

## **SECTION 7 – PARKING CONTROL SYSTEMS**

1. Garages shall be designed to permit multi-space meter and pay-on-foot parking systems. While any given garage will initially function under only one mode of operation, the design shall accommodate future changes. Structural components and conduit sleeves that must be embedded in beams and slabs at the time of construction, as required for future modes of operation, shall be included in the initial construction. Only those conduits which cannot be surface mounted at a later date shall be embedded in concrete. Anchor bolts to mount future equipment shall not be provided.
2. Master meter stations if provided, shall be sufficient in number and located so as to facilitate their use. One master meter for every 100 parking spaces has been used on other County garages. They should be well-lighted and protected from the weather, yet be open to view for security purposes. (see sample specifications in Section 7A below).
3. Pay-on-foot operation shall be considered when project program requirements specify this type of operation. (see sample specifications in Section 7B below).

## **SECTION 7A – MULTI-SPACE METER PARKING SYSTEM**

### **7A.1 GENERAL**

- A. The multi-space meter (MSM) parking system must have the ability to be managed and monitored remotely and be capable of operating in a Pay-by-Space, Pay-and-Display, or Pay-by-License Plate mode. MSM units must have a user-friendly interface and be accessible for people with reduced mobility. MSM units must accept payment by notes, coin, credit/debit cards (Visa, Master Card, Discover, and American Express) and smart cards. MSM units must be highly protected against fraudulent access to sensitive data and theft of stored cash revenue.
- B. System Design: This system shall be an un-gated MSM system to accommodate the following:
  1. Parkers who pay for parking on each visit.
  2. Multiple days parking.
  3. Frequent Parkers Program (FPP): Regular users who either prepay or prearrange for payment of parking as well as others authorized to park free in the facility shall use cards to identify themselves to the MSM devices.
  4. Enforcement may generate reports for the entire facility regardless of which machine they choose to extract the report from.
- C. System Configuration: A minimum of one (1) MSM shall be supplied for every 100 parking spaces. A minimum of one (1) MSM shall be supplied in each of the facility's pedestrian portals per level. A pedestrian portal is any area that pedestrians use to enter or exit each level.
- D. System Expansion Requirements: The MSM system shall be easily expandable to accommodate additional features and configurations. Expansion shall include, but not be limited to additional MSM units, pay by cell phone and enforcement software integration.
- E. MSM system must comply with all applicable codes, standards and ADA requirements.

### **7A.2 QUALITY ASSURANCE**

- A. Equipment that incorporates features which minimize maintenance and meet the following maintainability requirements shall be required:

1. Provide for ease of performance verification and failure detection while minimizing effort required for adjustment.
  2. Provide unobstructed access to equipment components.
  3. Minimize requirements for special tools and test equipment.
  4. Provide for easy removal and replacement of components.
- B. System and components shall be provided that have a service life of a minimum of ten years and specify periodic maintenance requirements in the maintenance manual to meet that life expectancy.

### **7A.3 WARRANTY**

- A. General: Equipment and installation (100 percent parts and labor) shall have a one year warranty from the date of final acceptance. The system shall be maintained and serviced against any and all malfunctions due to manufacturing or installation defects at no cost to the County during warranty period. Maintenance shall include preventive maintenance per manufacturer's recommendations, or as necessary to keep equipment in good working order. Contractor shall be responsible for performing all maintenance and repair during the warranty period, including all preventive maintenance and minor repair tasks. Software support shall also be provided during the warranty period. Contractor shall keep a log of all maintenance, preventive maintenance and repair work performed under warranty to be given to the County at the end of the warranty period.
- B. Warranty Period: Warranty period shall begin after Contractor has demonstrated satisfactory performance of completed MSM system as described in Section 7A.8 – Test and Acceptance Program.
- C. Response: Warranty response period shall be five days per week, 12 hours per day excluding County holidays. Response time from initiation of trouble call to on-site response of qualified service technician must not exceed four hours.
- D. Repair: Contractor shall repair or replace all defective or damaged items delivered under contract by end of calendar day following day on which notice was given by the County. Contractor may elect to have any replaced item returned to manufacturer at no additional expense to the County. If Contractor is not available, County personnel or staff may affect repairs. Contractor shall then reimburse the County for parts and labor necessary to correct deficiencies as defined within warranty clause and time. Contractor shall pre-qualify appropriate County personnel to affect repairs and identify the types of repair each trained individual is qualified to perform after training of County personnel.

### **7A.4 SITE CONDITIONS**

- A. MSM system components shall operate dependably within environmental conditions indigenous to Montgomery County, Maryland in which the MSM system shall be installed. Outdoor equipment shall be capable of operating in the temperature extremes of the geographic area stated. The County will provide "clean" power that for the purposes of the project shall be defined as 115 VAC +/- 10% and 60 Hz from circuits dedicated to the MSM system. The Contractor shall provide any additional power conditioning required for the operation of the system as described herein. Equipment layout shall be in strict accordance with manufacturer's recommendations to allow proper movement of air through and around equipment.

### **7A.5 EQUIPMENT AND PERFORMANCE REQUIREMENTS**

- A. A complete operational MSM parking system with all necessary components shall be provided. It is the MSM Contractor's SOLE RESPONSIBILITY to provide every component necessary for a complete functioning system.

