
Product Data - Validation Encoder	Proposal
Product Data – Proposed Server Hardware (Application and LPR)	Proposal
Product Data – Network Drops	Proposal
Product Data – Space by Space Detection	Proposal
Product Data – Reservation System Software	Proposal
Product Data – Entry and Exit Detection	Proposal
Product Data – Over Height Detection	Proposal
Product Data – Valet System	Proposal
Product Data – Pre-booking System Integration	Proposal
Product Data – Frequent Parker System	Proposal
Product Data – Command Center	Proposal
Product Data – Online Service Ticket Application	Proposal
PA DSS Report of Validation	Proposal
Credit Card Processing Subsystem Plan	Proposal
Identification of generation of PARCS software	Proposal
Software interface documentation	Proposal
Preventive Maintenance Plan	Proposal
List of clearinghouses for which the Contractor has a certified interface	Proposal
Color Illustrations (photo or scale drawing) of Ticket Dispenser and Close-up of Ticket Dispenser Display	Proposal
Close-up, Color Illustration (photo or scale drawing) of proposed exit station's patron display	Proposal
Close-up, Color Illustration (photo or scale drawing) of proposed Pay-in-Lane patron display	Proposal
Close-up, Color Illustration (photo or scale drawing) of proposed cashiers station including screen shots	Proposal
Close-up, Color Illustration (photo or scale drawing) of all proposed electronic signs that will be provided as a part of the contract	Proposal
Resumes of proposed maintenance staff	Proposal
Detailed job descriptions for all maintenance staff positions	Proposal
SCS Cabling subcontractor	Proposal

Notice of refusal to extend maintenance agreement	180 calendar days prior to withdrawal from maintenance contract
Request to begin Site Acceptance Test	30 calendar days prior to completion of LATs
Manual - Manufacturer's recommended maintenance procedures manual	45 calendar days prior to implementation
Manual - PARCS user manuals	45 calendar days prior to implementation
Manual - Audit manual	45 calendar days prior to implementation
Manual - LPR user manual	45 calendar days prior to implementation
Manual – Reservation System user manual	45 calendar days prior to implementation
Systems Administration Manuals	45 calendar days prior to implementation
Means for remote scoring of LPR system	30 calendar days prior to implementation
Naming conventions for field devices	30 calendar days prior to installation
Conceptual Design Document	Within 45 days of Contract Award
Critical Design Document	45 days prior to FAT
Software Design Document	10 business days prior to Critical Design Review meeting
Command Center	Prior to start of on-site equipment installation
On-Site Test Environment Installed and Fully Operational	Prior to start of FAT
Test Procedures – Factory Acceptance Test	45 calendar days prior to test start
Test Procedures – Lane Acceptance Test	45 calendar days prior to test start
Test Procedures – Site Acceptance Test	45 calendar days prior to test start
Test Procedures – Operational Demonstration Test	45 calendar days prior to test start
Manual - Instructional training manuals (workbooks, lecture notes, user manuals)	45 days prior to the respective training class
Instructional Training course outline	45 days prior to the respective training class
Failover & Failback procedures manual for PARCS (Disaster Recovery)	45 calendar days prior to implementation
Report Formats and layout for all reports	45 calendar days prior to FAT
Software Documentation	Six weeks prior to implementation
Manufacturer Specifications of components in the event of industry withdrawal	60 calendar days prior to withdrawal
Written evaluation of software modification's impact on PARCS	Seven calendar days prior to installing modification
Proposed Instructional Training Schedule	Prior to system implementation
Perpetual Software Licenses	When software is installed
Credit Card Clearinghouse Interface Design	Within 30 Days of Contract Award
Parking Ticket Specifications	Within 30 Days of Contract Award
Outstanding Punch List items w/estimated completion date	Weekly after the completion of FAT
As-Built Documentation	Prior to Final System Acceptance

1.06   QUALITY ASSURANCE

    A.   All PARCS components and their installation shall comply with all laws, ordinances, codes, rules, and regulations of public authorities having jurisdiction

over this part of the work. It shall be the responsibility of the Contractor to meet these and all other current technical, performance, and safety standards that are applicable to all components and to the entire system, even when not specifically referenced. It shall be the Contractor's responsibility to obtain any and all permits that are required to complete this work.

B.   The PARCS shall be an open-architecture system where all interfaces (hardware and software) conform to national and International Organization for Standardization (ISO) standards. All nonproprietary cabling infrastructure shall follow the HAS SCS Standards and Specifications.

C.   All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Equipment and materials which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class for which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive product data.

D.   Housings of the components exposed to weather shall meet NEMA 4 standards or better to be moisture-proof and shall provide sufficient protection so that the components continue to function without moisture, dust, heat, or extreme cold related interruption. Housing components shall be constructed of stainless steel (as preferred).

E.   The Contractor's application software shall conform to the latest publicly known PCI DSS standards and be PA DSS certified. The Contractor shall submit the most recent PA DSS Report of Validation as part of their Proposal to which their system is certified.

1.07   DELIVERY AND STORAGE

A.   Contractor shall be responsible for insuring all shipped items. Any items damaged during shipping shall be replaced and shipped to the Owner or Owner's Representative, by expedited means if requested, at no additional cost to the Owner or Owner's Representative.

B.   Contractor shall provide a designated storage/staging area for PARCS equipment that has not been installed. It is the Contractor's responsibility to protect the equipment from theft and damage until final acceptance including installation of fencing, locks, and any other security provisions. Should the stored equipment be stolen or damaged prior to final acceptance, the Contractor shall replace the equipment at no additional cost to the Owner or Owner's Representative. Equipment shall be programmed or configured off-site and brought to the site for installation and final testing.

C.   After equipment is installed, costs (time and material) for repair or parts replacement, components, etc., damaged or rendered unserviceable due to

apparent and provable misuse, abuse, vandalism or negligence by Owner, Owner's Representative, airport employees or the using public are excluded as a cost incurred by the Contractor. Also excluded from the costs incurred by Contractor are damages due to Acts of God that occur after installation.

1.08   PROJECT/SITE CONDITIONS

A.   All field equipment and components shall be fully protected from the ambient environment when installed in the proper housing provided by the Contractor. Operation of the equipment shall not be affected in any way by Normal Weather Conditions. In addition, operation of the equipment shall not be affected in any way by the conditions listed below:

1.   Ambient Temperatures: -10ºF to 120ºF (with addition of solar loading)
2.   Humidity: 0% to 95% (non-condensing)
3.   Rain: Blowing rain with 80 mph gusts
4.   Dust: Blowing dust and fine sand
5.   RFI/EMI: HAS standard environment

B.   The equipment shall be electromagnetically compatible with other equipment at HAS including radio frequency emissions. The equipment shall not be susceptible to noise induced from the emissions of Electro Magnetic Interference (EMI) of high-power radar, navigation aids, and radio equipment normally utilized at HAS.

C.   Environmental conditions shall not inhibit the PARCS from performing in accordance with these Functional Specifications. The Contractor shall provide a system such that environmental conditions in a cabinet shall not cause failure of the installed electronics.

D.   Electrostatic and electromagnetic forces within the environment, e.g., non-direct lightning strikes, or other types of power interference shall have no effect upon the integrity or operation of the PARCS. The Contractor's solution for preventing power interference shall be presented to the Owner or Owner's Representative for approval prior to implementation. Lightning protection through surge arrestors or earthen ground rods or a combination thereof shall be provided and installed for the PARCS. The Contractor shall determine, based upon their system requirements, the appropriate lightning protection method to use for the location where the equipment is installed. Equipment shall be UL approved for use as part of a master labeled lightning protection system and marked in accordance with UL procedures.

E.   Existing Conditions and Facilities: The existing PARCS was implemented at HAS approximately 20 years ago. The majority of the basic operational functionalities performed by the existing PARCS (ticket issue, gate up, etc.) shall be upheld in the replacement system, however there are no customized or unique features, functionalities, or hardware from the existing PARCS that will be implemented in the replacement PARCS. As such, only a limited discussion of the existing PARCS is provided.
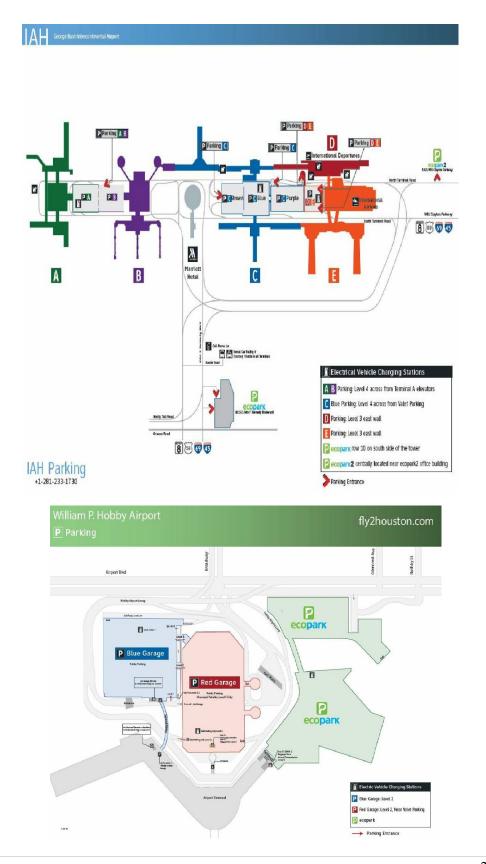
1. Existing Communications

   a. The PARCS communications and networking equipment is currently being operated and managed by New South Parking (NSP). NSP manages and maintains the PARCS servers, workstations, cashier stations, revenue system and network hardware. The NSP equipment currently resides on a virtual local area network (VLAN) supported by the Houston Airport System (HAS) IT backbone and network hardware. While this is a secure network connection, the HAS IT group would prefer to remove the NSP equipment from their network switches. Therefore, the selected Contractor will install new network switches dedicated to supporting the parking system. These components will typically be located in separate secured equipment cabinets. In addition, the NSP network will utilize the existing HAS fiber backbone to support the new PARCS Local Area Network (LAN) in establishing a secure and separate network dedicated for the NSP equipment. Each existing NSP equipment room was reviewed to determine if there is adequate capacity for the segregation of the NSP network from the current HAS VLAN. Contractor shall provide and run all fiber cabling, switches, etc. from the MDF (main distribution frame) room (also referred to as the "ER" or "Equipment room") to the lane. All cabling shall meet IT standards as described on the HAS website.

   b. Contractor shall install any required server(s) as part of the initial installation of equipment with the most current server equipment available at time of installation that will meet the requirements of the PARCS and the IT server equipment requirements as posted on the HAS website. See Appendix A for the requirements of the server(s).

   c. George Bush Intercontinental Airport

      (1) Rooms: There are approximately eleven (11) equipment rooms being utilized to support the NSP parking system equipment. In addition, there are servers located in five (5) different locations. The Terminal A MDF Room will be the final home for all the new PARCS servers at IAH. The other locations will no longer be required with the new system. There are three (3) valet offices which will remain in the project scope.

      (2) Backbone: The existing HAS fiber backbone at IAH is sufficient to support the segregated PARCS LAN. The new PARCS network will utilize from two (2) to four (4) strands of the existing fiber backbone to extend the signal to the Terminal A MDF Room servers. The existing backbone consists of both single mode and multimode fiber optic cabling, so the exact switch uplink module will need to be closely coordinated with the existing backbone. All connections that are currently using multimode fiber shall

instead use single mode fiber. If single mode fiber is non-existent, then single mode fiber shall be installed as a part of this project. Additionally, new single mode fiber shall be installed from the IDF rooms to each entry/exit lane as required.

(3)   Power: Generators are located at the economy lot equipment rooms, ecopark (JFK), ecopark2 (Will Clayton), and a Hobby main exit plaza only. The majority of the terminal building IT rooms have either an enterprise UPS panel serving the room or a rack mount UPS. At most locations, there is sufficient power available for the new equipment needs.

(4)   Pathways: The existing pathways are very old and undersized for support of the new PARCS cables. At the majority of the locations, the conduit infrastructure will need to be expanded or replaced per HAS Technology Standards and Specifications.

d.   William P. Hobby Airport

(1)   Rooms: There are approximately four (4) equipment rooms and one equipment enclosure being utilized to support the NSP parking system equipment. Two of the rooms are new and in conformance with HAS IT requirements. These rooms will be re-used. Three of the locations require removal or significant upgrades to bring into conformance. It is currently anticipated that two (2) of the existing locations will no longer be utilized and the equipment will relocate to a new HAS IDF closet. The third location will be upgraded to support the new equipment. There is one (1) valet office.

(2)   Backbone: The existing HAS fiber backbone at HOU in the rooms which will be re-used is sufficient to support the segregated PARCS LAN. However, for the new equipment room planned for use, new fiber backbone cable will need to be installed back to the MDF Room. The new PARCS network will utilize from two (2) to four (4) strands of the existing and proposed fiber backbone to extend the signal to the MDF Room servers. The existing, as well as the proposed, backbone consists of single mode fiber optic cabling. New single mode fiber shall be installed from the MDF room to each entry/exit lane as required.

(3)   Power: There is a generator located at the exit plaza. The IT rooms intended to be utilized for this project have an enterprise UPS panel serving the room. The location to be renovated will require the installation of a rack mount UPS. There is sufficient power available for the new equipment needs.

(4)   Pathways: The existing pathways for the main entrance and exit plazas is sufficient to support of the new PARCS cables. Several of the older locations such as the

economy lot and the employee lot will require new or modified conduit infrastructure.

2. Existing Power

a. The Contractor shall utilize the existing power where possible.

3. Parking Facilities

a. The following parking facilities are included in this project and are further depicted in Figure 1:

(1) HOU
(a) ecopark
(b) Orange Lot – Contract/Employee
(c) Red Garage
(d) Blue Garage
(e) Valet

(2) IAH
(a) Ecopark Employee Lot
(b) PL-6 Lot
(c) Terminal A Contract
(d) Terminal A Valet
(e) Terminal B Contract
(f) Terminal B Valet
(g) Terminal C West
(h) Terminal C Central
(i) Terminal C Contract
(j) Terminal C Limo
(k) Terminal C East
(l) Terminal C Valet
(m) UA Executive Lot
(n) JFK ecopark
(o) ecopark2 (Will Clayton ecopark)

b. Entry/Exit Control: Entry and exit lanes are distributed as detailed in Table 1.

c. Official Airport Parking office: The Parking Management Office (PMO) serves as the base of operations for HAS's parking operations. The office is staffed 24-hours a day, 7-days a week. The current location is on Level 1 of Terminal A.

Figure 1: Parking Facilities Overview

1.09   PROJECT SEQUENCING

A.   The Contractor shall coordinate with HAS and its representative to develop a comprehensive Phasing Plan that achieves full implementation of the PARCS starting approximately with a proposed Notice to Proceed delivered Q3 of 2020 with full implementation to be completed by Q4 of 2021 for existing garages. A draft phasing plan has been provided with this RFP.

B.   The project shall be completed in 3 phases. This draft phasing plan may be modified through coordination with HAS and its representatives. For example, the integration to the pre-booking reservation system may be accelerated to occur during an earlier phase.

    a.   Phase I – Installation of basic functionality for all lanes including, but not limited to:
       i.   Full software installation and testing (server(s) to be provided by HAS/NSP)
      ii.   Ticket, credit card, RFID (contract/employee) in
     iii.   Credit card, cash, RFID (contract/employee) out
     iv.   Intercom system
      v.   Test Bed system/equipment
     vi.   Command Center
    vii.   Customer Loyalty program
   viii.   Valet System
    b.   Phase II – Installation of full LPR and EZTag functionality for all patron lanes.
    c.   Phase III – Installation of other advanced features:
       i.   Pre-booking/Reserved parking program integration

C.   Contractor shall coordinate with HAS to not perform work on blackout dates such as (but not limited to) Spring Break, Thanksgiving week, and Christmas week.

1.10   MAINTENANCE AGREEMENT

A.   Contractor shall provide factory training for HAS or its representative's maintenance technicians. Factory training shall include training that will certify HAS maintenance technicians to perform all Level-1 maintenance services and a majority of Level-2 maintenance services. Contractor shall coordinate this training with HAS to occur prior to the on-site installation.

B.   The Contractor shall provide the following services for support and maintenance during the contract of services:
a.   24/7 Phone Support
b.   24/7 On-Site Emergency Support
c.   4 Preventative Maintenance Cycles (performed quarterly)
d.   Hourly system backups for all applications and databases provided as part of this contract including 3rd party software
e.   Operating System, Application, and Database Patches:
    i.   All Operating system, Application and Database Patches will be performed in accordance with the PCI-DSS version 3.2 or higher.
   ii.   Contractor updates will be applied as needed based on relevancy to the HAS system
f.   Offline lane devices shall be returned to online status within 6 hours

C. Maintenance services shall be available twenty-four (24) hours a day, seven days a week (24/7), and three hundred sixty-five (365) days per year. The response times stated below shall be maintained at all times. The Contractor shall provide factory level training for HAS technicians to provide all preventative, routine maintenance services. Contractor shall provide Level-2 and emergency maintenance services.

D. Contractor will return all service phone calls within 30 minutes from the time of the customer call. During the phone call, the time frame for remote support and completion of the work will be determined. If onsite support is required, the following protocol will be followed:
   a. Calls Monday through Friday between 8am and 5pm, on-site support will be provided within 2 hours.
   b. Calls Monday through Friday after 5pm, remote support will be provided next business day unless Emergency Service is required, then response times will be 30 minutes to log-in remotely and 4 hours for resolution from the time the service call is made.
   c. Calls on City Holiday, onsite support will be provided the next business day unless Emergency Service is required.
   d. Emergency service is defined as service to correct facility wide failure of the system's ability to allow ingress/egress and/or collect revenue. Immediate (ten minutes) remote support for emergency service.

E. The maintenance agreement scope of work for this agreement does not cover any repairs necessitated by vandalism, customer or owner misuse, Acts of God, or any other cause that does not specifically relate to normal wear and tear.

F. The maintenance agreement scope of work and related fee shall include all PARCS maintenance within business hours, including parts and labor. The maintenance agreement scope of work and related fee shall include all emergency maintenance outside of business hours. The maintenance agreement scope of work and related fee shall include all preventive maintenance.

1.11   WARRANTY (HARDWARE AND SOFTWARE SUPPORT) – YEAR 1 AND 2

A. The Contractor shall warranty all parts, materials, software, 3rd party hardware, 3rd party software, and workmanship following successful completion of the ODT and receipt of acknowledgement of formal system acceptance by the Owner or Owner's Representative, for a period of twenty-four (24) consecutive months. All-inclusive costs (parts, labor, maintenance, software, 3rd party software, 3rd party hardware, warranty repairs, Contractor travel time, Contractor expenses, etc.) incurred during the warranty period shall be provided without additional cost to the Owner or Owner's Representative.

B. The Contractor shall allow trained HAS PARCS maintenance technicians to perform maintenance/repair on PARCS equipment that shall not void the warranty of the equipment.

C. Costs (time and material) for repair or parts replacement, components, etc., damaged or rendered unserviceable due to apparent and provable misuse, abuse, vandalism or negligence by Owner, Owner's Representative or Airport employees or

the using public are excluded as a warranty item. Also excluded from the warranty are damages due to Acts of God. All services that are performed during the warranty period are assumed to be included as part of the warranty. If there are maintenance or other services that will be provided that are not included as part of the warranty, Contractor shall outline those services and costs for those services in their proposal.

D. The warranty period on the PARCS shall begin when the ODT has been successfully completed and the Contractor has received written notice of formal system acceptance from the Owner or Owner's Representative. The Contractor shall maintain all systems that are operating prior to starting the warranty period at no cost to the Owner or Owner's Representative. Maintenance services shall be as defined within the Manufacturer's recommended maintenance procedures manual submitted with the Proposal and as accepted by the Owner or Owner's Representative.

E. The Contractor shall maintain all systems throughout the warranty period. Maintenance services shall be as defined within the Contractor's recommended maintenance procedures manual submitted with the Proposal as accepted by the Owner or Owner's Representative. All preventive maintenance shall be performed at non-peak periods during regular business hours.   HAS factory trained representatives shall be allowed to assist with maintenance services during the warranty period without adversely affecting the Vendor's warranty.

F. Software Support during the Warranty Period: In this section PARCS software shall refer to the Contractor's software used in the PARCS.

    1.   The Contractor shall make available to the Owner or Owner's Representative normal PARCS software improvement releases (updates) when they become available. Where PARCS software problems are identified and are agreed to be minor, that is not affecting revenue, reporting, or the entry/exit or payment functionalities, these problems shall be corrected in a new PARCS software release to be available to the Owner or Owner's Representative within thirty (30) calendar days of notification. All upgrades or improvements to PARCS software shall be documented and approved, prior to implementation. The Contractor shall correct major PARCS software problems immediately on a priority basis. Major PARCS software problems are defined as those causing erroneous financial transactions, revenue loss, reporting errors, loss of entry/exit functionality, loss of payment functionality, system instability, database corruption and compromised operational efficiency. Where PARCS software problems are identified and are agreed to be major, these problems shall be corrected in a new PARCS software release to be available to the Owner or Owner's Representative within five (5) calendar days of notification.

    2.   All PARCS, and 3rd party software patches and updates (provided as part of this proposal) shall be provided free of charge during the warranty period; however, the Owner or Owner's Representative shall have the option of implementing the updates or not. Seven calendar days prior to all PARCS software modifications, patches, updates, and upgrades, the Contractor shall provide accurate and complete documentation that describes:

	a.	patch/update release designation
	b.	proposed date and time of implementation
	c.	detailed description of what the patch/update accomplishes
	d.	full disaster recovery procedures that return the system to its pre-patch update condition
	e.	list of other installations where the patch has been previously installed, and contact information for those customers

3. Contractor shall coordinate the testing and implementation of all patches and updates with the Owner or Owner's Representative.

4. Contractor shall provide a change control methodology to document system changes and approvals prior to implementation.

5. Contractor shall coordinate all remote and physical access into the servers with the Owner or Owner's Representative.

6. The Contractor shall support upgrades to their application based on operating system patch and upgrade requirements (For example, if the PARCS runs on a Microsoft operating system, the software shall be able to be patched according to the Microsoft patch and upgrade schedule without breaking any application. If Microsoft decommissions an operating system, the Contractor shall release code compatible with next operating system upgrade prior to Microsoft ending support for current operating system, at no cost to the Owner or Owner's Representative.)

7. The Contractor shall commit to provide corrective patches and upgrades in the event security vulnerability or system availability issues are discovered within fifteen (15) business days of discovery.

8. Software Upgrades - Copies of all software (and software updates/upgrades made during the warranty period) must be provided to the Owner or Owner's Representative at the conclusion of the warranty period. All software updates shall be provided free of charge during the manufacturer Contractor's warranty period; however, the Owner or Owner's Representative shall have the option of implementing the updates or not.   All software updates must be accompanied by accurate and complete documentation. When software upgrades include new functions and processes (enhancements), the Vendor shall provide a written evaluation of the upgraded software's impact on HAS's PARCS prior to installation of the upgraded software. The PARCS equipment and workstations shall be delivered with the most recent service packs and software patches and must be updated throughout the warranty period, unless otherwise specified by the Owner or Owner's Representative.

1.12   POST-WARRANTY SOFTWARE SUPPORT SERVICES – YEARS 3 THROUGH 10

A. The Contractor shall propose a scope of work to provide post-warranty Software Support Services similar to the services provided during the warranty period, and

as described in Section 1.15.E, above. Services to be described in the scope of work include, but are not limited to:

1.   On-Site Software Support for PARCS, and all 3rd party software applications

2.   Remote Software Support for PARCS and all 3rd party applications

3.   Application and Database Backups on an hourly basis

4.   Daily off-site backups.

5.   24/7 Hotline Telephone Support

6.   All PARCS software patches and updates shall be provided free of charge during years 3 - 10; however, the Owner or Owner's Representative shall have the option of implementing the updates or not. Seven (7) calendar days prior to all PARCS software modifications, patches, updates, and upgrades, the Contractor shall provide accurate and complete documentation that describes:

     a.   patch/update release designation
     b.   proposed date and time of implementation
     c.   detailed description of what the patch/update accomplishes
     d.   full disaster recovery procedures that return the system to its pre-patch update condition
     e.   List of other installations where the patch has been previously installed, and contact information for those customers

7.   Contractor shall provide all required documentation for patches, updates, and modifications in accordance with PCI-DSS version 3.2 or most recent at that time.

8.   Contractor shall coordinate the testing and implementation of all patches and updates with the Owner or Owner's Representative.

9.   Contractor shall provide firmware updates at no cost for the Client.

B.   Proposed scope of work shall be subject to modification and ultimate approval of the Owner or Owner's Representative.

C.   The Contractor shall propose a total cost to perform software support services contained within their proposal for the year following the warranty period as well as the subsequent nine years (YEARS 3 THROUGH 10). These costs shall be included in the Total Proposed Annual Base Price.

1.13   POST-WARRANTY HARDWARE MAINTENANCE SERVICES – YEARS 3 THROUGH 10 (ADDITIVE/ALTERNATE PROPOSAL ITEM)

A.   The Contractor shall make components available for ten years after the Project acceptance.

B. If the Contractor withdraws from the manufacture, distribution, or support of parking revenue control systems in the United States; or sunsets a hardware component, the Contractor shall provide the Owner or Owner's Representative with the notice of such occurrence at least 180 calendar days in advance of withdrawal. In addition, the Contractor shall provide the Owner or Owner's Representative with manufacturing specifications for all Contractor-manufactured components and sourced-proprietary components of the PARCS, and the Owner or Owner's Representative shall be provided the opportunity to purchase a suitable amount of spares of all discontinued components.

C. Preventive Maintenance and Emergency Support Agreement

    1.   The Contractor shall propose a scope of work to provide post-warranty Preventive Maintenance and Emergency Support Services similar to the services provided during the warranty period. Services to be described in the scope of work include, but are not limited to:

        a.   Preventive Maintenance support will be provided by the Owner or Owner's Representative for non-technician maintenance such as taking care of paper receipts, low stock for tickets.

        b.   Contractor shall provide factory training for the Owner or Owner's Representative to provide maintenance support

        c.   On-Site Maintenance for all PARCS components not covered by items a and b above.

        d.   Remote Support and Maintenance for all PARCS components

        e.   Preventive Maintenance services in accordance with the approved Preventive Maintenance Plan

        f.   On-Site Emergency Response Support

        g.   24/7 Hotline Telephone Support

    2.   Proposed scope of work shall be subject to modification and ultimate approval of the Owner or Owner's Representative.

The Contractor shall propose an annual cost to perform the preventive maintenance services contained within the scope of work as well as an hourly rate for various types of technical response during emergency support or response situations for the year following the warranty period as well as the subsequent nine years (YEARS 3 THROUGH 10). The Owner may excise the option to use the Contractor for preventative maintenance, or the Owner may perform preventative maintenance on their own using trained airport PARCS maintenance technicians. These costs shall be clearly indicated in the Proposal as Additive/Alternate Proposal Items and shall not be included in the Total Proposed Base Price. These prices shall be valid prices for the Owner or Owner's Representative to purchase the Maintenance Services through a service agreement between the Owner or Owner's Representative and the Contractor. For emergency support services, the Contractor shall provide Hourly Service Rates, by type, as defined below:

1. Regular Business Hours – 6:00 AM through 11:00 PM, 7 days a week
2. Outside of Business Hours – 11:00 PM through 6:00 AM, 7 days a week

1.14   MAINTENANCE SERVICES

1. The Maintenance Services to be provided by the Contractor include maintenance for the PARCS hardware components used for the public parking operation, and the subsystems, namely the License Plate Recognition System, the Intercom System and the Detection Systems. The services proposed by the Contractor shall also cover any additional subsystems that are installed by the Contractor as part of this project.

2. The support to be provided by the Contractor under the maintenance contract shall provide the Owner or Owner's Representative with complete PARCS support. The service coverage for hardware covered by the maintenance contract is 24 hours per day, seven days per week, and 365 days per year. Contractor-certified technicians shall provide total system support. Access to a Contractor-certified technician includes contact by telephone, e-mail, and on-site as needed to provide the levels of support defined within the Contract. The Contractor shall be responsible for providing all labor, materials, equipment, and supervision required to maintain and repair all PARCS hardware installed as part of this project, as well as PARCS hardware installed during the term of the maintenance contract. The scope of the maintenance work includes Preventive Maintenance and Emergency Services Maintenance.

3. Maintenance Responsibilities
   a. There are two types of maintenance, Preventive Maintenance and Emergency Services Maintenance, and each type is further divided into two levels, Technician Level and Operational Level. The Contractor shall only be responsible for providing Technician level services. All Operational level services shall be provided by Owner or Owner's Representative staff as defined within this section.

   b. Any individual providing Technician Level Maintenance Services as part of the maintenance agreement shall be a Contractor factory trained and certified technician.

   c. Failure to resolve the issue within a period not to exceed five (5) calendar days shall result in the Owner or Owner's Representative withholding payment of maintenance funds until such time as the issue has been satisfactorily resolved. Any issue affecting revenue functions, payment functions, entry/exit shall be resolved within a period not to exceed four hours.

4. Preventive Maintenance – Technician Level

   a. Preventive Maintenance Plan: The Contractor shall submit a proposed Preventive Maintenance Plan for all hardware specified in the Contract

that ensures all hardware operates as designed and specified. The Contractor shall submit the Preventive Maintenance Plan as part of their Proposal response. Preventive Maintenance services shall include but are not limited to inspection, testing, necessary adjustment, alignments, lubrication, parts cleaning, replacement of consumables, battery refresh, and communication system maintenance of the PARCS hardware provided as part of this project by the Contractor. The Owner or Owner's Representative reserves the right to modify any portion of the Preventive Maintenance Plan throughout the life of the Contract. Preventive Maintenance services shall be performed on each hardware component of the PARCS in accordance with the approved Preventive Maintenance Plan. The Contractor shall provide a list of Preventive Maintenance tasks and frequencies for each component, to include daily, weekly, bi-weekly, monthly, quarterly, semi-annual, and annual overhauls.

    b.   Preventive Maintenance shall be scheduled to the greatest extent possible during non-peak periods. The Contractor shall consult with the Owner or Owner's Representative to determine periods of peak activity for the various devices.

5.   Scheduled maintenance services shall follow this general procedure:

    a.   Prepare - This includes reading and becoming familiar with all manuals and material concerning the equipment, ensuring safety precautions are taken, obtaining all tools, taking the equipment out of service, initiating service documentation, and updating the online Service Ticket Log.

    b.   Visually Inspect – Includes checking for loose wires, missing hardware, structural damage, bent pins, damaged cables, cracked displays, peeling labels, rust, etc.

    c.   Service and Repair – This includes performing the service and repairing items noted faulty during the inspection. These components shall be taken from the spare parts inventory located at the Contractor's local offices and then replaced on a regular basis.

    d.   Test – This includes testing the equipment to ensure functionality in accordance with the Contract.

    e.   Return to Service – Once testing is complete and successful the technician shall return the equipment back into service.

    f.   Complete Service Documentation – The technician shall complete the service documentation, file paperwork for historical purposes, and update the online service ticket tracking system.

6.   As part of the Preventive Maintenance procedures for each piece of equipment the Contractor shall initial and note the date and time the Preventive Maintenance was performed either a handheld computer or laptop computer and update an online service ticket tracking software stored on the server. The Owner or Owner's Representative shall, at any time, access the online Service Ticket

Tracking software to compare the entries to the scheduled and logged maintenance services within the online Service Ticket Tracking Software and monthly reports provided to the Owner or Owner's Representative by the Contractor.

7. The Contractor shall be responsible for providing all tools and test equipment or any specialized tools required to perform the tasks of the maintenance agreement as well as any method of transportation, such as a vehicle, required to transport the technician(s) and store required tools and spare parts.

8. All consumable office supplies shall be the responsibility of the Contractor.

9. Preventive Maintenance Services - Operational Level:

   a. The Owner or Owner's Representative parking staff shall have the responsibility of providing the Operational Level Preventive Maintenance services as follows:

      1   Checking the status of the lane status lights and Dynamic Signage
      2   Checking printer clarity
      3   Checking gate arms for tightness and serviceability
      4   Checking printer paper and ticket stock
      5   Aesthetic cleaning of the PARCS equipment
      6   Broken Gate Arm
      7   Any other lane device

10. Emergency Services – Technician Level

    a. Emergency Services shall be performed in response to specific events and shall return equipment to an operating state following a malfunction. Emergency services shall include inspections and necessary tests to determine the causes of PARCS hardware malfunction or failure. The emergency services shall also include the furnishing and installation of components and/or parts that are required to repair malfunctioning system elements.

    b. The Contractor shall perform Emergency Services in response to notifications by the Owner or Owner's Representative under normal conditions as described herein. In addition, the Contractor shall perform Emergency Services in response to notifications by the Owner or Owner's Representative under unusual conditions. Unusual conditions may include a vehicle striking lane equipment thereby damaging the equipment so that the equipment may stop working. Services performed under unusual conditions shall be invoiced to the Owner or Owner's Representative above the Contract value on a time and materials basis. The Contractor shall propose hourly rates based on the time of day, day of week, etc. that the services are performed. Parts required to perform Emergency Services under unusual conditions, that are not included in the spare parts inventory, shall be invoiced to the Owner or Owner's Representative at the agreed upon rates used to replenish the spare

parts inventory, as further defined under the section of spare parts inventory, under normal conditions.

c.   Due to the gravity of an equipment malfunction/failure, emergency responses and associated corrective actions shall be provided within the response times in this specification. When Emergency Services are required, as determined by the Owner or Owner's Representative, the Owner or Owner's Representative shall notify the Contractor at any time, twenty-four (24) hours per day, seven days per week, three hundred sixty-five (365) days per year. As with Preventive Maintenance, emergency services shall be tracked in the online real-time software tracking Log. Contractor shall follow Owner or Owner's Representative provided procedures on who to contact to inform and/or update the status or resolution of a problem.

d.   The Owner or Owner's Representative shall enforce that only authorized staff shall notify the Contractor to initiate emergency service notifications. The intent of this provision is to reduce or eliminate unnecessary service notifications and interventions onsite. The Owner or Owner's Representative shall provide to the Contractor a list of all individuals authorized to place emergency service notifications. This list shall be included in the maintenance agreement and shall be updated as required by the Owner or Owner's Representative. Contractor shall answer all notifications but shall only respond to a notification for emergency service if call was initiated by an authorized representative. On the returned call the Contractor shall notify any unauthorized individuals that the service request must be placed by an authorized individual in order for the service to be initiated.

e.   The Owner or Owner's Representative reserves the right to modify notification policies and procedures at any time throughout the life of the maintenance agreement.

f.   License Plate Recognition Services

        1   The Owner or Owner's Representative will perform random LPR accuracy testing on various lanes within the PARCS each month. Contractual accuracy standards defined in the Specification shall be maintained throughout the life of the system.

        2   If the random test results do not meet these standards, an Emergency Services Maintenance notification shall be made to the Contractor by the Owner or Owner's Representative. The Contractor shall then respond to the notification and resolve the issue accordingly.

g.   Emergency Services to be provided by Owner or Owner's Representative Staff:

1 The Owner or Owner's Representative's staff will have the responsibility of providing the Operational Level Emergency Service as follows:
  (a) Level-1 services include such items as:
  (a) General cleaning, calibration, lubrication, etc.
  (b) Fault isolation
  (c) Replenishing ticket stock
  (d) Replenishing printer paper
  (e) Clearing simple ticket and credit card jams that present no risk of damage to the equipment
  (f) Equipment restart and/or reboot

2 Level-2 services include such items as:
  (a) General Preventive Maintenance
  (b) System evaluation and troubleshooting
  (c) Removal and replacement of components
  (d)   Replacement of damaged gate arms
  (e) Lane level maintenance and repair service
  (f) Other services as needed

h. Performance Review:

1 The Contractor shall submit monthly detailed reports that itemize the total invoice cost into scheduled preventive maintenance task effort (set amount each month) and emergency maintenance response effort, should such effort be required, (amount will vary based on actual effort performed each month)

11. Preventive Maintenance Performance Requirements

a. The Contractor shall complete no less than ninety-eight (98.00%) percent of all Preventive Maintenance Services scheduled during the month. Percentages shall be calculated on the total number of Preventive Maintenance tasks scheduled for just that month and the total number of Preventive Maintenance tasks fully completed in the month even if the scheduled maintenance is a monthly, quarterly, or annual maintenance requirement. Partial completion of a scheduled Preventive Maintenance item shall not meet this requirement and shall not meet the Owner or Owner's Representative's standards of fully completed. Any month that falls below this level shall require a written justification from the Contractor and with measures implemented to assure Owner or Owner's Representative staff that performance will improve. For each percentage point (below 98%) of total scheduled maintenance tasks that the Contractor does not complete, the Contractor's monthly invoice PM amount shall be reduced by 10%. For example, if the Maintenance Tracking System indicates that the Contractor performed 96% of all scheduled maintenance tasks, the Contractor's monthly invoice shall be reduced by 20%.

b. Factors beyond the control of the Contractor, such as unexpected delays in parts, delays due to accidents or damage created at no fault of the Contractor, severe weather and unusual traffic volume during the holiday

seasons shall be thoroughly documented in the online Service Ticket Log and reported to the Owner or Owner's Representative the next business day. The Owner or Owner's Representative retains the right to determine if the non-performance was beyond the Contractor's control and is a valid reason for non-performance.

12. Emergency Service Maintenance Performance Requirements

   a. The Contractor shall provide three methods of notification to be used for emergency contact information. The methods of notification shall provide a means of tracking the date and time the message was delivered. Examples of some documented communication include, cell phones, and email. The Contractor shall provide a response call within 30 minutes of notification by the Owner or Owner's Representative. The Contractor shall respond within 30 minutes to all emergency maintenance notifications. Performance shall be calculated as the total number of response calls returned to the Owner or Owner's Representative within 30 minutes divided by the total emergency notifications placed in one month. For each percentage point (below 100%) of total emergency maintenance calls that the Contractor does not respond to within 30 minutes, the Contractor's monthly invoice shall be reduced by 5% of its Emergency Maintenance (EM) invoice amount. Each thirty minutes in excess of the response to the maintenance call shall be treated as an additional call. For example, if the online Service Ticket Tracking System indicates that the Contractor responded within 30 minutes to 98% of all emergency maintenance calls, the Contractor's monthly EM invoice amount shall be reduced by 10%.

   b. Resolution of the situation within four hours after notification is required in all situations. A temporary solution is acceptable in the event replacement parts are not available in inventory. Performance shall be calculated as the total number of emergency events resolved within four hours divided by the total emergency notifications placed in one month. Each four-hour timeframe after the initial maintenance call shall be treated as a separate maintenance call. For each percentage point (below 100%) of total emergency maintenance calls that the Contractor does not resolve within 4 hours, the Contractor's monthly invoice shall be reduced by 5% of its EM invoice amount, unless the Owner or Owner's Representative agrees that there were factors beyond the Contractor's control that prevented them from performing. For example, if the Maintenance Tracking System indicates that the Contractor resolved 98% of all emergency maintenance calls within 4 hours or less, the Contractor's monthly invoice shall be reduced by 10%. The following table provides some examples of expected response times to given situations:

Situation/Problem	Anticipated Response Time
Call from airport	Within 10 minutes
Critical software malfunction	Within 10 minutes

Credit card system malfunction	Within 10 minutes
Ticket/credit card reader not working	1 hour
Gate malfunction	1 hour
Slowness in lanes	10 minutes

c. Factors beyond the control of the Contractor, such as unexpected delays in accidents, severe weather, and unusual traffic, shall be thoroughly documented in the online real-time Service ticket tracking software and reported to the Owner or Owner's Representative the next business day. The Owner or Owner's Representative may grant relief for the service hour requirement after reviewing these factors.

d. The Owner or Owner's Representative shall cooperate with the Contractor to fully explore any concerns regarding service and performance standards.

e. The Owner or Owner's Representative shall notify the Contractor in writing of performance problems with respect to the service standards within 20 days after the end of each month based on the performance reports from the online service ticket tracking system.