- B. The County shall be provided with two sets of keys for each piece of equipment with locks and two sets of master keys. Keys shall be unique to this parking equipment:
- C. Spare Components: The following spare components shall be provided, complete and ready to use, prior to commencement of operational testing. The Contractor shall maintain inventory of spare components at this level as components are used during the warranty period. After expiration of the warranty period, the County will pay for replacement of parts as used from this inventory.
  - 1. One Receipt Printer unit
  - 2. One Card Reader head
  - 3. One Note Acceptor
  - 4. One Bill Validator
  - 5. One Key Pad
  - 6. 50 rolls paper for each MSM

## **D. Hardware**

### **1. Cabinet and Pedestal**

- a. Cabinets and pedestals must be fabricated of a material that is strong and durable such as, but not limited to, stainless steel, aluminum alloy, or 12-gauge zinc-coated steel. Pedestal anchor bolts cannot be exposed outside the pedestal.
- b. Pay station should be available in a range of custom colors upon request and with the option for customized decals.
- c. In general, the cabinet must have an aesthetically pleasing design that is easily recognizable as parking related.

### **2. Physical Security and Lock**

- a. Separate compartments for maintenance and collections. There shall be no access to the money in the cash box when the pay station is open for maintenance or collections.
- b. Vandal-resistant with recessed hinges.
- c. Locks must have programmable keys. Optional electronic locks for maintenance and cash vault compartment doors.
- d. No locks can be exposed beyond the flush mount of the cabinet.
- e. Pay station must have vibration and shock sensing audible alarms.
- f. All pay station doors must be equipped with sensors that will send a notification, in real-time, to the back-office software alerting to doors being opened or closed.
- g. Cash Status, Audit Report, Stall Reports, and Revenue Reports must all be printable at the pay station without opening the cabinet door; password protection to reports is mandatory.

### **3. LCD Display**

- a. The pay station must have a color LCD screen, which is easy to read in various lighting conditions.
- b. All instructions and rates are to be provided through the LCD display, eliminating the need for external signage.
- c. The screen must be recessed and protected by a Lexan cover.
- d. The screen must be vandal-resistant, weatherproof, and corrosion-resistant.
- e. The screen must be modular and easily unplugged and replaced with basic tools for easy servicing.
- f. The LCD must have the ability to display at least five menu or rate options simultaneously.

- g. The LCD must be able to display a color graphic and/or photograph or message for a user-defined amount of time when the pay station is turned on.
- h. Prompts on the pay station must be user configurable.

#### **4. Keypad**

- a. The pay station must have an alphanumeric, tactile feel keypad.
- b. When a key is pressed, an audible indication must be given to provide feedback to the customer.
- c. The keypad must be vandal-resistant, weatherproof, and corrosion-resistant.
- d. The keypad must be modular and be easily unplugged and removed with basic tools for easy servicing.
- e. The keypad will be used to turn the pay station on when it is in sleep mode.

#### **5. Receipt/Ticket Cup**

- a. The receipt/ticket cup must be protected by a sliding door.

#### **6. Coin Slot**

- a. The pay station should support an automatic coin shutter.
- b. Coin slot shall accept selected U.S. coins through a single slot.

#### **7. Coin Acceptor**

- a. Must be capable of accepting nickels, dimes, quarters, and dollars (both Susan B. Anthony and Sacagawea).
- b. All excess coins are to be channeled to a coin compartment for subsequent removal.
- c. Pay station must have a coin escrow to allow customers to cancel the transaction at any time and have funds returned.
- d. Must reject fraudulent and foreign coins immediately through a coin return cup.
- e. Must be modular construction to allow for easy removal with basic tools.

#### **8. Cash Vault Compartment**

##### **8.1 Coin Canister**

- a. All denominations of coins must be held in a securely locked stainless steel coin canister separate from the maintenance compartment.
- b. The coin canister must have a handle to quickly and easily remove it, and must have a separate key to open it.
- c. The unit must have a self-locking mechanism upon removal from the cabinet to ensure no access to coins.
- d. The coin canister must have a minimum capacity of 1,000 coins.
- e. Maintenance personnel without keys must not be able to remove the metal coin canister.
- f. The unit should support a built-in sensor that sends a notification to the back-office software indicating the unit's removal and insertion.

##### **8.2 Bill Stacker**

- a. All denominations of bills must be held in their own metal vault separate from the maintenance compartment.
- b. The bill stacker must support a 1,000-note stacker.

- c. The bill stacker vault must have a handle to quickly and easily remove it. The unit must be self-sustaining and lockable. A separate key is required to open it.
- d. The unit should support a built-in sensor that sends a notification to the back-office software indicating the unit's removal and insertion.

#### **9. Bill Acceptor**

- a. The bill acceptor must be housed separate from the bill stacker vault.
- b. The bill acceptor must electronically accept U.S. \$1, \$5, \$10, and \$20 or any combination thereof. The ability to determine what bills are accepted must be configurable in the back-office software and loaded onto the pay station manually or remotely through a wireless connection.
- c. The bill acceptor must be four-way and accept bills in any direction (face up or face down).
- d. The bill acceptor must have an acceptance rate of 98 percent for street quality bills. All rejected bills must be returned.
- e. The bill acceptor must be programmable on site for any new bank notes issued by the U.S. Mint.
- f. The bill acceptor must be modular and be easily unplugged and removed with few tools for easy servicing.
- g. Maintenance personnel must be able to clear bill jams without the use of special tools and without accessing the bill stacker vault within five seconds of opening the pay station.