13. Contractor Maintenance Staff

a. The Contractor shall provide resumes for the proposed maintenance staff as a part of the Proposal.

b. The Contractor shall provide detailed job descriptions for all positions as a part of the Proposal.

c. The Contractor shall adhere to the requirements noted below, and then propose an appropriately sized staff to ensure successful performance of routine Preventive Maintenance and Emergency Services Maintenance. The Contractor's staffing plan shall take into consideration extenuating circumstances such as illness, family emergencies, vacations, etc. such that at all times the required number of technicians are available. Vendor shall propose options for technicians on site and their hours and shall also propose options for local technicians to be readily available to travel to the airport in case the Airport decides to not have technicians on site.

d. The Contractor's maintenance staff that will perform the scope of work described shall consist of:

1 Factory trained hardware technicians available throughout the life of the maintenance Contract to handle Preventive Maintenance.

2 Factory trained hardware technicians to handle emergency maintenance services calls, available by text, email, fax, phone, or pager twenty-four (24) hours a day, seven (7) days a week, three hundred sixty-five (365) days a year.

e.   The Owner or Owner's Representative shall have the right to have any personnel removed from the Site at its sole discretion. Contractor shall immediately remove personnel upon notification.

14.   Electronic Service Ticket Tracking System

a.   The Contractor shall utilize a Service Ticket Tracking System to monitor and record all scheduled, requested, and performed maintenance services. Contractor shall propose the Service Ticket Tracking System to the Owner or Owner's Representative for review and approval prior to the implementation of such system. The Owner or Owner's Representative reserves the right to select their own Service Ticket Tracking System for use by the Contractor.

b.   The Contractor shall fill in all required fields, completely, for all Preventive Maintenance and Emergency Maintenance Services scheduled and performed at the airport.

c.   The Contractor shall submit Monthly Maintenance Reports in the Owner or Owner's Representative approved format to designated personnel during the Contract period. All reporting requirements shall be determined at the time of Contract start.

d.   Owner, or it's representative, shall have online access to the service tracking log.

1.17   SPARE PARTS

Contractor shall provide listing of all spare components and manufacturers of those spare components to the Owner or Owner's Representative with contact information, pricing, and availability.

All spare parts shall be provided direct from the manufacture to HAS. Spare parts shall not be provided through a vendor or a distributor.

The Contractor shall propose a list of spare parts (type and quantity) to be maintained at the Contractor's site. HAS may elect to acquire additional spare parts to be maintained on-site. The list of all spare parts required to maintain the system under the submitted preventive maintenance program shall be clearly identified and included in the Proposal. In addition, the Contractor shall submit a price list for the proposed spare parts inventory that lists the cost of each part on the spare parts inventory.

Contractor shall provide an asset management application that is accessible by the Owner and Owner's Representative. This application shall maintain an ongoing inventory of all available spare parts and components, parts distribution, and pricing. The asset management application shall track on a daily basis and provide an up to date inventory of spare parts. The Owner and Owner's Representative shall have access to the asset management application to include review of spare parts inventory at any time.

The Contractor shall provide guaranteed component pricing for five (5) years inclusive of

a maximum percentage increase not to exceed the published CPI index for all components following Contract Award. These prices shall be valid prices for the Owner and Owner's Representative to purchase the spare parts through a service agreement between the Owner and Owner's Representative and the Contractor.

The Owner or Owner's Representative reserves the right to order additional parts and manage the PARCS spare parts inventory as required to maintain the system.

The proposed spare parts list is subject to the approval of the Owner or Owner's Representative, and the Owner or Owner's Representative reserves the right to modify the spare parts inventory throughout the term of the Contract. Contractor shall provide a storage location of the spare parts. The Contractor shall have access to the spare parts inventory and shall have the responsibility of ordering replacement components or parts as components or parts are used prior to completion of the warranty. Contractor shall replace used spare parts immediately upon use.

All equipment and parts shall be newly manufactured within the past 6 months and never installed in any other operational system other than for factory test purposes for this contract.

When delivered to the storage site Contractor shall provide an itemized list of Contractor's part numbers, model numbers, pricing, supplier's address, supplier's telephone numbers, and any single source components shall be identified by the Contractor. Contractor shall provide listing of all spare components and manufacturers of those spare components to the Owner or Owner's Representative with contact information, pricing, and availability.

1.18   CONSUMABLES

A. The Contractor shall provide the Owner or Owner's Representative with receipt specifications; parking ticket specifications (front and back sides of a typical parking ticket delineating required formats; barcode location; and proposed ticket printer) for the new PARCS within 30 days following Contract Award. The ticket format shall be such that the Owner or Owner's Representative can input their required information on the ticket and submit the revised ticket to the Contractor for review and revisions as required. An agreed upon ticket format for each facility shall be finalized within sixty days after Contract Award. The first supplement of ticket stock delivery shall occur prior to or concurrent with the first equipment delivery to the Owner or Owner's Representative. Ticket stock, receipt paper shall be printed with HAS logo and branding. IAH and HOU process approximately 3,200,000 transactions per year. HAS prefers to use the ticket as the receipt and would prefer to return the ticket to the patron and not a separate receipt.

B. The Contractor shall provide a twelve-month supply of receipt paper and tickets to the Owner or Owner's Representative upon the purchase of the system. The number of tickets that are supplied shall be based upon the number of parking transactions processed plus 50% allowance for growth in the number of transactions processed. Contractor shall submit proofs for each component for review and approval by Owner or Owner's Representative prior to placing any order. Contractor will coordinate shipment with HAS or its representative to receive periodic shipments

throughout the year. The Owner or Owner's Representative reserves the right to require a specific supplier/vendor to provide the paper tickets and receipt stock.

C. The Owner or Owner's Representative desires to not be tied down to any one particular ticket supplier. As such, ticket specifications shall be reproducible by multiple ticket vendors.

D. The Contractor shall provide all sets of keys for each unit of equipment that is stocked with tickets to the Owner and its Representative. The Contractor shall also provide ten (10) sets of master keys for all locks. All equipment of the same type shall have the same key. All keys should be unique for the project. Contractor shall also provide alternative solutions to secure equipment such as an electronic lock to monitor who accesses equipment and when.

PART 2 - PRODUCTS

2.01   SOFTWARE

A.   All software and software licensing required by the system shall be provided by
        the Contractor. The PARCS shall adhere to the Airport's Guidelines. Each such
        software package shall be identified in the Contractor's Proposal. Unless
        specified elsewhere, all third-party software provided by the Contractor shall be
        the latest available version at the time of system implementation. The Contractor
        shall be responsible for making any necessary modifications, and providing
        documentation of such modifications, to existing software programs that the
        Contractor adopts for the system. Should the Contractor and the software
        vendor be separate entities, the standard system software supplied shall not be
        modified by the Contractor in any way that shall preclude the purchase of a
        standard maintenance and service contract from the Contractor. The Contractor
        shall purchase software maintenance for all third-party software naming HAS as
        the software owner and contact. All third-party software maintenance agreements
        shall remain valid throughout the duration of the warranty period and shall be
        extended on an annual basis according to the provisions to be negotiated and
        described within the post-warranty Software Support, Preventive Maintenance
        and Emergency Support Agreement.

B.   The Contractor shall provide perpetual licenses and/or authorization for all
        software used by the Owner or Owner's Representative. The Contractor shall
        identify all third-party software and their associated licenses in the Proposal.
        Licenses shall cover future updates as required by the Contract Documents for
        as long as the software is maintained by the third-party provider. The operating
        systems, application software, development language, peripheral software, and
        PARCS hardware diagnostic software shall be licensed in perpetuity to HAS.
        Original CD-ROMs, DVDs, and software documentation shall be delivered to the
        Owner or Owner's Representative prior to system acceptance testing.

C.   Clock/Calendar –Clock/calendar that is synchronized with an official network time
        source such as the Naval Observatory or HAS's Network Clock. All field devices
        shall synchronize their time settings with a Server at least every hour.

        1.   PCI PA-DSS V3.2: Using time synchronization technology, synchronize
                all critical system clocks and times and ensure that the following is
                implemented for acquiring, distributing, and storing time.

                *Note: One example of time synchronization technology is Network Time
                Protocol (NTP).*

                a.   PCI PA-DSS V3.2: Critical systems have the correct and consistent
                        time
                b.   PCI PA-DSS V3.2: Time data is protected
                c.   PCI PA-DSS V3.2: Time settings are received from industry-
                        accepted time sources

D. Database Management System

1. Application software shall consist of software to provide complete operation of the PARCS to include the database management system.

2. The PARCS shall use an open Microsoft SQL that meets the Owner's current standards and that can be used by the Owner to access and manage data for parking transactions.

3. The database hardware, software, and management system shall be provided, installed, and maintained by the Contractor but Owner shall have unrestricted access to the PARCS database at no additional cost.

4. Data recorded by the PARCS shall be maintained in files that are in ODBC compatible formats. Solution shall support a relational database format for the storage of data based on HAS standards.

5. The new PARCS database shall migrate and integrate a minimum of the latest 5 years of historical data from the existing PARCS database. HAS will provide the Contractor with access to the existing PARCS database and the Contractor shall be responsible for all data mapping and migration into the new PARCS database.

E. Operating System Platform

1. Operating system software shall consist of software to support system setup, system operation, routine hard drive backups, diagnostics, and other maintenance routines.

2. The desktop/laptop operating system shall comply with the Airport's Guidelines.

   All PARCS functionality shall be accessible and usable via a browser-based GUI. The GUI shall be compatible with all major browsers and shall at a minimum work universally with Firefox, Chrome, Safari, and Internet Explorer.

3. The server operating system shall comply with the Airport's Guidelines referenced.

4. Upon commercial release of a new operating system version, the Contractor shall upgrade the PARCS application to operate on the most current operating system and version. Upon completion of successful testing, Contractor shall recommend implementation of the patch. Implementation shall be subject to the Owner or Owner's Representative's approval.

F.   System Design Reviews

1.   Contractor shall submit necessary documentation to conduct a Conceptual System Design Review (CSDR), Critical Design Review (CDR) and Software Development Review (SDR) for the new PARCS, in that order. Required documentation and all hands-on use of the PARCS shall demonstrate to the Owner or Owner's Representative that the Contractor's proposed system meets 100% of the requirements of this specification. The Owner or Owner's Representative shall require a minimum of five (5) business days for the review of each system design. To receive written acceptance, Contractor shall incorporate and demonstrate the Owner or Owner's Representative's feedback/comments from CSDR and CDR prior to commencement of the next milestone review. Contractor shall not proceed with the next design requirement until receipt of written acceptance presented by the Owner or Owner's Representative. The following summarizes in detail the requirements of these reviews:

2.   Conceptual System Design Review (CSDR):

    a.   Thirty (30) calendar days prior to the CSDR, the Contractor shall submit for the Owner or Owner's Representative's review and approval a CSDR Plan that includes the time, place and length of the review; review format; overall description of review; goals of the review; agenda items and topics; recommended participants; and the role/responsibilities of the Owner or Owner's Representative personnel in the review.

    b.   Ten (10) business days prior to CSDR, the Contractor shall submit five (5) printed copies of the CSDR documentation and one (1) electronic copy (PDF), including all Owner or Owner's Representative feedback and comments, to the Owner or Owner's Representative for review. Documents to be submitted shall include, but not limited to, the following:

        1)   Overall description of the PARCS and system components

        2)   System schematics, block diagrams, interconnection diagrams, and flow charts

        3)   Specifications or cut sheets for all proposed components and installation procedures

        4)   Standard reports samples and proposed formats for new reports

        5)   Software design approach, database design and list of all software

        6)   Detailed description of central server system, network

connection to HAS's LAN, and network design between field and central equipment.

  7) Detailed description of proposed credit card data flow and processing.

  8) Operational flow chart or sequence of activities diagram

  9) User screen formats

  10) Transition Plan

  11) Testing

  12) Operational procedures

  13) Detailed description of each activity, functionality, and operation, described in sequence and encompassing all system hardware and software components.

  14) Training Plan consisting of a proposed instruction schedule.

 c. Contractor shall facilitate and conduct the CSDR at the airport or at a location approved by the Owner or Owner's Representative.

3. Critical Design Review (CDR):

 a. Thirty (30) calendar days prior to the CDR, the Contractor shall submit for the Owner or Owner's Representative review and approval a CDR Review Plan that includes the time, place and length of the review; review format; overall description of review; goals of the review; agenda items and topics; recommended participants; and the role/responsibilities of the Owner or Owner's Representative in the review.

 b. Ten (10) business days prior to CDR, the Contractor shall submit five (5) printed copies of the CDR documentation and one (1) electronic copy (PDF), including all Owner or Owner's Representative feedback and comments, to the Owner or Owner's Representative for review. Documents to be submitted shall include, but not limited to, the following:

  1) Detailed description of PARCS and system components

  2) Completed schematics, block diagrams, interconnection diagrams, interface plans, interface control documents, and system and subsystem flow charts

  3) Detailed specifications and/or manufacturer's cut sheets for all proposed components

4)   Detailed and installation procedures

5)   All standard and new reports

6)   Detailed software design documentation

7)   List of all hardware necessary for initial operations

8)   Spare parts inventory

9)   Detailed central server system, network and communications design documentation

10)   Operations Plan describing and detailing end-to-end operations of the system

11)   Maintenance and servicing procedures for system components

12)   Graphical User Interface (GUI) User Screens

13)   Detailed and phased testing plan including both internal and Owner or Owner's Representative observed; and

14)   All software and database documentation including, but not limited to, licensing information and agreements, system and subsystem block diagram schematics, data flow diagrams and structures.

     c.   Contractor shall facilitate and conduct the CDR at the airport or at a location approved by the Owner or Owner's Representative. The CDR shall address those system design documents listed above as well as the following:

4.   Software Development Review (SDR):

     a.   Thirty (30) calendar days prior to the SDR, the Contractor shall submit for Owner or Owner's Representative review and approval an SDR Review Plan that includes the time, place and length of the review; review format; overall description of review; goals of the review; agenda items and topics; recommended participants; and the role/responsibilities of the Owner or Owner's Representative personnel in the review. Note: the CDR and the SDR may be conducted at the same time with the prior written approval from HAS or its representative.

     b.   Ten (10) business days prior to SDR, the Contractor shall submit five (5) printed copies of all SDR documentation and one (1) electronic copy (PDF), including all Owner or Owner's Representative feedback and comments, to the Owner or Owner's

Representative for review. Documents to be submitted shall include, but not limited to, the following;

1) Description of all software and firmware for all programs and subsystem, including data flow and data structure diagrams, database documentation, and software inter-relationships and integrations

2) Detailed description of each program, program function and operation

3) Files and message formats

4) GUI and user screen layouts, contents and formats

5) Documentation for all object-oriented software including application specifics, object diagrams, event coding, and relationships

6) Documentation for all command, batch, script or other files used to compile, link, load and/or execute application software and/or firmware

7) Operating systems, communication programs, assemblers, compilers, and utility programs used in the PARCS

8) Software Contractor's standard manuals

9) Software maintenance plan including all routine, preventive, corrective and emergency maintenance and servicing procedures and commands

10) All standard and new reports

11) All other pertinent software and database development issues and documentation including, but not limited to, licensing and ownership information and agreements.

c. Contractor shall facilitate and conduct the SDR at the airport or at a location approved by the Owner or Owner's Representative. The SDR shall address those software development documents listed above as well as the following:

G. Application Software

1. Application software shall be comprised of computer application programs to provide complete operation of the PARCS. Application software shall be compatible with the operating system platform. The software programs provided shall allow for future upgrade and expansion of the PARCS and PGS system.

2.   Servers and workstations solution shall allow multiple groups and roles that govern individual access to the system and transactions within the system. The assignment of a group/role will determine whether or not the individual may access a transaction, and if the access is update or view only.

3.   If servers or any type of data are stored on a cloud system, all data shall reside in the United States to comply with HAS requirements.

4.   The Contractor shall install and configure all application software and firmware required by the PARCS with all software licenses registered to HAS. All software shall be provided with soft keys, no hard keys will be accepted to support software licensing.

5.   The application software shall provide the following:

   a.   Any action that could compromise the integrity of the operating system or application software shall be password controlled and shall comply with current, up-to-date PCI standards.

   b.   Separate login shall be required for the separation of file maintenance and routine data entry and retrieval.

   c.   PCI DSS V3.2 or most current version: Assign all users a unique ID before allowing them to access system components or cardholder data.

   d.   PCI DSS V3.2 or most current version: In addition to assigning a unique ID, employ at least one of the following methods to authenticate all users:

      1)   Something you know, such as a password or passphrase
      2)   Something you have, such as a token device or smart card.
      3)   Something you are, such as a biometric.

   e.   PCI DSS V3.2 or most current version: Incorporate two-factor authentication for remote access (network-level access originating from outside the network) to the network by employees, administrators, and third parties. (For example, remote authentication and dial-in service (RADIUS) with tokens; terminal access controller access control system (TACACS) with tokens; or other technologies that facilitate two-factor authentication.)

   f.   PCI DSS V3.2 or most current version: Render all passwords unreadable during transmission and storage on all system components using strong cryptography.

   g.   PCI DSS V3.2 or most current version: Ensure proper user identification and authentication management for non-consumer users and administrators on all system components.

h.	PCI DSS V3.2 or most current version: Control addition, deletion, and modification of user IDs, credentials, and other identifier objects.

1)	Verify user identity before performing password resets.
2)	Set passwords for first-time use and resets to a unique value for each user and change immediately after the first use.
3)	Immediately revoke access for any terminated users.
4)	Remove/disable inactive user accounts at least every 90 days.
5)	Enable accounts used by vendors for remote access only during the time period needed. Monitor vendor remote access accounts when in use.
6)	Communicate authentication procedures and policies to all users who have access to cardholder data.
7)	Do not use group, shared, or generic accounts and passwords, or other authentication methods.
8)	Change user passwords at least every 90 days.
9)	Require a minimum password length of at least seven characters.
10)	Use passwords containing both numeric and alphabetic characters.
11)	Do not allow an individual to submit a new password that is the same as any of the last four passwords he or she has used.
12)	Limit repeated access attempts by locking out the user ID after not more than six attempts.
13)	Set the lockout duration to a minimum of 30 minutes or until administrator enables the user ID.
14)	If a session has been idle for more than 15 minutes, require the user to re-authenticate before re-activating the terminal or session.
15)	Authenticate all access to any database containing cardholder data. This includes access by applications, administrators, and all other users.
16)	Restrict user direct access or queries to databases to database administrators.

i.	All changes to data, system, or operating system shall be logged and recorded in accordance with PCI requirements and shall not jeopardize PCI Compliance.

j.	Browser-based – PARCS software shall be browser-based and web-browser enabled, i.e. the PARCS software shall be accessible by an authorized user through an internet browser. Users shall not need a client version of the software installed on their workstations to access the software. Access rights to the system for Owner or Owner's Representative personnel and others shall be defined during implementation.

k. Solution shall provide role-based access control using the principle of least privilege for all system functions including system administration and security administration.

l. The PARCS software shall provide functionality to easily track the preventative maintenance cycles for all equipment. The system shall show the history of preventive maintenance for equipment.

m. The PARCS software shall feature an automated work order system that shall can generate a work order request for equipment when it needs to be repaired due to a malfunction or when the next preventive maintenance cycle is due.

n. Integration with the Airport's website – The PARCS shall utilize web services to publish data from the PARCS in real-time, in a format specified by the Owner or Owner's Representative, to be published by the Airport's website. If not currently available, the Owner or Owner's Representative shall construct the website page(s) and inform the Contractor of the specific information to be published. At a minimum, the integration shall accommodate:

     1) The system shall charge variable rates based upon the time of day, day of week, and special events. The Contractor shall provide independent, variable rate structure for each facility.
     2) The rate structure shall be programmable to establish daily, weekly, monthly maximum fees, grace times, and complimentary periods.
     3) Should reference marketing messages and integration or tie-in with other airport marketing programs.
     4) Real-time Open/Full status and graphical depiction of each public parking facility – homepage, mobile website, or mobile application.
     5) The real-time number of available parking spaces in each public parking facility – homepage, mobile website, or mobile application.

o. Automatically detect and report fault conditions through a Facility Management System (FMS) - The system shall perform a self-check on a routine basis and provide notification for fault conditions and equipment failure. Fault conditions shall be categorized by severity and the system shall notify designated Owner or Owner's Representative personnel via email and or text message for any individual fault condition, category of fault, or Owner or Owner's Representative -selected group of faults. The system shall provide a continuous end-to-end self-checking capability.

p. Reporting as outlined in the Audit and Reporting Subsection.

q. Facilities monitoring of all field devices, e.g., entry station status, barrier gate status, Unattended Exit station status, cashier stations status, lane status display, Dynamic Signage status, UPS unit status, etc.

r. Allow Supervisors to authorize exception transactions occurring in a cashiered exit lane and remotely process an Unattended Exit Lane transaction from a workstation in the parking office. Authorization shall be auditable by username, date, and time.

s. Require Supervisors to enter reason for adjusting any ticket in a comment field. Each use of this function shall be automatically logged in the system with date, time, and username.

t. Central access and control of field devices – Users with the appropriate authorization shall be able to issue remote commands from system workstations to the field devices such as raising and lowering the barrier gates; rebooting the entry or exit station; putting the entry or exit station in or out of service; changing the lanes status signs; applying software patches and updates; etc.