#### **10. Credit Card Reader and Operation**

- a. The CC reader must only partially ingest the card thereby affording the consumer control of the card at all times.
- b. The CC reader must accept and process Visa, MasterCard, Amex, Discover or any combination thereof, and must be configurable via back-office software.
- c. The CC reader must be modular and be easily unplugged and removed with basic tools for easy servicing.
- d. The CC reader must read Tracks 1, 2, and 3 of all magnetic stripe cards conforming to ISO 7810 and 7811.
- e. The CC reader must read and write to chip-based smart cards conforming to ISO 7810 and 7816.
- f. The CC reader must be able to read and write to POM chip-based cards.

#### **11. Transaction Process**

- a. Contractor's software should provide management control and reporting of credit card process via Internet.
- b. System should allow both offline batch credit card processing and online real-time credit card processing.
- c. There should be a simple, one-step process to automatically transfer credit card data to the clearinghouse. No duplicate checks or transfer of data between files or spreadsheets should be required.
- d. The system must process and reconcile transactions with a PCI compliant credit card processor or gateway.
- e. The pay station must be PA-DSS validated.
- f. Credit card/smart card transactions that are declined should automatically populate a file of bad credit cards/smart cards to prevent future acceptance of bad credit cards/smart cards.

- g. Pay station must be capable of being used as a smart card reload station with the ability to check card balances.
- h. Contractor's management software should allow for manual entry of cards into a bad credit card/smart card file. Bad credit cards/smart cards should be prevented from use in any payment machine in the network.
- i. Contractors providing parking equipment to the County must meet the Payment Card Industry (PCI) Compliance standards as Service Provider and Payment Application Data Security Standards (PA-DSS) for all hardware and software proposed. All Contractors must provide a letter from a Qualified Payment Application Security Professional (QPASP) or Visa confirming the successful completion of meeting the latest standards. Contractors must also appear on the Visa Web site to be current for both compliant Service Providers and validated Application Vendors. The provision of voluntary security scan reports and self questionnaires as proof of compliance will not be acceptable. More details on these standards may be found at [www.pcisecuritystandards.org](http://www.pcisecuritystandards.org).

## **12. Printer**

- a. The printer must be a high quality thermal printer with a simple paper path and a reliable cutting edge.
- b. The paper roll must easily be removed and replaced in less than 60 seconds.
- c. The printer must be modular and be easily unplugged and removed with basic tools for easy servicing.
- d. Payment machine should allow report and receipt printing in the field. Payment machine should have capacity of producing at least 2,200 tickets/reports prior to replacing a print roll.

## **13. Receipt Paper**

- a. The receipt paper must have the capability to be pre-printed with customized messages on the back and logo watermarks on the front of the receipt.
- b. The tickets must be heat-, fade-, and curl-resistant, and must be capable of being left on a vehicle dashboard for extended periods of time.
- c. Paper must be 100 percent recyclable.

## **14. Power Operation and Recharging System**

- a. The pay station must operate on battery power with either an AC or solar recharging system for the battery.
- b. If a solar panel is provided, the solar panel is able to be affixed to the pay station, maximizing its exposure to direct sunlight.
- c. The battery must be a minimum of a 12V 33Ah, sealed gel-cell. Describe battery support available in AC or solar power configurations.
- d. A battery voltage check system must be integrated into the pay station cabinet and the voltage of the battery must be determined in less than five seconds either by accessing the pay station or by reviewing real-time updates over the Internet.
- e. The battery storage area must allow the battery to be removed and replaced in less than 60 seconds for servicing.
- f. Describe the pay station's unique power management capabilities.

## **15. Electrical and Electronic Components**

- a. All major components must be modular and be easily unplugged and removed with basic tools for easy servicing.

- b. All electronic connection plugs must be physically differentiated and must only fit one way.

## 16. Temperature Specifications

- a. -4° F to + 140° F (-20° C to +60° C) in non-AC environments; up to 95% relative humidity (non-condensing).
- b. Pay stations shall provide option for heater that can operate on AC power for environmental conditions outside of this temperature range.

## 17. CPU/Black Box

- a. The CPU must be specifically designed for operation with the pay station.
- b. The CPU must be custom designed, built, and supported by the manufacturer.
- c. The CPU must contain Flash memory that can record up to 10,000 transactions to allow data to be preserved when power has been removed.
- d. The CPU must not require a battery backup to preserve memory.
- e. The CPU must be modular and be easily unplugged and removed with basic tools for easy servicing.
- f. The pay station must have a bad card maintenance list that can store up to 16,000 card numbers for offline processing.
- g. To enable seamless additional application integration, the pay station must operate on a standard industry platform or another non-proprietary-based operating system.
- h. The pay station must be able to automatically adjust its internal clock for Daylight Savings Time changes.

## 18. Online Communication

- a. The pay station must be able to support direct Ethernet connection without any additional hardware.
- b. For wireless communication, an optional choice of GSM or CDMA modem must be available.
- c. All quoted communications options must be backed with a reference of a proven existing field installation where the communication method has been shown to be reliable.

## E. Software

### 1. Payment Options

- a. The pay station must support the following payment options:
  - **U.S. bills:** The denominations accepted must be configurable for each pay station.
  - **U.S. coins:** The denomination accepted must be configurable for each pay station.
  - **Credit cards:** Type of credit cards accepted must be configurable for each pay station.
  - **Smart cards:** Must be configurable for each pay station:
    - POM chip-based smart cards
  - **Magnetic stripe-based value cards:**
    - Blackboard, TotalCard, Nuvision
  - **Cell phone payment:** The solution must have an option of paying for parking with cell phone in a Pay-by-Space and Pay-and-Display deployment.
- b. The pay station must have the ability to allow for adding time to the existing time purchased in either Pay-by-Space or Pay-and-Display deployment. For Pay-by-Space and Pay-and-Display

deployment, a PIN number printed on the ticket must be entered when adding time to ensure that only the original parker can add time.

- c. The consumer must be able to pay for any space from any pay station provided the pay stations are online (communicating to the central server).

## **2. Pay-by-Phone Integration**

- a. The solution must have an option to pay for parking with a cell phone in a Pay-by-Space or Pay-by-License Plate deployment. Contractor must identify which Pay-by-Phone partner it integrates with and the integration capabilities that such a partnership brings.
- b. If the initial payment was made at the pay station, the consumer must have the ability to add time through the cell phone.
- c. If the initial payment was made through the cell phone, the consumer must have the ability to add time at the pay station.
- d. If payment was made through the cell phone, the system must be able to notify the consumer through the cell phone prior to expiration of the parking time.
- e. For enforcement purposes, the enforcement officer must be able to print a report at a pay station for valid spaces paid for regardless if they were paid for at the pay station or by cell phone.

## **3. Extend-by-Phone**

- a. The system shall enable consumers to receive text message (SMS) reminders of parking expiry on their mobile phone for transactions initiated at the pay station.
- b. When operating in Pay-by-Space or Pay-by-License Plate mode and when online credit card authorization is used, the system shall provide a means for consumers to extend parking transactions initiated at a pay station by sending a text message from their mobile phone.
  - Parking extensions of this nature shall be reflected in pay station stall or license plate enforcement reports and information presented to enforcement devices and license plate recognition systems.
  - No pre-registration (Web or telephone system) shall be required for consumers to benefit from text message reminders or extensions. They should be able to select this option by providing their mobile phone number at the pay station.
  - Parking extensions shall be charged to the credit card originally used at the pay station.
  - The text message sent by consumers to extend time must be simple and devoid of cryptic syntax. Ideally, the consumer should only have to send the number of minutes to add to the parking session.

## **4. Pay-by-License Plate**

- a. The Pay-by-License Plate system proposed by the Contractor shall fully integrate with the County supplied License Plate Recognition (LPR) enforcement system. Please provide details of LPR enforcement integration partners.
- b. The pay station system back-end shall be able to accept Pay-by-Phone payments and provide the information to the LPR enforcement system.
- c. The parking equipment shall be capable of transferring data in real-time between the pay stations, the central server system, and the LPR enforcement system.
- d. The pay station shall support license plate entry through an alphanumeric keypad.



- e. The Contractor must list all aspects of the management modules available to monitor finance, maintenance, operation, and administration of a Pay-by-License Plate system with the central server system.

## **5. Enforcement**

- a. At the pay station, the enforcement officer must be able to:
- b. Generate Valid Stall reports within the entered stall range regardless of how (pay station or cell phone) and at which machine the spaces were paid for. The report must clearly display the expiration time for each valid space.
- c. Generate an Expired Stall report within entered stall range which clearly displays the spaces that have not been paid.
- d. The County has a goal of integrating Pay-by-Space or Pay-by-License Plate data at the pay station with the County's selected enforcement system for consolidated reporting purposes. The Contractor should identify at least one option where this integration capability can be provided today as well as additional options that might be available in future.
- e. The central server system must be able to integrate with one or more of the leading mobile enforcement providers for real-time stall information. The Contractor must outline all potential partners where integration exists today.

## **6. Management Software Capabilities**

The management software must have the following capabilities:

- a. Ability to set up unlimited amount of pay stations at unlimited amount of parking facilities (depending only on available computer memory).
- b. Password access at the pay station for collection and maintenance personnel.
- c. The ability to set sleep timer mode for the pay station.
- d. The ability to configure the pay station to operate in Pay-by-Space (with a maximum of 99,999 stalls), Pay-and-Display, and/or Pay-by-License Plate environments.
- e. Enable/disable additional time to be added to paid stalls.
- f. Ability to configure credit cards that will be accepted.
- g. Ability to configure smart cards that will be accepted.
- h. Ability to configure magnetic stripe-based value cards that will be accepted.
- i. Ability to restrict payment types on a rate-by-rate basis.
- j. Enable online "real-time" credit card authorization (with Ethernet connection or modem option).
- k. Enable a "Store and Forward" mechanism to process credit cards that are accepted when online communications have been disrupted.
- l. Enable/disable issuance of printed refund slip.
- m. Enable/disable issuance of refund slip for cancelled payment.
- n. Allow a four-line custom message on introduction LCD screen.
- o. Allow for a color BMP image to be displayed on the pay station LCD screen.
- p. Allow a four-line custom message on exit screen.
- q. Allow a four-line custom message on receipt header.
- r. Allow a four-line custom message on receipt footer.
- s. Allow a four-line custom message on refund receipt.