    1) The use of central controls shall be logged with user ID, time, device controlled, and action taken.

u. Parking rate, grace period, and time increment changes – All parking rate, grace period and time increment changes shall be conducted at the server level and shall be auditable within the system. The PARCS shall remotely communicate with all devices in real-time for a general broadcast of information or software update or communicate to a single device to upload information or software. Broadcasting information such as rate changes or time increment changes shall be in real-time to all field devices. It shall be possible to remotely shutdown a field device's operating system, upload updates and remotely restart the field device. The system shall correctly process parking fees during a transition:

    1) from daylight savings time to standard time, and vice versa,

    2) at the beginning of March during leap years (e.g., when there is a February 29th), or from one rate to another (e.g., rate shall have an effective date so that patrons are charged a parking fee based upon the parking fee that was current at the entry date and time, not the exit date and time, allow the new rate to be either less than or greater than the new rate). This requirement shall apply to the parking fees as well as any tax rates or structures.

v. Rate changes shall be configurable within the application software GUI, such that the Owner can make rate changes with the assistance of the Contractor. There shall also be at least 99

different rate types available. New rate schedules shall be scheduled to automatically download to each individual lane device without manual intervention.

w. Dynamic parking rates based on space availability, time of day, day of week, month of year, and pre-settable dates.

x. Create system generated alarms – System shall generate alarms for any user selectable event type. Alarm Hierarchy shall be completely configurable so that the Owner or Owner's Representative can adjust priority of alarms, audible tones, where the alarms are sent (email, text, etc.), etc. Initial Alarm Hierarchy shall be coordinated with the Owner or Owner's Representative during implementation.

y. Export all query results to multiple formats including comma-separated-value, Microsoft Excel©, Microsoft Access©, etc.

6. Industry standard software packages shall be utilized. Each such software package shall be identified in the Contractor's Proposal. The Contractor's Proposal shall state the purpose of the software package, where it will be used, and how it will be used. If one software package is required to interface with another software package, the interface shall be documented and supported by flowcharts or block diagrams as appropriate. The Contractor shall advise if the software used in the system will be customized or "off the shelf" software and shall describe the method of obtaining further software updates or modifications. Application software shall have been designed for use in PARCS systems, and shall be written in a standard, industry-accepted computer language such as Java, C++, Visual Basic, etc. The Contractor shall identify the version of PARCS software that will be used at HAS in their Proposal.

H. Audit and Reporting

1. The PARCS system shall document parking revenue and activity and generate revenue and activity reports. All reports shall be available online, report data during user-specified dates, and on demand for Owner or Owner's Representative personnel who have proper password access.

2. The Owner or Owner's Representative shall establish its virtual midnight for transaction processing, credit card batch close, and report cutoff times. The establishment of virtual midnight shall be the Owner or Owner's Representative responsibility that follows applicable instruction and training of Owner or Owner's Representative personnel by the Contractor.

3. The system shall identify and produce reports that reflect separately public parking, and employee parking activities.

4. Public parking data shall be able to be separated by Parking Facility, and Parking Product for reporting purposes.

5. Provide electronic event journal that can be accessed by a supervisor from a PARCS workstation during a cashier shift and following shift close to perform cashier closeout.

6. The PARCS transactional stream of data shall be compiled in an ODBC compliant database. The Owner or Owner's Representative shall be able to prepare custom reports using this data including the exportation of data to a report generation application such as a Business Intelligence tool or Microsoft Excel©, at a minimum, via a comma-separated-value file format or as a PDF file.

7. All reports shall query, filter, and sort transactions by date/time, location, ticket id, vehicle license plate number, field device unique identifier, parking fee, transaction type, exception, validation type, or cashier, at a minimum.

8. Capture, record and report separately all exception transactions that could not be processed 100% and automatically by the system (swapped, unreadable, lost, foreign, mutilated, used, disputed fee, cancelled, credit card transactions processed in an off-line mode, etc.).

9. All reports and receipts shall follow the Fair Access and Credit Transaction Act (FACTA) guidelines and not show more than the last four digits of credit cards on receipts and reports.

10. The Owner or Owner's Representative shall create a historical transaction (similar to a receipt) for transactions that have occurred as many as sixty (60) days prior to the date of the request.

11. Contractor shall provide a definitions key for every report including a narrative description of what data each column and row represents and calculation formulas that define how all figures are obtained.

12. Develop and prepare up to twenty-five (25) additional "custom" reports. The content and layout of the information in these new reports shall be dictated by the Owner or Owner's Representative in consultation with the Contractor.

13. The PARCS reporting subsystem shall be a software component of the PARCS application. It shall not be a separate, integrated application.

14. The PARCS reporting subsystem shall be queried within the PARCS application to allow Owner or Owner's Representative staff to develop ad hoc reports. The system shall save up to 100 ad hoc reports developed by the Owner or Owner's Representative staff in addition to standard and custom reports.

15. The Contractor shall coordinate with the Owner or Owner's Representative as required during the system design to address the specific reporting needs of the Owner or Owner's Representative. All standard and custom-designed reports shall be proven accurate prior to the Contractor receiving formal system acceptance from the Owner or Owner's Representative. At a minimum, reports provided shall include:

   a.   Shift Reports

      1) Cashier shift report
      2) Unattended Exit station shift report
      3) Daily shift report
      4) Weekly shift report
      5) Monthly shift report
      6) Yearly shift report
      7) Cashier detail report – w/ date range

   b.   Monthly Reports

      1) Monthly Insufficient Funds summary
      2) Monthly lost ticket summary
      3) Monthly lost ticket transactions that could not be reconciled by LPR (i.e., charged the daily maximum rate)
      4) Monthly lane load factors report
      5) Monthly revenue summary
      6) Monthly credit card summary
      7) Monthly cash, credit card, and access card transaction summary
      8) Monthly paid ISF summary
      9) Monthly peak occupancy report (Relating to Facility)
      10) Monthly year to date transaction & revenue summary

   c.   Daily Reports

      1) Daily Shift Summary of (Date)
      2) Daily Credit Card Summary of (Date)
      3) Daily Revenue Summary
      4) Daily Transactions by Lane
      5) Daily Revenue Summary (Relating to Facility)
      6) Daily Validations by Facility
      7) Daily Validations by Type
      8) Daily Validations by Amount
      9) Daily Validations by Cashier/Issuer
      10) Daily Validations Summary
      11) Daily Exception Transactions Report

   d.   Access Card Reports

      1) Active Access Card Listing
      2) Access Cards Blocking Listing
      3) Access Cards Delete Listing

4) Access Card Expired Listing
5) Daily Access Card Granted Entry Listing

e.   Reports that allow queries over any length of time (hours or days)

1) Occupancy (including the peak occupancy over a given
    timeframe)
2) Length of stay (vehicle staying over XX (parameter driven)
    days)
3) Transactions by lane
4) Revenue statistics
5) Summary report turnover – movement
6) Summary report events
7) Event journal
8) Ability to query by rate

f.   Gate Open Report – For manual gate raises

1) A report noting if a gate (entry or exit) was manually opened
    and by whom (or who was logged on at the time). Also noting
    if the gate was opened from a terminal or at the device.

g.   Lost Ticket Transactions Tracking Report (available in daily,
        monthly, and yearly containing the sort-able/filterable columns
        below)

1) Exit date & time
2) Transaction #
3) Lost Ticket Amount
4) Last name (non-case sensitive)
5) First name (non-case sensitive)
6) Middle initial (non-case sensitive)
7) Address
8) Phone #
9) LPN State
10) LPN
11) Cashier (non-case sensitive)
12) Supervisor approval (non-case sensitive)

h.   Reports specific to each program

1) Coupons & coupons detail report
2) Credit card in & out
3) Etc.

i.   Summary Reports

1) All Transactions

    (a)   Non-specific
    (b)   Specific

   (c) Specific with Entry Time

2) Duration of Stay
3) Cancelled Transactions

   (a) All Cashiers
   (b) Specific Cashier

4) All transactions for a specific device.

5) Lost & Unreadable details

   (a) 2 days
   (b) Most recent 30 days
   (c) Ticket back details
   (d) Cancelled

6) Credit card transactions

7) Free of charge ticket

8) Insufficient Funds

   (a) Paid transactions for cashiers

9) Ticket by rate

   (a) Most recent 15 days
   (b) Choose date range
   (c) For prior month

10) Customer Loyalty Program Reports (Reservation System, etc.):

   (a) Patron account information
   (b) Transaction history
   (c) Transaction detail
   (d) Point accumulation
   (e) Point utilization
   (f) Credit card expiration information

11) Coupons and Park Free Programs

   (a) Patron account information
   (b) Transaction history
   (c) Transaction detail
   (d) Summary information

12) Valet Program
   (a) Transaction history
   (b) Transaction detail

(c)   Credit card expiration information

16.   Where the authorized remote address is requesting modification to the PARCS Server systems' application software, an authorization check shall be made based on the requester's PIN. Where the change and/or update is authorized, an audit trail and report containing the following information shall be maintained: Contractor shall propose the preferred PCS compliant software for Owner or Owner's Representative approval.

   a.   Date/time of change
   b.   Login ID of who made the change
   c.   Remote access address making change
   d.   Authorization PIN code to make change (varies based on type of clearance)
   e.   Record of change made
   f.   Record of data modified or changed (prior to change)
   g.   File identities and record count

2.02   POWER

   A.   Existing power infrastructure (transformers, panels, conduits, and cabling) shall be re-used by the Contractor to support the new PARCS.

   B.   It is possible that the existing cables may not be able to be reused where cables have become damaged or corroded. For this unforeseeable situation, the Contractor shall propose a cost to the Owner or Owner's Representative upon discovery to install new power conduits and cabling to replace the unusable portions. The additional cost will be a modification to the total Contract cost through a change order. Contractor shall use an Owner's approved vendor for all cabling requirements. The Owner will provide contact information upon request.

   C.   The Contractor shall provide power grounding of all devices per NEC. If an isolated ground is required, there may be instances where power-conditioning equipment may be required due to the location of equipment in relation to the power distribution panel and transformers.

2.03   COMMUNICATIONS

   A.   Contractor shall provide new fiber conduits to a central location for each individual lane. Contractor shall notify HAS the number of drops required per lane. Contractor shall pull fiber from the MDF room to each lane as well as cabling from the central location (switch) to each lane device as needed. Additional, Contractor shall provide and install lockable/securable, weatherproof NEMA cabinets where necessary to provide weather proof locations for the termination of the fiber and electrical cabling. A qualified cabling vendor per HAS Standards and Specifications shall install fiber-optic cabling from the MDF/IDF room to the termination points.

   B.   In addition to the requirements in these Functional Specifications, the Contractor shall comply with the Airport's Guidelines that can be found on the airport website.

C. The Contractor may select specific interfaces for lane equipment, however; standard, open-architecture interfaces at the physical layer shall be utilized. Ethernet shall be utilized from the equipment to the Servers. Ethernet connectivity is required at all device locations.

D. All Ethernet equipment and design must meet the Airport's Guidelines.

E. Contractor shall propose a solution for network maintenance.

F. Contractor shall provide network switches at each server room, MDF room, and entry/exit device location cluster. Network hardware will be provided, installed and maintained by the Contractor. Network hardware shall provide capacity for 25% growth in bandwidth and port density at the central server room and the Operation Center. Network switches shall be installed in a secure (locked) environment with conditioned temperature, humidity, shock, and vibration. If a conditioned environment is unavailable at a specific location, the Contractor shall provide an industrially hardened network switch. All provided network equipment shall be Cisco in accordance with other airport network equipment.

G. The Contractor shall indicate using the following table if each device requires a unique IP address.

Entry Lane				Exit Lane		
	Unique IP Address				Unique IP Address	
Device	Yes	No		Device	Yes	No
Entry Column				Exit Column		
Ticket Dispenser				Bar Code Reader		
Bar Code Reader				EMV Reader		
EMV Reader				Contactless Credit Card Reader		
Contactless Credit Card Reader				Pinhole Camera		
Pinhole Camera				LPR camera(s)		
LPR camera(s)				AVI Reader		
AVI Reader				RFID Reader		
RFID Reader				Barrier Gate		
Barrier Gate				Cashier Terminal		

2.04 EQUIPMENT AND SUBSYSTEMS

A. System Architecture

1. Contractor shall provide required server and adhere to HAS IT equipment requirements. See Appendix A for initial requirements.

2. If contractor proposed a cloud system, all data shall reside in the United States to meet HAS requirements. All data shall be stored separately from other client's data.

3. PARCS lane components shall operate in a stand-alone condition (without server connectivity) for a minimum of two (2) consecutive days without loss of transaction data.

4. The PARCS shall be an open-architecture system where all interfaces (hardware and software) conform to national and International Standards Organization (ISO) standards. Where there are no standards, documentation shall be supplied to the level defined by Open Architecture.

5. Contractor shall provide information of network drops in proposed system.

6. Equipment shall be made of IP based equipment. Equipment that has serial connections shall be listed and identified in the proposal.

7. PARCS Network Management and Remote Monitoring:

    a. The PARCS shall be designed to support stand-alone operations (distributed system with intelligent devices) as well as centralized management of the PARCS.

    b. The Intercom system, and printers, etc., shall reside in the HAS Command Center. Location of the intercom masters are to be determined and coordinated with HAS. The PARCS shall support and feature real-time notifications of hardware and software issues. The notifications shall report issues by equipment type and by facility name, airport name, garage name, and lane number/identifier.

8. System Performance to be Achieved:

    a. The PARCS shall operate 24 hours per day, seven days per week. A failure shall be defined as any malfunction that causes the loss of functionality according to the specifications. A system failure is considered a failure where loss of more than one function occurs. System failures shall not result in unplanned system downtime more than 0.02% (105 minutes of downtime per year) of the time.

    b. Concerning revenue activity, the system shall meet the accuracy as defined below:

        - fee calculation accuracy – 100.0%
        - transaction counts – 100.0%
        - exception counts – 100.0%
        - protocol sequence counts – 100.0%
        - revenue – 100.0%
        - calculations – 100.0%

    c. Contractor shall deliver a PARCS that can remotely communicate with all devices in real-time for a general broadcast of information

or software update or to communicate to a single device to upload information or software. Broadcasting information such as rate changes or time increment changes shall be in real-time to all field devices. It shall be possible to remotely shutdown a field device's operating system, upload software and remotely restart the field device.

9.   System Level Reliability, Redundancy, and Maintenance:

   a.   All equipment provided under this procurement shall meet maintainability requirements as follows:

      1) Incorporate features that shall reduce to a minimum the maintenance requirements for preventive maintenance, failure repairs, and performance verification. This includes the use of SNMP (V2 or V3) at all functional levels of the system.
      2) Provide for easy removal and replacement of component parts. Where fault tolerance is provided, hot swap out shall be supported.
      3) Design equipment for easy access, minimizing the removal of other items to gain access to a specific part.
      4) Reduce or minimize the requirement for special tools and test equipment.
      5) Design equipment so that performance can be verified, failures detected, and adjustments made with a minimum effort.
      6) All devices shall have electrical surge protection (comply with UL 1449).

   b.   The Vendor shall have built into the system structured exception handling so that the system responds predictably to error conditions, without lock-up or "crashing," and without distribution of corrupted data throughout the system. Error handling includes those caused by hardware failures, and errors caused by operators and errors induced deliberately or accidentally in software.

   c.   Upon system acceptance, the Owner or Owner's Representative shall maintain the system to eliminate faults or to keep the hardware or software in satisfactorily working condition, including applicable tests, measurements, replacement, adjustments, and repairs as is detailed in the Vendor's Systems' Administrative Maintenance Manual. The Vendor shall notify the Owner of all test equipment necessary to support the PARCS.

   d.   The field intelligent devices shall be PC based with the latest processors available at the time of contract and shall have sufficient memory capacity to retain a minimum of two (2) consecutive days of transactions plus minimum 30% built-in spare including buffer memory.

   e.   During implementation and testing, on-line, real-time

communication between the Vendor's PARCS Servers and the Vendor's software support team for supporting and maintaining the system is required. This communication shall be via a VPN connection communication link from the Vendor's home office that will be required to go through a firewall to get onto the Owner's backbone and thence to the PARCS Servers. All communication access shall be in compliance with the most current PCI published requirements.

10. System Hardware:

a. Network Hardware

1) Network hardware shall be in compliance with the Airport's Guidelines for aggregation of communications at each entry plaza and exit plaza. All switches shall be fault tolerant and possess dual fiber optic interfaces with one connection to each data center.

2) Network switches located in non-conditioned environments (such as a NEMA cabinet) shall meet industrial standards for temperature, humidity, shock, and vibration.

3) Network switches shall be supported by APC SNMP compatible UPS units at data center locations. UPS units shall provide 30 minutes of battery backup.

4) Vendor shall provide optional costs for new Cisco Network equipment and associated integration.

5) System shall be mainly IP based. If any equipment has serial connections, Contractor shall detail it on the proposal and cut sheets.

B. All computing resources, application, information management, and information distribution design and configuration are subject to the approval of the Owner or Owner's Representative and shall be in compliance with the Airport's Guidelines.

C. All lane equipment performing a like function and of the same part number shall be fully interchangeable without the requirement for physical modifications.

D. The Contractor shall utilize equipment that supports TCP/IP and remote monitoring of distributed units. SNMP shall be utilized for all equipment with Ethernet connections, i.e., Servers, networking equipment, lane control interface processors, etc., as well as all UPS units. The Contractor shall provide network monitoring for all PARCS field equipment and server hardware.

E. Each field device shall be assigned a unique identifier within the PARCS that is not shared with any other field device. Should the field device need to be replaced, the replacement field device would assume the old device's unique

identifier. Contractor shall coordinate with the Owner or Owner's Representative to develop the naming convention for the field devices.

F.   The PARCS configuration shall provide lane autonomy such that no single point of failure of a device shall cause an operational failure of surrounding lanes. Equipment at a single lane may fail causing a shutdown of a lane; however, the failure shall not affect other lanes.

Lane equipment shall not feature vendor names, signs or, branding.

G.   Credit Card Processing Subsystem

1.   Approximately 85% of the parking revenue is processed as credit card transactions in the lane. The respondent's solution shall be certified to process credit card transactions through the PaymentTech platform. Should the Merchant Banking Services Provider change, the Respondent shall be required to adjust to accommodate possible changes in the platform utilized. The Contractor shall provide a list of credit card processors compatible with their product.

2.   The PARCS shall accept major credit card types (i.e. credit debit and prepaid) and the following card brands – American Express, Discover, MasterCard, and Visa for payment. For all approved bankcard authorization requests, the PARCS shall provide a credit card transaction receipt if requested by the patron.

3.   The PARCS shall provide online real-time authorization for credit card payments made at PARCS point-of-sale devices.