- t. Allow configuration of special stalls (in Pay-by-Space mode) for exclusion from transient parking on specified days and times.
- u. Allow for the remote upload of all rate and configuration parameters to the pay station via the central server at no charge as many times as the operator wishes.

## **7. Standard Rate Capabilities**

Please confirm that the equipment provided can address the following rates desired by the County:

Standard rate capabilities must include:

- a. Rates by the minute, hour, and day.
- b. Different values can be assigned to different hourly increments (for example, first hour at \$0.75; each additional hour thereafter at \$0.60).
- c. Programmable minimum and maximum time periods.
- d. Ability to preset special rate structures up to a year in advance.
- e. One-step uploads of bad credit card/smart card file.
- f. Incremental rates with minimum increment being five minutes.
- g. Ability to set a minimum credit card value for incremental rates.
- h. Ability to provide monthly passes.
- i. Rate descriptions must be user configurable up to 20 characters in length.

## **8. Management Reports**

- a. Contractor should provide samples of all reports to allow for evaluation of reporting features.
- b. The pay station must issue a report from the printer with the following information:
  - Machine serial number
  - Date and time of collection
  - Date and time of previous collection
  - Total amount of money in the collection
  - Total amount of bills by denomination
  - Total amount in coins
  - Total amount of credit card payments by credit card type
  - Total number of tickets issued
  - Total amount of refunds issued
  - Total amount of change issued
  - Pay station firmware version
  - Stall reports showing valid stalls, unpaid stalls, or paid since last stall report
- c. The pay station must issue a report with the history of the machine with the following information:
  - Audit details:
    - Date of the transactions with “from” and “to” parameters
    - Total deposits
    - Overpayments
    - Total transactions
    - First transaction number

- Last transaction number
- d. Revenue detail must have the capability of providing the following information at the pay station:
  - Today's total
  - Last 24 hours total
  - Yesterday's total
  - This month's total
  - Last month's total
  - This year's total
  - Last year's total
  - 3<sup>rd</sup> year back
  - 4<sup>th</sup> year back
  - 5<sup>th</sup> year back
  - History total since commissioning of pay station
- e. In the back-office software, reports must be able to be generated based on the following parameters:
  - Transaction Date
  - Transaction Time
  - Payment Method
  - Rate
  - Pay Station Number
  - Credit card type

## 9. Remote Management

The County would like the Contractor to host remote management options. The capabilities provided through remote management must include the following:

### a. Real-Time Reporting/Pay Station Configuration

Real-time reporting:

- The pay station must provide the ability to generate all of the reports as listed under "Reports" above through any computer with an Internet connection using up-to-date real-time information.

Remote pay station configuration:

- The solution must allow for changes in the rate structure remotely from the office provided the pay stations are online.
- The solution must allow for other changes listed under "Management Software Capabilities" to be configured from a remote PC and capable of being uploaded to the pay station in real-time (with a maximum upload delay of five minutes) provided the pay station is online.

### b. Real-Time Monitoring/Intelligent Dispatch

The pay station must provide, as an option, the ability to monitor at a minimum the following parts and systems and communicate any malfunctions or supply requirements through e-mail or cell phone:

Critical alarms:

- Alarm on
- Shutdown due to low battery power
- Shock from being bumped, tilted, or shaken

Major alarms:

- Coin jam
- Bill acceptor jam
- Bill acceptor unable to stack
- Battery voltage low
- Printer paper low
- Printer paper out

The alarms must be transmitted within 10 seconds of the event occurring at the pay station.

Monitoring:

Items without alarms that may be monitored on a secure Internet connection include:

- Number of coins
- Number of bills
- Battery voltage levels
- Solar charging condition – charging/not charging
- Pay station temperature level
- Pay station humidity levels

**c. Real-Time Credit Card Authorization**

- The pay station must provide, as an option, to have credit cards processed in real-time.
- The unique authorization number received from the credit card clearinghouse must be clearly displayed on the receipt.
- The authorization number must be available in the back-office software to be used as criteria for credit card transaction searches.
- The pay station must be configurable to accept or not accept credit card payment in the event that the communication to the pay station becomes temporarily unavailable.
- Assuming adequate communication signals are in place, real-time credit card authorization must be completed within three seconds typically, and within 10 seconds maximum.
- For online credit card transactions, batch processing of the credit cards at the end of the day is not acceptable.
- The back-end system must allow partial and full refunds of credit card transactions.

**d. Configuration Software Must:**

- Enable manual updates and retrieval of information from each pay station using a portable device such as a USB key.
- Download all configuration and rate table settings.
- Upload all transactional data from the pay station.
- The process to download/upload transactions must be easily done by on-site personnel.
- Contractor should demonstrate adequate security of data through password protection and layered levels of privileges.

## **10. Future Capabilities**

The identification of features that will be available after the equipment is deployed may also be mentioned, but descriptions should clearly state when features will be available for deployment and any hardware upgrades associated with such upgrades.

### **7A.6 COORDINATION**

- A. General: Meet with County, Engineer/Architect, and General Contractor within 30 days of contract award to verify all details of MSM system. Schedule must be achieved with adequate time for installation, testing, and trial period as described herein.
- B. Submittals: Contractor shall provide those responsible for related work with all product and installation submittals as necessary.
- C. Meetings: Meet with General Contractor, before any rough-in work begins, to review building plans as they relate to MSM equipment, to explain details or precautions necessary to assure that all parking equipment shall work properly, and to determine that all required conduits and wiring are properly laid out.
- D. Additional Wiring: Contractor shall provide all additional conduit and wiring which is needed for total system performance.

### **7A.7 INSTALLATION OF MSM SYSTEM**

- A. MSM equipment shall be installed in accordance with manufacturer's recommendations.
- B. Installation and Start-Up: Contractor shall be responsible for installation of all control and communication wiring and Contractor supplied equipment and its interfacing and interconnection with County supplied equipment. The Contractor shall authorize and accept responsibility for application of power to the equipment and initiation of operation, be responsible for running all initial diagnostics and system generation programs necessary to provide a complete working system.

### **7A.8 TEST AND ACCEPTANCE PROGRAM**

- A. General: Format for all system acceptance testing reports shall be submitted to Engineer/Architect and County and must be approved before acceptance of MSM system.
- B. Installation Test Demonstrations: Upon installation of each piece of equipment, an installation test shall be performed. This test shall exercise the equipment in accordance with specific test procedures document required to test every function of equipment. A County representative may witness and/or conduct tests. The Contractor shall notify the County and Engineer/Architect in writing at least one week prior to each official test session. In the event that first test is not successful, the Contractor shall correct noted deficiencies and notify the County and Engineer/Architect, at least two days in advance, that test session is ready to resume. The Contractor shall promptly correct all problems encountered at the Contractor's expense. A schedule of all tests shall be submitted for the County's review and approval. The following specific tests shall be included in installation testing:
- C. Thirty-Day Operational Test and Final Acceptance: Upon completion of all installation tests, demonstrations and training required herein, County or its agents shall operate complete system for test period of thirty days. During this period, following performance standard must be met in order for final acceptance to be issued:
  - 1. All mechanical components must be operational without downtime. For each downtime period of four hours or more, one working day will be added to acceptance cycle.
  - 2. All electronic components must be operational without downtime or programming problems for complete monthly reporting cycle. For each downtime period of more than one hour, but less

than eight hours or less or programming problem that delays report cycle, one working day will be added to acceptance cycle.

3. All test reports must correlate 100% with cash receipts in each fee computer for test period.

## **7A.9 TRAINING PROGRAM**

- A. The Contractor shall develop and implement a comprehensive training program for the County's personnel. Such training program shall be implemented through the use of formal classroom training and/or other forms of training that the Contractor shall propose.
- B. The curriculum shall be designed so that each group of trainees shall be trained in the full repertoire of system commands that they may have to use in the course of performing their designated functions. This training shall be accomplished through the use of lectures, visual presentations, hands-on operation of the equipment, and any materials necessary to perform the job. Each student shall be provided with a complete set of training materials and operating manuals during the training session, which he/she shall retain for use on the job at the completion of training.
- C. The Contractor shall conduct the required training at times and locations coordinated by the County. The County shall make personnel available to receive training. The full complement of training courses shall be conducted over a five day period, as required to accommodate shift personnel. The training shall include, but not be limited to, the following groupings of staff:
  1. Enforcement Officers
  2. Supervisors/Cash Collectors
  3. Maintenance Personnel
  4. System Managers/Administrators
- D. At the conclusion of the maintenance training session(s), the Contractor shall submit to the County a list naming qualified County (or County representative) maintenance personnel. The list shall detail the level of maintenance/repair functions each of the County personnel are qualified to perform.
- E. Training shall consist of the following:
  1. Enforcement Officers shall be trained to operate the MSM.
  2. Supervisors: Supervisors shall be trained to:
    - a. Operate the MSM.
    - b. Perform primary maintenance on MSM components (trouble shoot/replenish supplies).
    - c. Understand any and all system messages provided by the MSM system, including but not limited to alarm messages, indications of attempts to compromise the MSM and explanations of atypical lane activity displayed by the count system, revenue control system.
    - d. Be able to understand the purpose and data contained within any and all reports produced by the MSM system.
    - e. Be able to operate the MSM system.
  3. Maintenance personnel: Maintenance personnel shall be trained to perform primary maintenance on all major components of the system. Additionally, maintenance personnel shall be trained to:
    - i. Replenish all system supplies.
    - ii. Clear jams.
    - iii. Reset the system after a power failure.
    - iv. Replace internal elements such as circuit boards.
    - v. Lubricate and clean internal components.
    - vi. Be certified by the Contractor to perform primary maintenance.
    - vii. Perform all MSM functions.
  4. System Administrators: System Administrators shall have the same basic training as Supervisors. In addition to such training, System Administrators shall be trained to operate the MSM system and to understand statistical reports which reveal trends in revenue generation, facility utilization, and based on information available from the MSM system, to perform checks and balances over actions of Supervisors and their subordinates.