4.   The following types of credit cards/devices shall be accepted at all point of sale devices for parking access and payment:

a.   Magnetic-stripe credit cards
b.   EMV Chip credit cards with P2PE
c.   Contactless Chip credit cards
d.   Mobile Payment with ApplePay, Google Wallet
e.   Preloaded credentials distributed by HAS.
f.   Garage Access Pass (Frequent Parkers, Employees, VIP, COBP, etc.)

5.   Contractor shall provide a pay-by-phone application.

6.   Contractor shall provide handheld credit card processing terminals independent of the PARCS operating system for all cashier and valet lanes.

7.   Contractor shall provide preloaded credentials that can be offered to patrons to pay for parking.

8.   The Contractor's credit card interface shall utilize a P2PE certified encryption solution that encrypts credit card transactions at the point-of-

sale and shall remain encrypted for communication to the offsite clearinghouse.

9. The point-of-sale terminal shall be integrated with the central PARCS to provide a tokenized version of the credit card number for transactional data continuity.

10. Contractor-provided aspects of the credit card processing subsystem shall be PCI-compliant, such that no Contractor-provided product or solution will prevent the Owner or Owner's Representative from achieving PCI Compliance in its parking operation. The Contractor shall provide a solution that reduces the scope of the Owner or Owner's Representative with regards to PCI compliance assessments of the network infrastructure.

11. Contractor's proposed PARCS shall conform to PCI -DSS Version 3.2, or most current version, and the PARCS application shall be PA-DSS certified and PIN Transaction Security (PTS) for PIN transaction devices according to the most recent PCI standards as of the Contract Award date.

12. Solution enables credit card payments to be authorized for the exact amount of parking services being purchased.

13. Credit card authorizations shall use the Airport's existing internet connection and firewall.   The system shall switch to a redundant communication connection for processing credit cards should the Airport's primary connection fail. Secondary internet connection shall be provided by the Owner or Owner's Representative should they decide to activate the secondary connection.

14. Where the credit card clearinghouse utilizes multiple IP addresses for clearing redundancy, the Contractor solution shall be configured to send transactions to all the available IP addresses offered by the clearinghouse.

15. As part of their Proposal, the Contractor shall submit a flowchart diagram and detailed summary of the credit card processing subsystem architecture and the process for credit card transaction approvals.

16. As part of their Proposal, the Contractor shall submit an example pricing structure for any related credit card, chip and PIN card, pay-by-phone or contactless fees that will be incurred. The pricing structure should be from a similar deployment.

H. PARCS Workstations

1. All non-proprietary PARCS workstation hardware components that will support the PARCS will be purchased separately from this Contract by the Owner or Owner's Representative through existing purchase agreements. Contractor shall only provide workstations for the command center.

2. Solution shall utilize existing HAS desktop and laptop hardware except for the command center equipment. These workstations will meet Contractor's requirements as well as the IT Department's requirements and standards. Contractor shall provide minimum requirements for these devices.

3. Contractor shall provide minimum recommended requirements of workstations where they differ from HAS standards.

4. The workstations shall exclude any hardware that shall preclude the purchase of standard maintenance and service contract from the computer manufacturer, dealer, third-party or Contractor.

5. Any workstation shall access any module of the PARCS based on access rights of the user including PARCS, LPR, etc.

I. Entry Stations

1. Each Entry Station shall consist of the following components and capabilities:

   a. Meets ADA requirements and standards
   b. It is preferred that all equipment shall be constructed of stainless steel.
   c. Push button to allow patron to choose to use their EZTag account.
   d. Access door with appropriate tamper-resistant locking system (all entry stations keyed alike, and unique to this installation)
   e. Issues one credit card-sized, barcode parking ticket for each entry transaction
   f. Push-button intercom integrated into the face of the Entry Station. The intercom shall be a VOIP solution. The intercom shall have video integrated such that the operator can see the patron within the entry/exit lane.
   g. Active color matrix message screen that is easily readable in all ambient lighting conditions. Sample of this screen shall be provided with the Contractor's Proposal Response
   h. Utilize visual instructions for patrons to understand the sequence of events to complete a transaction
   i. Issues audio voice instructions to compliment the visual instructions
   j. Pinhole camera
   k. Push-button or touch screen ticket issue, with a preference to touch screens
   l. Illuminated ticket slot
   m. Retractable ticket mechanism
   n. Uniquely encoded parking tickets printed for each specific parking area
   o. Unique machine identification number
   p. TCP/IP communications port for connection to the servers.
   q. Stand-alone capabilities for each Entry Station in the event that

network communication is lost, and regardless of where on the network the communication interruption occurs. Specifically, each Entry Station shall provide offline transaction storage capacity for all transactional information for a minimum of two (2) consecutive days. The lane shall automatically close in the event that the minimum transaction threshold is reached and shall remain closed until reestablishment of communications. Entry Station shall automatically upload all transaction information to the Servers once communication is restored.

    r. Bar code / QR code reader to read either paper or electronic (smartphone) bar code and QR code.

    s. Ticket Stock Low alarm generated in PARCS software

    t. Ticket Stock Out alarm generated in PARCS software

    u. Option for patron to change screen commands to Spanish

2. As part of their Proposal, the Contractor shall submit product data of proposed Entry Stations.

J. Unattended Exit Stations

1. Each Unattended Exit Station shall be equipped with the following components and capabilities:

    a. ADA requirements and standards

    b. Access door with appropriate tamper-resistant locking system (each Unattended Exit station keyed alike, and unique to this installation)

    c. Ticket reader/validator that accepts ISO standard readable, barcode parking tickets through the same single slot that shall print a patron receipt. EMV card readers may be a separate device from the ticket reader.

    d. It is preferred that all equipment shall be constructed of stainless steel.

    e. The exit station ticket slot or separate EMV reader shall read the standard EMV chip implementations for Visa, Mastercard, American Express and Discover.

    f. The EMV reader at an exit station shall not have an integrated 10-key PIN pad but shall be capable of easy integration with a PIN pad in the future if needed.

    g. Push-button intercom integrated into the face of the Entry Station. The intercom shall be a VOIP solution. The intercom shall have video integrated such that the operator can see the patron.

    h. Active color matrix message screen that is easily readable in all ambient lighting conditions. Sample of this screen shall be provided with the Contractor's Proposal Response

    i. Utilize visual instructions for patrons to understand the sequence of events to complete a transaction

    j. Issues audio voice instructions to compliment the visual instructions

    k. Bar code / QR code reader to read either paper or electronic

(smartphone) bar code and QR code.
l.   Pinhole camera
m.   Customers shall be given the option for a single receipt for all transactions (no auto-issued receipts). Receipt shall include:

    1) HAS brand-logo and address
    2) Receipt #/Transaction #
    3) Time, date and lane in/out
    4) Length of stay
    5) Parking fee
    6) Total amount
    7) Method of payment
    8) Amount paid

n.   The Owner or Owner's Representative shall have the option to change receipts for credit card transactions to be auto issue or by request. The configurable timeout function for receipt request shall be initially set for 20 seconds or until the next ticket is inserted.
o.   Receipt Stock Low alarm generated on FMS
p.   Receipt Stock Out alarm generated on FMS
q.   Active color matrix display, minimum size six inches measured diagonally, shall be readable in all lighting conditions
r.   Utilize visual instructions for patrons to understand the sequence of events to complete a transaction
s.   Issues audio voice instructions to compliment the visual instructions
t.   Cancel button that allows a patron to cancel a transaction once a parking ticket has been inserted. Upon activation of the cancel button, the parking ticket shall be returned to the patron.
u.   TCP/IP communications port for connection to the servers.
v.   Stand-alone capabilities for each Unattended Exit Station in the event that network communication is lost, and regardless of where on the network the communication interruption occurs. Specifically, each Unattended Exit Station shall provide offline transaction storage capacity for all transactional information, including encrypted credit card data, for a minimum two (2) consecutive days. The lane shall automatically close in the event that the minimum transaction threshold is reached and shall remain closed until reestablishment of communications. Unattended Exit Station shall automatically upload all transaction information to the Servers once communications are restored.

    1) In the event that the device's offline storage capacity is filled, and the device needs to shut down, all stored credit card information shall be permanently stored and accessible once the device is powered on.
    2) In the event that a device is operating in off-line mode and on UPS power, the device shall permanently store all credit card information prior to shutting down in the event that the UPS battery power is depleted.

w. Patron shall be given the option to change message displays to Spanish

2. As part of their Proposal, the Contractor shall submit product data of proposed Unattended Exit Stations.

K. Pay in Lane Stations

1. Each Pay in Lane Station shall be equipped with the following components and capabilities:

a. ADA requirements and standards
b. Access door with appropriate tamper-resistant locking system (each Unattended Exit station keyed alike, and unique to this installation)
c. It is preferred that all equipment shall be constructed of stainless steel.
d. Ticket reader/validator that accepts ISO standard readable, barcode parking tickets through the same single slot that shall print a patron receipt. EMV card readers may be a separate device from the ticket reader.
e. The exit station ticket slot or separate EMV reader shall read the standard EMV chip implementations for Visa, Mastercard, American Express and Discover.
f. The EMV reader at an exit station shall not have an integrated 10-key PIN pad but shall be capable of easy integration with a PIN pad in the future if needed.
g. Pinhole camera
h. Slot to receive cash payment
i. Secured box to keep cash
j. Secured box to recirculate cash bills
k. System alarms for cash boxes
l. Push-button intercom integrated into the face of the Pay-in-Lane. The intercom shall be a VOIP solution. The intercom shall have video integrated such that the patrons can see the operator and the operator can see the patron.
m. Active color matrix message screen that is easily readable in all ambient lighting conditions. Sample of this screen shall be provided with the Contractor's Proposal Response
n. Utilize visual instructions for patrons to understand the sequence of events to complete a transaction
o. Issues audio voice instructions to compliment the visual instructions
p. Bar code / QR code reader to read either paper or electronic (smartphone) bar code and QR code.
q. Customers shall be given the option for a single receipt for all transactions (no auto-issued receipts). Receipt shall include:

1) HAS brand-logo and address

2) Receipt #/Transaction #
3) Time, date and lane in/out
4) Length of stay
5) Parking fee
6) Total amount
7) Method of payment
8) Amount paid

r. The Owner or Owner's Representative shall have the option to change receipts for credit card transactions to be auto issue or by request. The configurable timeout function for receipt request shall be initially set for 20 seconds or until the next ticket is inserted.
s. Receipt Stock Low alarm generated on FMS
t. Receipt Stock Out alarm generated on FMS
u. Active color matrix display, minimum size six inches measured diagonally, shall be readable in all lighting conditions
v. Utilize visual instructions for patrons to understand the sequence of events to complete a transaction
w. Issues audio voice instructions to compliment the visual instructions
x. Cancel button that allows a patron to cancel a transaction once a parking ticket has been inserted. Upon activation of the cancel button, the parking ticket shall be returned to the patron.
y. TCP/IP communications port for connection to the servers.
z. Stand-alone capabilities for each Unattended Exit Station in the event that network communication is lost, and regardless of where on the network the communication interruption occurs. Specifically, each Unattended Exit Station shall provide offline transaction storage capacity for all transactional information, including encrypted credit card data, for a minimum two (2) consecutive days. The lane shall automatically close in the event that the minimum transaction threshold is reached and shall remain closed until reestablishment of communications. Unattended Exit Station shall automatically upload all transaction information to the Servers once communications are restored.

3) In the event that the device's offline storage capacity is filled, and the device needs to shut down, all stored credit card information shall be permanently stored and accessible once the device is powered on.
4) In the event that a device is operating in off-line mode and on UPS power, the device shall permanently store all credit card information prior to shutting down in the event that the UPS battery power is depleted.

a. Patron shall be given the option to change message displays to Spanish

5) As part of their Proposal, the Contractor shall submit product data of proposed Pay-in-Lane devices.

L.   Entry and Exit Lane Vehicle Detection Device

1.   Saw cut or embedded loops shall be used for entry and exit lane vehicle detection with the exception of the Terminal A/B Garage Exit plazas.

2.   Contractor shall replace all existing loops and loop detectors. The exit plazas located at the Terminal A/B garage require a different type of vehicle sensor instead of the traditional inductive loops. Contractor shall provide an alternate means of vehicle detectors at the Terminal A/B Garage.

3.   Entry Lane Vehicle Detection: Entry lane vehicle detectors shall detect vehicular presence, legal entry, illegal exit, and back-out. Dual arming loops shall be provided for all public entry lanes.

4.   Exit Lane Vehicle Detection: Exit lane vehicle detectors shall detect vehicular presence, legal exit, illegal exit, and back-out.

5.   The loop detectors shall be dual channel detectors. The detectors shall detect the presence or transit of a vehicle over an embedded loop of wire.

6.   The loop detector shall provide two channel pulse and presence outputs.

7.   The loop detector shall provide separate, momentary contact closures upon detection of a vehicle, along with continuous contact closures during the period that the vehicle is detected.

8.   The loop detector shall contain two fully separate, self-tuning, vehicle loop detectors and directional logic circuitry.

9.   The loop detectors shall each incorporate a sensitive Tailgate Recognition System capable of resolving two automobiles within six inches of each other on a standard 2.5 ft. W x 6 ft. loop.

10.   The loop detectors shall each operate in three separate sensitivity modes: high, medium and low.

11.   Different sensitivity settings shall allow vehicles of varying height and size to be properly detected.

12.   The loop detector shall be fully microprocessor-based.

13.   Each detector shall continuously retune itself to its loop frequency during non-detect periods to prevent the detector from generating a false detect output due to frequency variances caused by environmental effects or other factors. Analog type detectors requiring periodic manual tuning or any type of detectors that do not retune unless a manual function is performed shall be unacceptable.

14.   The loop detector shall generate two loop frequencies. No two frequencies shall be the same. This shall minimize the possibility of

detector crosstalk or interference between two detector loops mounted within close proximity. Detectors generating an identical frequency shall be unacceptable.

    15.   Loop wire shall be either #16 AWG THHN or TFFN stranded wire, at a minimum.

M. Barrier Gates

    1.   All barrier gates referenced in these Functional Specifications shall contain the following:

        a.   Direct drive mechanism
        b.   Aluminum gate with padded arm (articulating gate arm as appropriate)
        c.   Electronically controlled rebound feature
        d.   Non-resettable, mechanical gate action counter mounted in the barrier gate housing
        e.   Gate arm typical length of ten feet. Contractor shall determine the appropriate length of gate arm. There are two gates that require a twenty (20) feet arm length. These are located at the following locations:
            (1)   South Terminal Road between Terminal B and the Marriott Hotel
            (2)   North Terminal Road just north of the Marriott Hotel and west of Terminal C
        Two gates require fifteen (15) feet arm length. These are located at the following locations:
            (1)   ecopark2 left entry lane
            (2)   ecopark2 left exit lane
        f.   Single piece gate arm, except for the articulated gate arms.
        g.   Contractor shall install delineators in the Contract entry lane (number 521) located at the second level of Terminal C to restrict vehicles from driving around the barrier gate arm.

    2.   Barrier gates shall have sufficient power/resistance to ensure they cannot manually be forced open.

    3.   In case of a power failure, the Owner should be able to configure position of Barrier gates, so the lanes would operate according to the Airport's procedures.

    4.   As part of their Proposal, the Contractor shall submit product data of all proposed barrier gates.

    5.   Stainless steel cabinets preferred.

N.   LPR System

1. A LPR system shall be installed at HAS as part of the PARCS replacement project in all public entry and exit lanes.

2. No impediment to the spontaneous and immediate access and retrieval of any LPR data shall result from use of the database(s) or any other system architecture, hardware or software.

3. Contractor shall provide information on how long LPR data is stored.

4. The LPR Subsystem shall consist of all hardware and software necessary to provide a complete and functional LPR subsystem that achieves the Owner or Owner's Representative's required functionality and accuracy percentages, and that does not adversely affect any function of the PARCS.

5. The Contractor shall be responsible for providing a LPR subsystem that is fully interfaced and integrated into the PARCS. This integration shall include linking the LPN captured at entry to the unique ticket identification (or other entry credential information) for every transaction. Should the entry information need to be obtained at an exit station to process the transaction (i.e. lost ticket, unreadable, etc.), both the LPN and ticket shall be removed from their respective active (open transaction) inventories once the vehicle has exited.

6. The LPR database shall be used to conduct automated searches and queries for special circumstances, such as outstanding balances, unresolved incidences, and prior entries with no exits, Gray/Black List, and police requests. The LPR database shall be used for license plate number (LPN) searches to provide the following, but not limited to, information:

    a. If vehicle is currently present at the airport, including:
       (1) Date entered
       (2) Entry credential used: ticket, EZTag, credit card, etc.
       (3) Facility used
       (4) Image of vehicle's license plate and overview image
    b. History of vehicle parking at the airport for the most recent twelve (12) months, including:
       (1) Dates of entry and exit
       (2) Facility used
       (3) Duration of stay
       (4) Frequent parker or SurePark account
       (5) Payment at exit: cash, credit card, EZTag, SurePark, etc.
       (6) Image of the vehicle's license plate and overview image for each instance.
    c. Comment box with a drop down menu of options to select from or free form typing.

7. LPR images shall be maintained in the active database for a 12-month duration, at a minimum.

8. The LPR system shall keep a "Gray List" of exception transactions based upon vehicle LPN information. Exception transactions shall include insufficient fund transactions, lost ticket transactions, swapped media transactions and passback violation transactions. This Gray List shall reside on the PARCS server system's database. As an exception transaction is processed, the LPN and corresponding transaction information shall be recorded as part of the Gray List record.

9. When a patron enters the parking facility using a credential such as RFID hangtag, EZTag, badge, or other credential, the LPR system shall automatically capture the license plate (LPN) data and update the patron's record with the appropriate license plate information. This will allow the use of the patron's LPN on future transactions.

10. LPR Cameras

    a. The Contractor shall furnish and install image capture cameras including any lights or shade canopies necessary at all public entry and exit lanes to provide system functionality.

    b. Devices shall be placed in theft deterrent and vandalism resistant housings that meet applicable code requirements for outdoor equipment.

    c. The Contractor shall determine the exact location of each device and utilize existing conduit and mounting infrastructure where possible.

    d. All entry images shall be pre-capture, meaning that the cameras are placed in such a position that a vehicle's LPN is photographed before the entry credential issuance to the patron or accepted by the system. In addition to the rear facing LPR cameras, a front facing LPR camera shall be installed to capture the vehicle's front license plate. Contractor shall perform a site visit to determine the most efficient and effective method of installing LPR at these two locations. Contractor shall provide a narrative with their proposal discussing the advantages and disadvantages of installing LPR cameras to capture both the front and rear license plates and if this configuration will improve the capture rate or improve the timing of the LPN capture.

    e. All exit images are to be pre-capture, meaning that the cameras are placed such that a vehicle's LPN is photographed before the patron presents their parking credential at the exit.

    f. The preferred method of illumination for license plate capture is infrared light.

    g. As part of their Proposal, the Contractor shall submit product data of the proposed LPR cameras. The following LPR vendors have been pre-approved to provide equipment for this project:

      (1)   HTS
      (2)   Genetec
      (3)   Quercus
      (4)   Red LPR

11.   LPR Image Review Workstations (IRWs)

a.   Contractor to provide according LPR review workstations that meet the IT specifications/requirements as listed on the HAS website. Dedicated IRW hardware shall be installed in the Parking Management Office. The PARCS shall include a web-based IRW component to enable an operator to review images for manual read and data correction into the LPR database. Contractor shall provide a suggested number of IRWs required to support the operations at IAH and HOU. The PARCS shall support up to 10 concurrent IRW operators (subject to available hardware provided by the Owner or Owner's Representative).

b.   When any LPR exception occurs, it shall be displayed as a high priority alarm on all logged-in system workstations at the same time. Once an LPR exception is resolved from any workstation, the alarm shall instantly be removed from all system workstations.

c.   Entry and Exit transaction review shall occur on the same application, on the same screen, such that multiple windows are not required for both entry and exit image review.

d.   Exit transactions shall be given higher priority than entry transactions for review at all IRW's.

e.   Entry lane images shall be reviewed and corrected if necessary after the fact; that is after the vehicle has entered the parking facility. No time limit shall be stipulated for after the fact entry lane LPN correction, therefore, entry lane corrections can be made during off-peak transaction processing time. LPR images up for review will be placed into a single queue and be dispatched to the LPR Review Workstations that are active. Exit review will be given priority over entry reviews.

f.   License plate images that fail to match the numbers that are captured at entry shall be alarmed into an IRW for correction. It shall be possible for the Owner or Owner's Representative to "turn-off" the alarm and requirement to correct license plate numbers at entry.

g.   Authorized users shall use the IRW to enable remote processing of exception transactions (e.g. Lost Ticket, Mutilated, Unreadable, etc.) at all Cashier Stations and Unattended Exit Stations. The authorized user shall use the LPR data sent from the lane to the

IRW to verify entry information and transmit the entry information to the exit station for automated calculation of the appropriate parking fee. Remote exception processing shall cause the Cashier Station or Unattended Exit Station to generate and swallow an exception ticket for audit purposes.