## SECTION 7B – PAY ON FOOT PARKING SYSTEM

### 7B.1 SUMMARY

A. List of Abbreviations:

1. ACS Access Control System
2. APM Automated Payment Machine
3. EV Exit Verifier
4. FMS Facility Management System
5. DSS Data Security Standard
6. ID Identification
7. NEMA National Electrical Manufacturing Association
8. PARCS Parking Access and Revenue Control System
9. PCI Payment Card Industry
10. POF Pay on Foot
11. RCS Revenue Control System
12. ROC Roving Cashier
13. UPS Uninterruptible Power Supply
14. LPR License Plate Recognition

B. This Section includes provision of all material, labor, equipment, services and training necessary to furnish and install fully integrated on-line, real-time PARKING ACCESS AND REVENUE CONTROL SYSTEM (PARCS) that shall function in manner described herein. The PARCS shall include all hardware, software, licenses, installation, training and support services.

C. System Design: This system shall be gated PARCS with the following subsystems:

1. Facility Management System (FMS): Network consisting of server, task or subsystem computers, and workstations that provide on-line monitoring and control of all PARCS devices. Through information generated by system reports, complete FMS shall be capable of:
  - a. Correlating RCS and ACS entries and exits with vehicles present;
  - b. Reconciling time parked with revenue generated;
  - c. Providing independent and consolidated occupancy and activity counts for both RCS and ACS systems; and
  - d. Monitoring all lane equipment.
2. Revenue Control System (RCS): For parkers who pay for parking on each visit, RCS in pay-on-foot (POF) configuration shall be provided.
3. Access Control System (ACS): For regular parkers who will either prepay or prearrange for payment of contract and/or monthly parking, an ACS using proximity reader technology shall be provided. Payment methods include monthly parking, automatic credit card billing, and decrementing prepay. Payment: Made either through automatic credit card charge or through manual payment. These parkers shall bypass ticket/cash payment system.
  - a. Decrementing parkers pay in advance. Their balance is reduced by fee of

actual time parked based on entry and exit time using ACS or by a flat rate every time their ACS is used to enter the facility.

D. Primary components of integrated system shall include:

1. FMS, including software, computers with related monitors, data storage devices and printers.
2. RCS consisting of ticket dispensers, machine-readable fee computers, automatic payment machines (APM), and exit verifiers
3. ACS consisting of proximity card readers, local controller and central computer with software and associated peripherals.
4. Parking barrier gates for gated control points.
5. Roving cashier system consisting of readers along with associated software at exit verifiers.
6. A mass validator as specified herein.

E. Additional components and accessories include:

1. Loops and detectors.
2. Fee displays.
3. Initial supply of operating stock items.
4. Spare components and parts.
5. Drop safes.
6. Intercom stations and master panel.
7. Duress alarms and APM tamper alarms.
8. Electronic signs.
9. Machine-readable validation devices

F. System Configuration:

Entrance and exit lane requirements are based on traffic volumes and facility layout. Number and location of APM units depend on pedestrian volumes and number of pedestrian portals in the facility.

G. Source Code Protection: Provide complete source code for all software and all firmware programs used throughout Parking Access and Revenue Control System. These products shall be held in secure sealed package in escrow at premises of third party. Source Code: Provided in both printed listings and machine-readable media. Separate modules necessary to generate complete working set of binary task images sufficient to operate system in its entirety shall be provided. Prior to sealing, package shall be inspected and contents verified by County or County's designated representative. Source Code: Updated with every system upgrade purchased. County will bear costs for escrow storage of source codes. Source Code: Become property of County under following conditions in order that necessary future changes can be made:

1. Financial insolvency of vendor.
2. Failure of vendor to provide support for product.

## **7B.2 QUALITY ASSURANCE**

A. Allow County and/or its Representative(s) free access to facility(s) at any time to



observe installation process.

- B. Provide seven day notice to County and Engineer/Architect to review completed installation prior to acceptance testing.
- C. Provide equipment incorporating features which minimize maintenance and meet following requirements:
  - 1. Provide for ease of performance verification and failure detection while minimizing effort required for adjustment.
  - 2. Provide unobstructed access to equipment components.
  - 3. Minimize requirements for special tools and test equipment.
  - 4. Provide for easy removal and replacement of components.
- D. Provide system and components that have service life of ten years and specify periodic maintenance requirements in maintenance manual to meet that life expectancy.
- E. If Contractor elects to integrate components from different manufacturers, be responsible for insuring that all specified features are provided and fully operating when system is turned over to County for testing and acceptance.
- F. Be responsible for all software and insure that communications are properly received and sent by all computers and peripheral devices.

### **7.B.3 QUALIFICATIONS**

- A. Contractor/Installer shall:
  - 1. Have continuously worked successfully with equipment manufacturer for minimum of three years.
  - 2. Be approved in writing by PARCS manufacturer(s).
  - 3. Provide in writing proof of vendor/installer certification from manufacturer's training within the last two years.
  - 4. Have manufacturer approved equipment service center in sufficient proximity to respond on-site to service calls within two hours.
  - 5. Use only fiber-certified technicians for fiber installation and connections (if required).