O.   Intercom System

1.   The Contractor shall provide a turn-key intercom system that consists of two host intercom stations and an integrated microphone, video and speaker in each Entry Stations and Exit Stations.

2.   The intercom in the cashier booths shall communicate the same way as the other devices but shall also include a panic alarm that can send an alert to the Parking Command Center.

3.   HAS prefers that the intercom system feature audio induction hearing loops that supports improved audio transmission for hearing aids.

4.   The intercom shall be a push-button intercom with integrated camera that focuses on driver such that in the event a patron needs assistance while stopped in a lane, the button can be pushed, and a connection established between the field location and the host intercom station.

5.   In the event that the arming loops are triggered for a configurable amount of time with no transaction being initiated, the intercom station in the lane shall automatically call the Parking Management Office.

6.   The intercom system shall utilize VOIP.

7.   The intercom communications shall be directed to a command desk console that will be located in the Command Center with roll over capabilities to a second base station as designated by the Owner or Owner's Representative or other telephone/cell phone. The Command Center shall be equipped with an intercom base station that displays the physical location of the incoming intercom call and camera for the video of parking operator to patrons. Incoming calls to the base station should employ visible and audible signals to alert Command Center staff.

8.   Once activated, two-way communication shall be possible, and the intercom line remains open until the parking staff member terminates the call.

9.   It shall be possible that if one intercom is open, and a second call comes in, the attendant shall place the first call on hold and answer the second call.

10.   As part of their Proposal, the Contractor shall submit product data of the intercom base station and push button intercom terminals.

P.   Validation System

1.   The PARCS shall create, process, and track multiple forms of fee discounts and validations electronically in the system. Discounts and fee modifications can be related to: Americans with Disabilities Act (ADA), Disabled Veterans, coupons, etc.

2.   The Contractor shall provide an electronic validation system whereby the Owner or Owner's Representative may discount a patron's parking fee by either re-encoding their parking ticket, issuing a barcode or QR code voucher, or issuing an electronic barcode or QR code for presentation by a smartphone.

3.   Validations shall be made for fee modifications or discounts expressed in specific dollar amounts per transaction or per time period (e.g. $5.00 off total fee or $5 off per day), specific durations of time (e.g. two hours free, one or more days free, etc.), for the entire parking fee, or a fee calculated at a reduced or alternate rate structure for an individual ticket. Contractor shall provide a method of tracking validations issued by user with a comment field to be completed upon entering the validation.

4.   The Owner or Owner's Representative shall create validations via Validation Stations that are connected to the browser-based PARCS and protected by username and password. The Contractor shall be responsible to ensure that the validation stations function in accordance with these specifications even if the validation stations are connected to an existing HAS computer workstation.

5.   Only users with appropriate authorization shall issue validations and the PARCS shall track all validations for auditing purposes by user, validation date, validation type, and validation amount.

6.   System shall provide online web-based validation

7.   The Contractor shall submit a cut sheet of the proposed Validation Stations as part of their Proposal.

Q.   Frequent Parker Program

1.   The PARCS shall provide a Frequent Parker Program to allow patrons to open and maintain an account with HAS to provide automatic billing for each parking transaction at a HAS parking facility and reserve a parking space for specific dates.

2.   Frequent Parker Program will be negotiated with the Airport, but system should allow growth and future expansion.

3.   The PARCS shall provide the following minimum program:
       a. Frequent Parking Program (FPP):
           1. The FPP shall provide the following functions:

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(a) Web-based accounts for patrons to establish/open an account and maintain the information within the account:
(b) Patrons can perform the following functions:
  1. Register for program
  2. Maintain account information
  3. Change or edit account information
  4. Request/print receipts
  5. Track the number of parking accrued by LPN, day, and facility
(c) Account information shall contain the following minimum information and in accordance with PCI-DSS version 3.2 or higher:
  1. Name
  2. Billing address
  3. Credit Card number(s)
  4. Expiration date
  5. Email address(es)
  6. License Plate Numbers of vehicles associated with the account – there could be multiple LPNs.

2. Mobile Device Compatibility:
   (a) Users may access the FPP via mobile devices, such as tablets, smart phones, note/netbooks, etc.

3. Functional Requirements:
   (a) The engine shall be a user-friendly booking surface, easy to understand, and to handle by the customer
   (b) The engine shall provide a user interface to allow the user the following minimum functions:
      1. Option to insert a promotion code
      2. Provide a customer account option
      3. Link to an interactive car park for the airport
      4. Support corporate membership and various loyalty schemes
      5. Loyalty scheme, such as calculating the earning of points.

4. The and Frequent Parker Program shall provide marketing opportunities through email solicitations or mailing solicitations to account holders. This shall require specified web-enabled elements or pages of the user interface of the Parking Loyalty software module, to integrate with specified pages of the HAS's website.

5. The Frequent Parker Program shall allow the patron to accumulate points associated with the number of days parked within the various parking facilities. The points accumulated shall be separated by the various parking facilities.

6. Upon reaching certain thresholds, the patron may elect to use the points to pay for a parking fee or to be transferred to their preferred airline customer loyalty program such as United's MileagePlus program.

R.   Parking Guidance System and Subsystems

1.   The Contractor shall integrate with current PGS providers at both airports.

S.   Command Center

1.   The Contractor shall provide a proposal for a new command center located in the parking offices in the arrivals terminal.

2.   The command center shall have two 70" or larger wall mounted monitors to monitor video images from the lanes. The size of the monitors shall be coordinated with the Owner.

3.   Each intercom shall communicate to an intercom base station to be located in the command center.

4.   The command center shall have multiple workstations that access the LPR and PARCS software. Contractor to propose the appropriate number of LPR review workstations based upon the number of transactions and lanes.

5.   PARCS workstations shall be integrated with the monitors. Monitors shall also provide 2x3, or 3x3 image displays.

6.   The command center shall have access to the image review workstation to allow operators to modify transactions with LPR errors, mismatches, lost tickets and any other situation that would require them to troubleshoot a transaction.

T.   RFID/AVI

1.   There shall be three types of RFID/AVI readers installed at various locations at both IAH and HOU:
       a.   Public Lanes – TransCore Readers (E-5) with multiple protocols that read EZTag, TXTag, TollTag transponders issued by the various Texas toll agencies, and the RFID hangtags currently in use at each airport.
       b.   Contract/Employee lanes – Tagmaster model AB XT-3 Readers
       c.   Ecopark bus lanes and IAH recirculation lanes – Tagmaster model LR-3 Readers

2.   The Houston Airport System and HCTRA are currently discussing the integration of the EZTag system as a payment option for parking patrons at the airports. The current schedule is to have an agreement in place by the end of 2020. Should an agreement not be reached, the scope of work of the PARCS vendor may change with the potential removal of the TransCore readers in the public entry and exit lanes.

3.   The PARCS shall be integrated with HCTRA to provide access to their patrons through the patron's toll account which will allow the patron to

enter parking facilities at either IAH or HOU, exit through the exit plaza and charge the parking fee to their HCTRA toll account.

4.   HCTRA will send a current white list once per day. The PARCS shall capture this white list and use this list to check for valid EZTags displayed within the patron's vehicle.

5.   HCTRA will send periodic updates throughout the day and the PARCS shall update the white list with these updates.

6.   The PARCS shall only allow a patron into the parking facility if a valid EZTag is present and included in the white list.

7.   The patron will be required to opt in to the program to be able to use and charge their EZTag account at either IAH or HOU.

8.   The patron will further be required to opt in at the entry lane by pushing a button on the entry device that will activate the PARCS to capture the EZTag located in the patron's vehicle.

9.   Upon exit, the PARCS will automatically capture the valid EZTag and the tag must be on the current whitelist and close the parking transaction while opening the gate to allow the patron to exit.

10.   The PARCS shall periodically forward a file to HCTRA for processing. This file shall include such information as (final design will be coordinated between HAS, HCTRA, and the Contractor):
       a.   EZTag number
       b.   Amount of parking fee

2.05   PATRON PROCESSING PROCEDURES

A.   Public Entry Procedures

1.   The following shall take place for all entry events:

       b.   When the entry lane arming loops are not activated, the Entry Column device screen shall display the date and time.
       c.   When the vehicle activates the arming loops, the message on the Entry Station's display shall read, and an audible voice shall sound, "Welcome to George Bush Intercontinental or William P. Hobby, Please Press Button for Ticket, credit card, or to use EZTag"
       d.   The arming loop will activate the LPR cameras to capture the LPN of the vehicle.
       e.   If the LPN has been pre-registered with the PARCS and has a reservation, the PARCS will open a parking transaction and automatically open the gate.
       f.   If the LPN has not been pre-registered, the patron will extract the ticket or present a bar or QR code, select to use their EZTag, or

select to use their Contractor RFID tag, and the barrier gate will be opened. Only a single-entry event shall be permitted for each arming event, e.g., if the ticket issue button is pressed, no other entry type shall be permitted.

g.   Upon clearing the barrier gate's closing detector, the barrier gate arm shall lower to the closed position, the PARCS shall associate the LPN with the entry transaction and the ticket number or credential used and reset the lane for a subsequent transaction.

h.   The entry event shall be validated and the associated data with the entry event shall be stored.

2.   Transaction specific procedures are required in addition to those listed above. The transaction specific entry procedures and procedures for abnormal events are detailed below.

3.   Normal Entry with Ticket

a.   Once the vehicle has activated the arming loop, the LPR camera(s) shall capture the LPN of the vehicle.

b.   When a patron presses the ticket issue button, no other entry method is allowed at that point and the Entry Station shall issue a uniquely numbered parking ticket while an audible signal shall sound. The Entry Station shall dispense a magnetically encoded or bar code or QR code imprinted parking ticket and print on the ticket the year, month, date, entry time (hour/minute/second), facility code, lane number, entry sequence number, unique transaction number, and unique machine number. Abbreviations are acceptable; time stamps shall be in 24-hour, military time.

c.   The LPN captured by the LPR camera(s) shall be encoded on the paper ticket.

d.   When the printed/encoded ticket is extracted from the Entry Station, the audible signal shall cease, and the display shall read, and an audible voice shall sound and say, "thank you". The barrier gate shall rise to the open position, allowing the vehicle to enter the parking facility.

4.   Use of EZTag at Entry

a.   Once the vehicle has activated the arming loop, the LPR camera(s) shall capture the LPN of the vehicle.

b.   When a patron presses the EZTag button located on the Entry Device, the EZTag reader shall be armed and capture the EZTag located within the vehicle. If the EZTag is listed on the white list as valid, the PARCS shall create an entry transaction and raise the gate. The LPN and other entry data shall be included as a part of the entry transaction.

5.   Back out at Entry

a.   If a patron pushes the ticket issue button and backs out of the lane without retrieving the ticket the barrier gate shall remain closed

and the ticket shall be retracted and retained in the Entry Station. The ticket shall be invalidated by the entry station and within the system to prevent future use. The back out entry event shall be stored in the system and the lane shall reset for a subsequent transaction.

6.   Stolen Ticket at Entry

   a.   If a patron pushes the ticket issue button, retrieves the ticket, and then the vehicle backs out of the lane the barrier gate shall automatically return to the closed position (no timed delay to lower the barrier gate arm to the closed position shall be acceptable), the ticket shall be invalidated within the system, and an alarm shall be generated. The stolen ticket entry event shall be stored in the system. The ticket shall be electronically invalidated and shall not be allowed to be processed at any exit.

7.   Reservation System/ Frequent Parker Program Entry
   a.   If patron presents a valid credential (barcode/QR code, LPN, or EZTag) from the reservation system next to the barcode/QR code reader, the audible signal shall cease, and the display shall read, and an audible voice shall sound "Welcome to Houston Airport System". The barrier gate shall rise to the open position, allowing the vehicle to enter the parking facility.
   b.   Once the vehicle has activated the closing loop, the LPR camera shall capture the LPN of the vehicle and associate the LPN with the entry transaction and the reservation transaction.

B.   Unattended Exit Lane/ Pay in Lane Procedures

1.   The following shall take place for all normal exit transactions when an exit station is operating as an Unattended Express Exit Lane:

   a.   As the vehicle approaches the Exit Lane, the patron shall see the dynamic signage with the appropriate message and/or graphics displayed. Exact messages to be displayed shall be determined by the Owner or Owner's Representative during installation.
   b.   When the Exit Lane arming loops are not activated, the patron's display screen in the Exit Station shall display the Airport's logo, date, and time for a period of no longer than ten (10) minutes and then shall blank the screen to be activated when the next vehicle crosses the arming loop.
   c.   After activating the arming loops, the LPR cameras shall capture the LPN of the vehicle. If the LPN has been used as a credential and the valid entry transaction has been identified, the PARCS shall use the LPN to close the parking transaction, charge the patron's account, and open the gate allowing throughput.
   d.   After activating the arming loops, the EZTag reader will search for a valid EZTag. If a valid EZTag is discovered, the PARCS will

search for the open entry transaction. The PARCS will close the parking transaction, charge the EZTag account, and open the gate.

e. If the patron entered by extracting a parking ticket, the following occurs. After activating the arming loops, the display reads, and an audible voice sounds, "Insert Ticket, or present validation".

f. After the appropriate entry credential is presented, the message "Processing, Please Wait" is displayed. Once positive verification of data occurs, the display shows the fee due. The display reads, and an audible voice sounds, "Please Insert or Present Credit Card for Payment".

g. The patron inserts or presents a credit card or cash.

h. During credit card authorization, the display shows the message "Processing, Please Wait". During cash transaction, system calculates fee correctly.

i. Once payment is obtained the display reads, and an audible voice sounds, "Please Take Credit Card".

j. Card is removed, the station gives the option to print the patron receipt, if selected the display reads, and an audible voice sounds, "Please Take Receipt", and the station produces an audible "beep". Shall also provide receipt option for cash transactions.

k. Receipt is taken, audible "beep" ceases, the display reads, and an audible voice sounds, "Thank you from the staff of Houston Intercontinental Airport", and the barrier gate rises.

l. Vehicle crosses the closing loop, the barrier gate closes, and the lane resets for the next transaction.

m. The ticket is moved from active ticket inventory to inactive ticket inventory.

2. The following shall take place for all normal exit transactions when an exit station is operating as an Unattended Exit Lane with a Pay-in-Lane (PIL) Device:

a. As the vehicle approaches the Exit Lane, the patron shall see the dynamic signage with the appropriate message and/or graphics displayed. Exact messages to be displayed shall be determined by the Owner or Owner's Representative during installation.

b. When the Exit Lane arming loops are not activated, the patron's display screen in the PIL shall display the Airport's logo, date, and time for a period of no longer than ten (10) minutes and then shall blank the screen to be activated when the next vehicle crosses the arming loop.

c. After activating the arming loops, the LPR cameras shall capture the LPN of the vehicle. If the LPN has been used as a credential and the valid entry transaction has been identified, the PARCS shall use the LPN to close the parking transaction, charge the patron's account, and open the gate allowing throughput.

d. After activating the arming loops, the EZTag reader will search for a valid EZTag. If a valid EZTag is discovered, the PARCS will search for the open entry transaction. The PARCS will close the

parking transaction, charge the EZTag account, and open the gate.

e. If the patron entered by extracting a parking ticket, the following occurs. After activating the arming loops, the display reads, and an audible voice sounds, "Insert Ticket, or present validation".

f. After the appropriate entry credential is presented, the message "Processing, Please Wait" is displayed. Once positive verification of data occurs, the display shows the fee due. The display reads, and an audible voice sounds, "Please Insert Cash for Payment".

g. The patron inserts cash.

h. Once the transaction is complete, the station gives the option to print the patron receipt, if selected the display reads, and an audible voice sounds, "Please Take Receipt", and the station produces an audible "beep".

i. Receipt is taken, audible "beep" ceases, the display reads, and an audible voice sounds, "Thank you from the staff of Houston Intercontinental", and the barrier gate rises.

j. Vehicle crosses the closing loop, the barrier gate closes, and the lane resets for the next transaction.

k. The ticket is moved from active ticket inventory to inactive ticket inventory.

3. Transaction specific procedures are required in addition to or in place of those listed above. The transaction specific exit procedures and procedures for abnormal or unique events are detailed below.

a. Exit – Ticketed transaction with Invalid Credit Card Presented for Payment

1. After fee is displayed, an invalid credit card is inserted or presented, and the display shows the message "Processing, Please Wait".

2. Once authorization is declined, the credit card, if inserted, is returned through the ticket slot and the display reads, and an audible voice sounds, "Your Card Was Not Accepted, Please Try a Different Credit Card or Press the Intercom for Assistance".

3. After the invalid credit card is removed, if reinserted, the ticket remains in the Exit Station and the display alternates between displaying the fee and the message "Insert or Present Credit Card for Payment"

4. Once the patron presents a valid credit card for payment, the transaction continues as a normal exit transaction.

5. If the patron does not have a valid credit card, they must push the intercom for assistance.

b. Exit - Lost Ticket Transaction (Express Lane)

1. The patron pushes the intercom button and is connected to a supervisor. After the patron informs the supervisor that they have lost their ticket, the supervisor uses a

workstation to verify the patron's entry information based on the LPR data. From the workstation, the supervisor selects "lost ticket" which automatically transmits the entry information to the Exit Station.

2. The correct fee is calculated and displayed.
3. The display reads, and an audible voice sounds, "Please Insert or Present Credit Card for Payment".
4. After payment is received, the Exit Station generates an exception ticket for a lost ticket and retains the exception ticket.
5. The station prints a receipt, if selected, and the transaction continues as a normal exit transaction.

c. Exit - Unreadable Ticket Transaction

1. Ticket is inserted into the ticket slot. The ticket cannot be read by the Exit Station and is returned through the ticket slot. The display reads, and an audible voice sounds, "Ticket Unreadable, Please Press Intercom Button for Assistance".
2. The patron pushes the intercom button and is connected to a supervisor. After the patron informs the supervisor that their ticket is unreadable, the supervisor uses a workstation to verify the patron's entry information based on the LPR data. From the workstation, the supervisor selects "unreadable ticket" which automatically transmits the entry information to the Exit Station. The correct fee is calculated and displayed. The display reads, and an audible voice sounds, "Please Insert or Present Credit Card for Payment".
3. After payment is received, the Exit Station generates an exception ticket for an unreadable ticket and retains the exception ticket.
4. The station prints a receipt, if selected, and the transaction continues as a normal exit transaction.

d. Exit - Attempt to Exit with Swapped Ticket

1. Swapped Ticket is inserted into the ticket slot, and the LPR system verifies that the ticket information does not match the LPR entry information. The entry and exit images are sent to an IRW. While LPR verification is taking place, the message "Processing, Please Wait" is displayed. The image reviewer selects the correct entry image and the fee is automatically calculated based on the LPR data.
2. The transaction is automatically logged in the system as a swapped ticket and the swapped ticket is retained.
3. Correct fee is displayed, and the transaction continues as a normal transaction.

e. Exit - Attempt to Exit with Stolen Ticket

1. Stolen Ticket is inserted into the ticket slot, the ticket is identified as a Stolen Ticket, appropriate alarm generated by the system, and the message "Ticket Invalid, Please Press Intercom Button for Assistance" is displayed.
2. The patron presses the intercom button and the supervisor verifies (via the stolen ticket alarm) that the transaction is a stolen ticket.
3. The supervisor uses a workstation to verify the patron's entry information based on the LPR data. From the workstation, the supervisor selects "lost ticket" which automatically transmits the entry information to the Unattended Exit Station. The correct fee is calculated and displayed, and the Stolen Ticket is retained by the Unattended Exit Station.
4. After fee is displayed, the transaction continues as a normal transaction.

f. Exit - Exit with Validation – ticket only

1. After fee is displayed, a validation ticket is inserted into the ticket slot or the patron's re-encoded parking ticket is inserted into the ticket slot and the discount is applied to the parking fee due based on type of validation (either dollar value or time value).
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 exit transaction.
4. If the validation does not satisfy the entire parking fee, the patron must present a credit card to complete payment and the transaction continues as a normal exit transaction.

g. Exit – Discounted Exit with Bar Code or QR Code (cell phone or hard copy) and Reservation System– ticket only

1. After fee is displayed, a bar coded ticket or cell phone bar code is presented to the bar code or QR Code reader and the discount is applied to the parking fee due based on type of validation (either dollar value or time value).
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 exit transaction.
4. If the validation does not satisfy the entire parking fee, the patron must present a credit card to complete payment and the transaction continues as a normal exit transaction.

2.06   EQUIPMENT AND SUBSYSTEM PERFORMANCE STANDARDS

A. The system shall perform the following calculations with accuracy as defined within this section:

1.   parking fees
2.   transaction counts
3.   revenue processing
4.   reporting

B.   The system shall calculate parking fees based upon different parking areas, time/day of entry, applicable taxes, lengths of stay, time increments and rate structures.

C.   LPR Subsystem performance

1.   At each public entry and exit lane the LPR Subsystem shall acquire an image of a vehicle's entire license plate at a 99 percent (99%) rate for all non-exception vehicles as defined within this section. The intent of the 99% capture rate is to have a visual record of 99% of all non-exception license plates entering the facility.

2.   At each public entry and exit lane the LPR Subsystem shall achieve an N Factor rating of 90% meaning specifically that the LPR Subsystem shall read all license plate characters, exclusive of stacked characters, correctly 90 percent (90%) of the time for all non-exception vehicles as defined within this section. Missing, misread, or additional characters as determined by the LPR Subsystem shall be 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 read, the system must return the LPN "ABC123" exactly.) Additional characters added before or after the license plate characters shall count against the read rate. (i.e., "1ABC123" would not constitute an N read.).

3.   At each public entry and exit lane the LPR Subsystem shall achieve an N-2 Factor rating of 95% meaning specifically that the LPR Subsystem shall read all but two LPN characters, exclusive of stacked characters, correctly 95 percent (95%) of the time for all non-exception vehicles as defined within this section. Missing, misread, or additional characters as determined by the LPR Subsystem shall be 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-2 read, the system must return the LPN "C123", "ABC1", "CCC123", "ABRR23", "1ABC1231", etc. Additional characters added before or after the license plate characters shall count against the read rate.

4.   Exception vehicles shall not count against the accuracy of the LPR Subsystem. 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 (having a foreign object within .375 inches (⅜") of any LPN character).

b. Oversized vehicles that have a total distance between the center of the drivers' side window and the end of the rear bumper greater than 14 feet.

c. 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.

d. Vehicles with no license plate

e. Vehicles with temporary cardboard (non-reflective) "Dealer Plates."

f. Motorcycles

5. Ambient lighting conditions shall have no effect on the accuracy of the LPR system regardless of the time of the day and night. The Contractor shall provide any necessary shading or lighting elements required to mitigate the effect of the ambient lighting conditions on the LPR system performance.

6. The Contractor shall provide a means, subject to approval by the Owner or Owner's Representative, to remotely score the LPR Subsystem to ensure it meets the performance requirements. The Contractor shall assist the Owner or Owner's Representative in transferring or uploading images from each lane to a secure FTP site that can then be viewed and scored on a standalone PC by the Owner or Owner's Representative. The Owner or Owner's Representative shall select any images stored on the LPR database for scoring purposes. The Contractor shall provide all software needed to test the LPR Subsystem's performance. The software shall be downloadable to a standalone PC used for testing.

7. In addition to the LPR camera, the PARCS shall include an overview camera to capture and store an image the rear of the vehicle. This image shall also be associated with and become a part of the transaction.

8. LPR shall read plates from all contiguous surrounding states around Texas, including the Country of Mexico plus any other additional state as required by the Owner.

D. Processing Times

1. The PARCS shall achieve the allowable processing times listed below:

a. Report generation for data less than twelve (12) months old: less than fifteen (15) seconds

b. Report generation for data twelve (12) months or older: less than thirty (30) seconds

c. Credit card authorizations sent and returned: less than four (4) seconds, The Contractor shall provide the Owner or Owner's Representative with the speed of connection that is required to allow credit card authorizations to be sent and returned and accounting for 150% increase in transactions. The Owner or

Owner's Representative shall coordinate with the Contractor to increase the available bandwidth as necessary.

    d.   At vehicle entry, the total elapsed time from the point a vehicle triggers the picture capture zone to the point where the LPR Subsystem submits a valid LPN into the database shall not exceed two (2) seconds for any single event.

    e.   At vehicle entry and exit using the HCTRA toll tag, the total elapsed time from the point the toll tag triggers the system zone to the point where the system grants entry/exit shall not exceed two (2) seconds.

    f.   At vehicle exit, the total elapsed time from the point a vehicle triggers the picture capture zone to the point where the LPR Subsystem communicates a successful or unsuccessful correlation message to the exit lane shall not exceed two (2) seconds for any single event.

2.07   SOURCE QUALITY CONTROL

A.   Internal Contractor Tests

    1.   All equipment shall have successfully passed formal manufacturing tests and quality assurance inspections to validate compliance with the Contract prior to the start of the FAT. Records for formal internal Contractor testing and inspection for performance, materials quality and/or workmanship shall be maintained by the Contractor and made available if so requested by the Owner or Owner's Representative prior to the start of any acceptance test.

    2.   Contractor shall have readily available proof of product reliability analysis and testing should reliability become a problem at any time from the beginning of installation testing through the final operational test period.

PART 3 - EXECUTION

3.01   EXAMINATION

A.   Site Verification of Conditions: The Contractor shall verify all existing conditions in the field prior to implementation. In the event that conditions in the field are different from the existing conditions described and shown in the Contract, the Contractor shall notify the Owner or Owner's Representative in writing of the exact differences and shall inform the Owner or Owner's Representative in writing of any implications the differences have on the project.

3.02   INSTALLATION

A.   During implementation and the warranty period, the Owner or Owner's Representative shall attempt to make available to the Contractor an area to serve as an office/work area for the technicians that shall support the system. It is the responsibility of the on-site technicians to keep the office/work area clean and free of all hazards.

B.   Contractor shall follow the appropriate Owner or Owner's Representative security procedures to obtain security badges for all personnel who perform regular work at HAS facilities. Contractor shall be responsible for all fees associated with the badging process. Contractor shall be responsible to maintain badge validity in accordance to the rules and regulations of the Airport's badging office.

C.   During implementation and testing, on-line, real-time communication between the PARCS servers and the Contractor's software support team for supporting and configuring the system is required. This communication shall be via a HAS-provided VPN connection and shall be required to go through the firewall to get onto HAS's network and thence to the PARCS Servers. Contractor shall go through the Owner or Owner's Representative IT clearance process in order to gain VPN access.

D.   Any patches, upgrades, updates, or modifications to the software during the installation period shall require appropriate documentation and approval before the modification is made. Contractor shall propose a change control system for review and approval by Owner or Owner's Representative prior to implementation.

E.   Equipment Installation

1.   The Contractor shall verify that the installation location is prepared and ready to have the installation completed. The Contractor shall notify, in writing, the Owner or Owner's Representative if the Contractor finds that the installation location is not prepared for installation due to unfinished work outside of the Contractor's scope of work. The written notification shall provide detail of the elements that require modification in order to prepare the location for equipment installation.

2.   Entry and Exit Lane Dynamic Displays

a.   HAS intends to reuse the existing Daktronic Dynamic signs.

F.   Disposal of Existing Equipment

1.   The Contractor shall be responsible for removal of all existing equipment with no interference to ongoing revenue activity that is replaced under this project. Contractor shall disassemble, uninstall and transport removed equipment to an off-Airport location. Contractor shall be responsible for repairing any damages that occur to existing components during the removal and transport processes.   The Owner or Owner's Representative will identify any device, equipment, or component that the Owner or Owner's Representative may wish to keep. Contractor shall dispose of this equipment based upon the City of Houston requirements which can be found on the City of Houston web site.

G.   Phasing and Transition Plan

1. A Traffic Control Plan (TCP) has been included with this RFP. The TCP requires the Contractor to provide signs, barricades, and in some cases a flag person to restrict traffic through the lanes during construction.
2. Contractor shall review the TCP/phasing plan and coordinate with HAS and its representatives to make any modifications necessary to provide for a smooth transition to the new PARCS.

3.03 FIELD QUALITY CONTROL

A. Acceptance testing shall serve to verify the functional performance of the PARCS and its components to ensure adherence to these Functional Specifications. The Acceptance testing process shall not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning system that meets all requirements of these Functional Specifications. Each application software package, firmware, and hardware equipment component delivered by the Contractor shall undergo acceptance testing as part of the installation process.

1. Factory Acceptance Test (FAT)
2. Lane Acceptance Test (LAT)
3. Site Acceptance Test (SAT)
4. Operational Demonstration Test (ODT)

B. The Contractor shall construct a complete test environment with a minimum of one of each piece of equipment being installed in the final system. All of the test equipment shall feature the same version of hardware and firmware that will be installed in the final system. The Contractor shall construct the complete test environment so that it is capable of all functionality as described in this specification. The test environment shall be installed on HAS property in a location that HAS will provide. HAS shall own this test environment and the equipment installed therein and will use this test environment for additional training of personnel as well as testing of software upgrades and patches prior to field implementation. The test environment shall be fully operational prior to the commencement of FAT.

C. Contractor shall provide a movable cart(s) to facilitate the lane testing. Each cart shall replicate a vehicle passing over the inductive loop or activate the alternative vehicle detection system thereby arming the lane equipment. Each cart shall also incorporate a method of mounting test license plates to facilitate the testing of the LPR cameras within each lane.

D. Contractor shall provide a minimum of three-hundred (300) test license plates that are uniquely numbered and represent the current license plates issued by the state of Texas, the contiguous surrounding states, and the county of Mexico.

E. The PARCS shall successfully pass each testing phase before the next testing phase commences. The LATs shall not begin until the FAT has been successfully completed; the Site Acceptance Test shall not begin until all LATs for that facility have been successfully completed; and the ODT shall not begin until all Site Acceptance Tests have been successfully completed. Tests shall

not be excluded or conducted out of sequence without prior written authorization from the Owner or Owner's Representative.

F.   Thirty days prior to the anticipated completion of all LATs for a parking facility's implementation, the Contractor shall submit a written request for starting the Site Acceptance Test. A Site Acceptance Test shall be performed for each individual parking facility after all LATs for that parking facility have been successfully completed. Following successful completion of all Site Acceptance Tests, an ODT shall be conducted to assess the entire PARCS installation as a system.

G.   Factory Acceptance Tests

1.   FATs shall be conducted by the Contractor as a demonstration to the Owner or Owner's Representatives that the installed equipment complies with the Contract, the Contractor's shop drawings, and to other documentation, such as user manuals.

2.   FAT shall be conducted at a site within 15 miles of HAS airport administration offices.

3.   FAT shall be conducted in a simulated environment that represents similar conditions as where the equipment would be installed.

4.   Upon successful completion of the Contractor's test, the Contractor, and the Owner or Owner's Representative shall perform the FAT to verify performance. The FAT shall only be observed by the Owner or Owner's Representative after a fully completed and signed test script verifying successful completion of the Contractor's internal testing is submitted. Signed internal test scripts shall be submitted at least five business days prior to the scheduled test with the Owner or Owner's Representative.

5.   The Contractor shall provide test procedure documents for FATs in accordance to the submittal guidelines. FAT Test Procedures Documents shall be provided for each lane type or device type and test procedures shall include the following sections:

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, exceptions tickets, credit cards, transponders, equipment keys, etc.);
d.   checklist for the components of each lane or device;
e.   signature page for all LAT participants' signatures;
f.   step by step instructions for testing each functionality;
g.   tests for all patron processing procedures;
h.   tests to ensure that the proper rate structures are being used;
i.   tests for verifying the reporting requirements;
j.   area within each test section to denote "pass" or "fail"; and
k.   section for listing and describing test deviations.

6.   The FAT shall be considered successfully completed when all components have passed their respective test procedures and all test documents have been signed by the Owner or Owner's Representative and Contractor. Minor deviations resulting in the creation of punch list items shall not be considered grounds for failure of the overall FAT. Major deviations found during the FAT shall result in the retest of the equipment. The Contractor shall agree to credit the Owner or Owner's Representative from its total contract value for any travel and/or labor costs incurred by the Owner or Owner's Representative as a result of retesting a failed lane.

H.   Lane Acceptance Tests

1.   LATs shall be conducted by the Contractor as a demonstration to the Owner or Owner's Representatives that the installed equipment complies with the Contract, the Contractor's shop drawings, and to other documentation, such as user manuals.

2.   After successful completion of the FAT the equipment, software, and subsystems may be installed at the Airport, based on an Owner or Owner's Representative -approved schedule. When a lane installation has been completed, the Contractor shall conduct its internal testing of the installed equipment. Internal testing shall follow the identical LAT test procedures that shall be used during LATs observed by the Owner or Owner's Representative.

3.   Upon successful completion of the Contractor's test, the Contractor, and the Owner or Owner's Representative shall perform the LAT to verify performance. The LAT shall only be observed by the Owner or Owner's Representative after a fully completed and signed test script verifying successful completion of the Contractor's internal testing is submitted. Signed internal test scripts shall be submitted at least five business days prior to the scheduled test with the Owner or Owner's Representative.

4.   LATs shall be conducted at the Airport for each entry lane, exit lane and PARCS. The Contractor shall not activate any entry/exit lane for service until its LAT has been successfully completed, and the Owner or Owner's Representative has notified the Contractor that it is ready to put the equipment in operation.

5.   The Contractor shall provide test procedure documents for LATs in accordance to the submittal guidelines. LAT Test Procedures Documents shall be provided for each lane type or device type and test procedures shall include the following sections:

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, exceptions tickets, credit cards, transponders, equipment keys, etc.);

  d. checklist for the components of each lane or device;

  e. signature page for all LAT participants' signatures;

  f. step by step instructions for testing each functionality;

  g. tests for all patron processing procedures;

  h. tests to ensure that the proper rate structures are being used;

  i. tests for verifying the reporting requirements;

  j. area within each test section to denote "pass" or "fail"; and

  k. section for listing and describing test deviations.

6. The Contractor shall provide all ancillary items necessary to complete the LATs 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. In addition, the Contractor shall make available sufficient personnel to perform the LAT in an efficient and timely manner.

7. The LAT shall be considered successfully completed when all components have passed their respective test procedures and all test documents have been signed by the Owner or Owner's Representative and Contractor. Minor deviations resulting in the creation of punch list items shall not be considered grounds for failure of the overall LAT. Major deviations found during the LAT shall result in the retest of the lane. The Contractor shall agree to credit the Owner or Owner's Representative from its total contract value for any travel and/or labor costs incurred by the Owner or Owner's Representative as a result of retesting a failed lane.

I. Site Acceptance Tests

1. The Site Acceptance Tests shall test each parking facility's equipment installation as a system, e.g., all entry lanes, exit lanes, communication to the workstations, PARCS, and Servers. The Site Acceptance Test is a pass/fail test that relies upon the operation and status of equipment and system reports of an individual facility. The Owner or Owner's Representative and the Contractor shall collectively select an "initial start-up date" for each Site Acceptance Test. Site Acceptance Tests shall run for seven days beginning at the initial start-up date and continuing for seven consecutive 24-hour periods with no major deviations. Site Acceptance Tests shall be performed for each individual facility only after all LATs in a parking facility have been successfully completed.

2. During a Site Acceptance Test only routine maintenance procedures, as defined by the preventive maintenance manual and according to industry standards, shall be permitted. All other maintenance procedures shall be approved in writing by the Owner or Owner's Representative before they

are performed; otherwise, they shall constitute a failure of the Site Acceptance Test and a mandatory restart.

3.   The Owner or Owner's Representative reserves the right to be present for all maintenance services during the Site Acceptance Tests.

4.   The Contractor shall submit a Site Acceptance Test Procedures Document in accordance with the submittal requirements. Site Acceptance Test Procedures Documents are intended to outline procedures for monitoring the overall performance of the PARCS and shall not include test procedures for individual lanes or components. The Site Acceptance Test Procedures Document shall include:

     a.   narrative describing the general procedures to be followed;
     b.   methodology for calculation of downtime for the various PARCS components; and
     c.   electronic tracking document to be used during the Site Acceptance Test period for documenting failures and downtime.

5.   The performance criteria for successful completion of the Site Acceptance Test shall include:

     a.   All subsystems listed below shall be operationally available 100% of the time during the seven-day test period:

          1) Application Server
          2) Data Server
          3) Credit card authorization system
          4) Data communication system
          5) PARCS Workstations
          6) Entry Lane
          7) Exit Lane
          8) LPR System
          9) LPI System
          10) Internal cameras
          11) Signs
          12) Barcode readers
          13) Intercom System

     b.   If any single component fails the seven-day test shall halt and start over upon the replacement or correction of the problem.

6.   In addition to the comprehensive reports generated during the Site Acceptance Tests, the Contractor shall provide to the Owner or Owner's Representative a one-page summary report that clearly provides the overall percentage of system downtime, causes of that down time, and any incidental cost incurred during each test.

7. The Contractor shall provide to the Owner or Owner's Representative a corrective action report that provides a detailed description of each failure that occurs during each Site Acceptance Test. The corrective action report shall include the type of failure, why the failure occurred, what was done to remedy the failure, and whether or not the failure resulted in a restart of the Site Acceptance Test.

8. All reports shall be 100% accurate and be reconcilable against each other for the seven day testing period otherwise the test shall be deemed a failure, problems shall be corrected, and the test shall be restarted from the beginning.

J. Operational Demonstration Test (ODT)

1. The ODT shall be comprised of all equipment, systems, and subsystems performing under actual conditions, e.g., patron use, normal activity recording, and reporting procedures. This ODT shall demonstrate, over a period of thirty (30) consecutive calendar days, the successful performance of all aspects of the PARCS.

2. During the ODT only routine maintenance procedures, as defined by the preventive maintenance manual and according to industry standards, shall be permitted. All other maintenance procedures shall be approved in writing by the Owner or Owner's Representative before they are performed; otherwise, they shall constitute a failure of the ODT and a mandatory restart.

3. The Owner or Owner's Representative reserves the right to be present for all maintenance services during the ODT.

4. For purposes of the ODT, a subsystem is defined to be any one of the following:

   a. Application Servers
   b. Data Servers
   c. Credit card authorization system
   d. Data communication system
   e. PARCS Workstations
   f. Entry Lane
   g. Exit Lane
   h. LPR System
   i. LPI System
   j. Barcode readers
   k. Signs
   l. Intercom System

5. The ODT shall begin after all facilities have successfully completed their respective Site Acceptance Tests on a date mutually selected and agreed to in writing by the Owner or Owner's Representative and the Contractor

at a time designated by the Owner or Owner's Representative. The ODT monitors system performance of the entire system operating as a single unit. The Contractor shall submit an ODT Test Procedures Document in accordance with the submittal requirements. ODT Test Procedures Documents are intended to outline procedures for monitoring the overall performance of the PARCS and shall not include test procedures for individual lanes or components. The ODT Test Procedures Document shall include:

    a.   narrative describing the general procedures to be followed;

    b.   methodology for calculation of downtime for the various PARCS components; and

    c.   electronic tracking document to be used during the ODT period for documenting failures and downtime.

6.   The ODT shall continue for thirty (30) consecutive twenty-four (24) hour periods during which all the performance criteria, stated below, shall have been met. If during the thirty (30) day period the system fails to meet any one of the following specified performance criteria, the test shall begin anew on a day agreed upon by the Owner or Owner's Representative and the Contractor. The Contractor shall agree to credit the Owner or Owner's Representative from its total contract value for any travel and/or labor costs incurred by the Owner or Owner's Representative as a result of retesting the system.

7.   The performance criteria for successful completion of the ODT shall include:

    a.   No individual subsystem shall be operationally unavailable for four or more hours cumulative during the thirty (30) day test period.

    b.   No individual subsystem shall be operationally unavailable for more than two consecutive hours.

    c.   If any single component fails more than once during the thirty (30) day period for the same reason, it shall be replaced upon the second failure with a newly manufactured component of the same type and the test shall continue.

    d.   No component of a given type (e.g., cashier station, exit station, barrier gate, entry station, etc.) shall fail more than three times during the thirty (30) day test period for the same reason. Upon the fourth failure all components of that type shall be replaced to correct the common deficiency, and the test shall be restarted from the beginning.

8.   In addition to the comprehensive reports generated during the ODT, the Contractor shall provide to the Owner or Owner's Representative a one-page summary report that clearly provides the overall percentage of system downtime and causes of that down time.

9. The Contractor shall provide to the Owner or Owner's Representative a corrective action report that provides a detailed description of each failure that occurs during the ODT. The corrective action report shall include the type of failure, why the failure occurred, what was done to remedy the failure, and whether or not the failure resulted in a restart of the ODT.

10. All reports shall be one hundred (100%) percent accurate and can be reconciled against one another over the thirty (30) day testing period, otherwise the test shall be deemed a failure, problems shall be corrected and the test restarted.

11. A subsystem shall be considered unavailable as long as any major component of the subsystem is not functioning. As an example, the major components of an entry lane include but are not limited to:

    a. Lane Open/Closed Signs
    b. Vehicle detector devices
    c. Intercom
    d. Barrier gate
    e. Entry Station
    f. PARCSC devices – sensors and signs
    g. LPR Camera
    h. EZTag or RFID reader
    i. Data communication
    j. Power supply

12. An inoperative subsystem shall not be deemed unavailable if it has become inoperative because of:

    a. malicious damage or vandalism to a component(s) by employees, patrons or others;
    b. routine parking operational issues such as excessive ticket jams defined as one lane experiencing more than 10% more ticket jams than any other lanes during any 24-hour period;
    c. network connectivity issues beyond the PARCS;
    d. PARCS failures due to Owner or Owner's Representative provided equipment issues and/or failures;
    e. failures caused by a 3rd party; or
    f. Act of God.

13. Should a failure occur in the system that is caused by normal hardware failure, it shall be repaired and the test resumed with downtime accrued. Where the failure causes inadequate test data to be collected or a loss of test data, then the test shall be restarted from a point where it can be successfully completed with data to verify compliance with the Contract and the test procedures document.

14. If the system "crashes" during a test, then the test shall be stopped. "Crash" is defined as a failure in which the PARCS cannot properly

process revenue transactions. The Contractor shall analyze the cause of the system "crash," document the cause in a system problem report, responsively repair the flaw, and document the repair in a corrective action report.

15. Where corrective action impacts delivered documentation, the documentation shall be corrected prior to final acceptance. Only after Contractor has repaired flaw and Owner or Owner's Representative accepts corrective action and the flaw report can the test be restarted.

16. Upon formal written approval of the corrective action report by the Owner or Owner's Representative, testing may continue if a problem has been encountered as long as the Contractor can clearly demonstrate that the failure is associated only with one function of the system, corrective action has been taken to remedy the failure, and the corrective action shall not impact other areas of the system.

17. Where the system does not perform a function or incorrectly performs the function but the system does not crash, testing may continue, as long as the function is corrected and all of the following conditions are met:

   a. the functionality of entry/exit lanes and parking time works properly according to the Contract,
   b. the functionality of parking fee calculations and correct collection works according to the Contract;
   c. no personnel, vehicle or driver safety issues exist;
   d. transactional archiving operates in accordance with the Contract;
   e. failure does not cause loss or contamination of transactional data; and
   f. all reports balance and are 100% accurate.

18. Where the above criteria are not met, the test shall be stopped and corrective action taken and verified prior to testing restart.

19. During the test, the continued availability of the system shall be demonstrated. Where a failure occurs that causes data loss, system instability (crash), and/or contamination of the transactional data and the database, the Contractor shall immediately correct the problem. Testing shall continue until a consecutive 30 day period of stable operation is achieved. Stability is defined as the proper functioning of the PARCS with a failure having no impact on the continued system operation or on the integrity of transactional data.

K. Punch List

1. Starting with the first week after completing the FAT through final system acceptance, the Contractor shall submit a document on a weekly basis showing the status of all outstanding system issues, regardless of severity, including the plan for resolution and estimated completion date.

L.   Final System Acceptance

1.   Final System Acceptance will be submitted by the Owner or Owner's
Representative, in writing to the Contractor, upon successful completion
of the FAT, all LATs, all Site Acceptance Tests, the ODT, upon
verification by the Owner or Owner's Representative of complete
resolution of all outstanding items on the punch list, receipt of detailed
Record Drawings, and independent validation that the installed system is
PCI-DSS compliant.

3.04   INSTRUCTION AND TRAINING

A.   Submit a Training Plan with proposed instruction schedule as part of the system
design review. The Owner shall tentatively approve or suggest changes to the
training schedule at that time. Fourteen calendar days prior to each instruction
session, the Contractor shall submit a training plan of where and how training
sessions are conducted, a copy of the instruction materials, equipment needed
and provided, and approximate duration of the session. Ample time shall be
allotted within each session for the Contractor to fully describe and demonstrate
all aspects of the PARCS, and allow Owner personnel to have hands-on
experience with the PARCS.

B.   The Contractor shall instruct the Owner's designated staff in the operation,
adjustment, and maintenance of all products, equipment and systems.

C.   Contractor shall provide factory training and certification of HAS maintenance
technicians for Level-1 and Level-2 maintenance.

D.   Contractor shall coordinate schedule for training with the Owner to avoid conflicts
and peak period personnel demands. Contractor shall submit a schedule during
design review and Owner will tentatively approve or suggest changes.

E.   Contractor shall submit and outline of all training materials and approximate time
of training sessions. Contractor shall provide plenty of time to demonstrate, train
and let operators have hands-on experience with PARCS.

F.   The instructor shall speak fluent English in a clear and precise manner.

G.   The class material shall include schematics and description of the equipment.
The Contractor shall provide all documentation necessary to instruct the Owner's
personnel. The Owner remains the right to copy and distribute material for
internal use only.

H.   The Contractor shall submit a user's manual with every instruction in the course.
The Contractor shall submit a hardcopy and electronic copies (.PDF on a CD-
ROM, DVD, or USB thumb drive) to the Owner. The manual shall be written in
English with appropriate photos, diagrams and schematics to supplement the
text.

I.   Contractor shall provide two temporary cashier stations for training purposes.

J.   Training classes shall be provided in the following groups:

    a.   Cashiers
    b.   Supervisors
    c.   Auditors and accounting personnel
    d.   HAS staff and Administrators
    e.   Command Center staff for image review
    f.   Maintenance technician training

PART 4 - PRE-BOOKING/RESERVATION SYSTEM

A.   The objectives of the Pre-Booking/Reservation system include, but are not limited to:

    1.   Patron

        a.   Account creation
        b.   Reserve and pay for a parking space prior to travel.
        c.   Modify or cancel a booking
        d.   Print receipt
        e.   Communications to and from patrons

    2.   Administration

        a.   Modifications of web images, scripts, email messages, etc.
        b.   Set-up, deploy and present new products.
        c.   Space allocation and occupancy controls
        d.   Pricing rules and the deployment of yield management principles
        e.   Provides cross sell and upsell opportunities
        f.   Integration of patrons into loyalty program(s)
        g.   Export data in commonly used tools for CRM, research, email marketing, and social media marketing.
        h.   Provide marketing opportunities with 3rd parties such as concessionaires.

    3.   Third-party sales and Integrations – Describe the ability to accommodate parking sales through third parties, including, but not limited to:

        a.   Types of customers that can be accommodated, e.g. airlines, travel entities and corporate customers
        b.   How multiple brands are addressed
        c.   How customer-specific products are defined, limited or controlled
        d.   How product and price changes roll out (or not) across channels
        e.   What reports and tools are available to the customer and to the airport to track transactions and revenues and control occupancy across various channels
        f.   Where the proposed API has been used by other similar projects in the past, including integrations with apps and websites.
        g.   Provide examples of, how Vendor approaches and embraces

new technologies and its impacts.

4. Payment and Audit - Describe the payment options and processes, as well as the audit and tracking of payments, including but not limited to:

    a. Available payment options, including credit cards, google/android pay, PayPal, etc.
    b. Existing payment relationships in the USA
    c. Integration costs and timelines to integrate with new payment clearinghouses or banks
    d. Implementation of 1-click payment and stored credit cards
    e. End to end audit trail of payments and transaction matching
    f. Refunds

5. Security - Describe security features, including but not limited to:

    a. Secure Hosted solution:
        - Provide real-time transaction processing
        - Hosted servers shall be refreshed or upgraded to current server hardware technology every three (3) years, at a minimum
        - The operating software shall be refreshed or upgraded to the current software versions when each software versions is released by its supplier
        - The servers shall be housed in a secure location with state of the art security that meets or exceeds current or future PA DSS/PCI requirements.
        - The server(s) location shall incorporate the most advanced environmental requirements including HVAC, power backup generation, lightning protection, weather related protection, fire detection and firefighting equipment.
        - All HAS data shall be stored separately from all other hosted clients that will facilitate migration to a third-party solution should Parking Reservation and Yield Management Supplier cease business
    b. Provision of administrative permissions, e.g. administrator, super user, etc.
    c. Tracking and audit of users and changes made by users
    d. Safeguarding of customer and payment details
    e. PCI compliance and certification
    f. Provide a network / server architecture diagram and a PCI data flow diagram to display points of encryption and PCI data in flight and at rest

6. Reporting - Describe the Reporting function including, but not limited to:

      a.   Any summary reports

      b.   Visual aids such as graphs, tables and dashboards

      c.   Customer details

      d.   Transactions and revenue reports by time period and by product and offer

      e.   Analytics and projections

      f.   Standard reports and customer defined reports

      g.   Provide examples of key reports

B.   Required Features – The Pre-Booking System shall provide the following features:

1.   The booking process must involve the minimum number of clicks possible. A clear, visible booking path with progress marker and a pinned booking summary across pages are preferred.

2.   The ability to integrate through single sign-on (SSO)

3.   The System should facilitate third-party sales, such as parking sold through travel agents, airlines or other partners, and parking sold to corporate customers. As such, the system should be able to accommodate specific products and differential pricing for these customers and provide discounts and commissions with the associated reporting both for the third-party and for the airport to track transactions and revenues. Controlling inventory by product is required.

4.   The systems shall clone products and pricing using shortcuts across multiple channels.

5.   Authorized and trained HAS staff or designated third parties, shall set up, change or remove parking products for specific car parks. They shall easily set and adjust prices, availability and business rules around parking products. Any changes shall provide immediate implementation on the system. Owner should also be able to create a long range (e.g. 365 days) pricing calendar, and nominate prices that vary by multiple criteria, including booking days of the week, dates and times, time in advance of booking, occupancy rate and so forth.

6.   The branding of the System shall be adapted and customized to meet the ever-evolving requirements of Owner. Content management shall be easily accessible to trained staff, including scripts, digital images, promotional forms, confirmation emails and SMS messages, etc.

7.   The solution shall include a comprehensive suite of reports and also include provide customizable reports

8.   The system shall perform data exports in selectable formats, e.g. csv or MS Excel to other systems, including any Business Intelligence database – for data analysis purposes, at standard and programmed dates and times.

9. It is critical that the System provide a sophisticated and powerful reporting and data analytics functionality to enable the deployment and implementation of nimble yield management strategies. This capability should include comparison activity to prior years, to make projections, to automate certain responses to occupancy levels and so forth.

10. The System shall allow the export of customer details to commonly used customer relationship management (CRM) systems, email marketing programs, online research programs, and social media marketing platforms.

11. The system shall facilitate or integrate with online promotions, vouchers and coupons.

12. The System shall integrate with, or be accessible by, Operations such that any access or payment issues may be addressed by authorized personnel in the Control Room or onsite.

13. The System shall provide a reasonable accommodation for customers arriving or departing at times that do not align exactly with the times provided in the reservation, such as an entry grace period and the ability to pay for overstays at the exit plaza.

14. The System shall provide a customer loyalty program that may be customized to Owner's specifications.

15. The System shall download information from the system at any time and in a format suitable for editing and sorting, customer email addresses such that Owner can automatically issue promotions and special offers, welcome home emails, survey, market research, major event notification, e.g. airport or parking lots and decks closure notice, to selectable customers as a standard function.

16. The solution shall identify email addresses of customers who have 'opted in' and to exclude all other email addresses from such lists.

17. The System shall utilize online customer surveys at the end of the booking reservation or as part of a follow-up contact

18. Shall allow for a corporate accounts function which accepts multiple bookings made with a single bank card, multiple bank cards, or invoice – and using multiple credentials and/or multiple bank cards as identifiers.

19. Provide Single-use promotion codes to customers. Each code shall expire/become invalid immediately upon use.

20. Undertake email promotions including a link to discounted rates for prescribed dates/times and customer groups

21. The system shall maintain a history of previous prices and promotions via download or system integration.

22. System upgrades shall not over-write existing code; system shall have a robust disaster recovery plan.

23. Set price according to the length of stay.

24. Support increasing or decreasing hourly based pricing based upon forecast demand.
25. Support establishing pricing for a specific parking facility or future date.
26. Support "lead time pricing" to modify price based upon when the patron books the reservation, i.e. the closer the time is to the reservation, the higher the price
27. Support congestion based pricing to modify price based upon utilization.
28. Support additional pricing options.
29. Provide upgrade and cross selling opportunities.
30. Support the management of promotional opportunities, such as, but not limited to:

   a. Park for 7 days and receive the 8th day free
   b. Park at ABC Ramp and receive the pricing of DEF Garage.
   c. One-time use code.
   d. Multi-use code.

31. Commercial relationships with partners for the issuance of promotion codes.
32. Allow HAS to manage the time-period of the booking.
33. Provide a tool to transmit a message to the patron offering an upgrade or promotion, such as:

   a. Move the client to an underused facility.
   b. Offer a discounted price to move to a different facility.
   c. Offer an upgrade or other promotion.

C. IMPLEMENTATION – the successful Proposer shall:

1. PLAN: Ascertain detailed implementation requirements and constraints and document an implementation plan and refined work breakdown structure (WBS) with corresponding task descriptions, roles & responsibilities, and schedule

   a. Contractor shall interview stakeholders and ascertain all the requirements associated with deploying a successful Pre-Booking System. Owner shall review a draft of the Implementation plan and provide feedback to the Contractor, to finalize.

2. MOBILIZE: Install, configure and integrate software.

   a. The Company shall procure, install, and configure all required software set forth in this RFP. Installation will initially be done in

a pre-production environment support design, build, integration, testing, etc., prior to deployment of the operational system.

3.   DESIGN: Customize and integrate with close involvement from stakeholders to determine how it will be displayed for each of the following assets: Website, and Mobile Applications

    a.   The Company shall develop and submit graphical design themes Owner brand guidelines or other design criteria. Consistency in color and style must be achieved within Owner's branding standards. Owner will provide direction for the approved template theme.

    b.   All font sizes, contrast of text to background colors, color coding (if enabled) must conform to ADA guidelines.

    c.   The Contractor shall be responsible for implementing all aspects of final approved design**.**

4.   BUILD: Customize, configure, integrate and implement the designed and approved System.

    a.   Once the designs are approved, the Contractor shall begin to customize the System.

    b.   During the Design/Implementation phase, the Contractor shall install a test environment and a similar production environment.

    c.   All builds (software versions) shall be done in the test environment and shall not be moved into the production environment until express written consent has been granted by Owner.

5.   TEST: Integrated testing in a simulated environment. The Test environment must exist for the term of the Contract.

    a.   The Company is to develop a step-by-step testing procedure with checklist and pass/fail/comments columns, to inspect/test all functionality, and interoperability of the System, per the developed specifications and design.

    b.   Owner will review the test procedure and provide feedback for the Contractor to incorporate as needed. The Contractor shall use this test procedure to perform QC/QA testing. Owner reserves the right to modify test procedures if required or desirable.

    c.   A punch list will be created as an extension to the test procedure and the Contractor shall correct any inaccuracies, contradictions, and issues with functionality and/or interoperability, etc. Test process shall repeat as needed until Owner accepts the System.

    d.   The testing procedure shall be submitted to HAS for review and approval 45 days prior to the implementation of the test.

6.   DOCUMENT: Document all system configurations, interfaces, processes and procedures

a. The Contractor shall develop and submit "As-Built" documentation describing the detailed configuration, content, and integration interfaces of the System which passed acceptance testing.

b. The Contractor shall document complete processes and procedures for operating, maintaining, updating/modifying content, back-ups, fail-over, archiving, upgrading, and interfacing with other systems. This documentation will constitute the Operations & Maintenance (O&M) manual for administration of the System.

7. DEPLOY: Deploy the operational integrated System in the production environment across facilities in a non-disruptive, seamless phased transition.

a. It is expected that the system will roll out sequentially across lots as the new PARCS is installed. Company must provide HAS a detailed Implementation plan to ensure minimal customer impact and operational disruption.

8. SUSTAIN: Maintain and support

a. O&M software support shall cover all software, systems, integrations, and content issues arising during the term of the Contract.

b. Support services as detailed below;

(1) The provision of a 24-hour x 7-day support facility via portal, phone line, or combination over the period, to act as entry point to support. This will be the single point of contact for online parking pre- booking and pre-payment system related incidents and requests

(2) Interaction with internal technical and business departments and other 3rd parties required to resolve incidents

(3) A mechanism for the engagement of internal departments and 3rd party suppliers in the resolution of incidents where such engagement is diagnosed as required due to the nature of the incident

(4) Ownership and management of communication in regard to online parking pre-booking and pre- payment system related incidents and problems

(5) Deployment of fixes and new functionality into the test environment

(6) Deployment of fixes and new or upgraded functionality sometimes provided by 3rd party suppliers, into the live environment under strict production system change control procedures. This relates to system/database changes rather than content changes.

(7) Maintenance of a documented configuration of the online parking pre-booking and pre-payment system

configuration with the existing configuration audit acting as the baseline

      (8)   Maintenance of a consistent test environment that accurately reflects the live online parking pre- booking and pre-payment service.

      (9)   Proactive monitoring and alerting on the live environment and its interfaces to ensure the availability of online parking pre-booking and pre-payment system functionality and data to Owner and the public.

      (10)   Secure and controlled support delivery.

      (11)   Strategic and tactical advice on online parking pre-booking and pre-payment service trends in technology and function.

      (12)   Transition management where required

c.   Contractor shall be responsible for managing software support as needed. Software vendors should not be proposed that do not offer the required support availability as set forth in the Contract.

d.   Complete hard and soft copy sets of system and user manuals in English to include all information and instructions necessary to ensure smooth delivery of the required service.

e.   Training for system at deployment and ongoing as needed based on system updates. On-site training to be provided prior to deployment.

f.   The company shall provide development services encompassing full life-cycle delivery (planning, analysis, design, build and test, user acceptance testing, deployment) of new functionality and related technologies (excluding hardware, operating system, network) into the online parking pre-booking and pre-payment system environment covering;

      (1)   Development of additional websites and smart phone apps

      (2)   Enhancement of existing online parking pre-booking and pre-payment service functionality

      (3)   Integration development

      (4)   Database enhancement

      (5)   Additional e-commerce functionality

      (6)   B2B functionality between Owner and 3rd party business partners

      (7)   Secure and controlled development environment and process

h.   Customer details

i.   Transactions and revenue reports by time period and by product and offer

j.   Analytics and projections

k.   Standard reports and customer defined reports

l.   Provide examples of key reports.

This is the final page of the Functional Specifications