### **7.B.4 WARRANTY**

- A. General: Warrant equipment and installation (100% parts and labor) in each phase for period of two years from date of final acceptance of that phase by County. System: Maintained and serviced against any and all malfunctions due to manufacturing or installation defects at no cost to County during warranty period. Maintenance: Include preventive maintenance per manufacturer's recommendations, or as necessary to keep equipment in good working order. Be responsible for performing all maintenance and repair during warranty period, including all preventive maintenance and minor repair tasks. Software support shall also be provided during warranty period. Keep log of all maintenance, preventive maintenance and repair work performed under warranty to give to County at end of warranty period.
  - 1. Warranty and maintenance coverage is based on the date it is reported to the PARCS vendor/contractor and will survive the service/warranty period if the defect has not been remedied upon completion of the service/warranty period.

- B. Warranty Period: Warranty period shall begin after Contractor has demonstrated satisfactory performance of completed PARCS as specified in Section 7B.15, "Test and Acceptance Program".
- C. Response: Warranty response period shall be Monday through Saturday, 6:00am to 12:00 midnight, six days 18 hours per day including holidays. Response time from initiation of trouble call to on-site response of qualified service technician shall not exceed two hours.
- D. Software: Contractor shall repair or correct software functions required by specifications, even if undiscovered during testing, commissioning or warranty period, including report formatting and data recovery resulting from software deficiencies at no additional cost.
- E. Software Updates: Contractor shall install all commercially-released software updates, patches and upgrades applicable to this system that are released during warranty period at no additional cost.
- F. Repair: Repair or replace all defective or damaged items delivered under contract by end of calendar day following day on which notice was given by County or its agent. Contractor may elect to have any replaced item returned to manufacturer at no additional expense to County. If Contractor is not available, County/operator personnel may effect repairs. Contractor shall then reimburse County for parts and labor necessary to correct deficiencies as defined within warranty clause and time. Contractor shall pre-qualify appropriate County/ Operator personnel to effect repairs and identify types of repair each trained individual is qualified to perform after training of County personnel.
- G. Limitations: Warranty: Not cover acts of vandalism, damage caused by third party, or natural phenomena. Warranty: Not cover damage caused during maintenance actions by untrained/unapproved County personnel.

#### **7B.5 ACCEPTABLE MANUFACTURERS OF PRIMARY COMPONENTS**

- A. Acceptable manufacturers for any and all primary components shall meet following requirements:
  - 1. Manufacturer shall have been continuously in operation for past five years.
  - 2. Manufacturer shall have current version of each primary component currently operating successfully in two or more parking facilities of similar size and activity.
  - 3. If all components of PARCS are not from same manufacturer, Contractor shall be responsible for performance of these components, as they relate to proper functioning of system as required herein.
  - 4. Manufacturer shall be able to demonstrate successful performance of proposed system and equipment. Proof of successful performance shall be submitted as specified herein.
- B. Substitutions:
  - 1. It is recognized that there are variations in equipment between manufacturers. Where functional performance, features or quality of vendor's proposed system varies materially from that specified, submit request for substitution identifying substitution being offered/suggested prior to proposal due date.

## **7.B.6 PROJECT SITE CONDITIONS**

- A. PARCS Components: Operate dependably within environmental conditions indigenous to Montgomery County, Maryland. Components located in 24-hour climate controlled office shall be capable of normal performance in business environment. Outdoor Equipment: Capable of operating in temperature extremes of geographic area stated.
- B. Special electrical power and grounding.
  - 1. Furnish and install on-line, regulating computer grade uninterruptible power supply (UPS) for:
    - a. Servers and task computers (system controllers) with 30 minutes of back-up battery power.
    - b. Work stations, fee computers, ticket dispensers, exit verifiers, APM and local controllers (both revenue and access) with 30 minutes of back-up battery power for data protection.
  - 2. General Contractor will provide back-up emergency power.
  - 3. General Contractor will provide power that for purposes of this Project shall be defined as 115 VAC +/- 10% and 60 Hz from circuits dedicated to PARCS. Contractor shall provide any additional power conditioning required for operation of system as described herein.
  - 4. Provide dust and noise protection in strict accordance with equipment manufacturer's recommendations.
  - 5. Equipment layout shall be in strict accordance with manufacturer's recommendations to allow proper movement of air through and around equipment.
  - 6. All communication runs longer than 100 feet shall be fiber optic. Provide lightning protection devices at both ends of all communication wiring longer than 25 feet that is not fiber optic.
- C. Fiber optic (F/O) cabling requirements – To be installed by Certified F/O technicians.
  - 1. Pull boxes shall be as noted on drawings or per industry standards.
  - 2. Provide and install multimode 62.5 / 125um plenum rated optic cable or of quality required to provide communication and data transfer in underground conduit.
  - 3. Provide detailed parts list showing number and manufacturer, for all fiber backbone material. (F/O cable, Terminators, Patch Panels, Fiber Duplex Patch Cords, etc.).
  - 4. Label all F/O components as per TIA/EIA-606. (Cables, Connectors, Hub facilities, Termination facilities, Conduits, and Pathways). All Drops are to be labeled.
  - 5. Do not exceed minimum bend radius for all F/O cable.
  - 6. Do not exceed allowable tensile rating for F/O cable during installation. If winch or pulling machine is used, dynamometer must be used to monitor tension.
  - 7. F/O testing and certification of all runs is requirement, per industry standards. Written test results of each test must be submitted to Engineer for review.
    - a. End-to-End Attenuation testing.
    - b. Optic Time Domain Reflectometer (OTDR) testing.

## **7B.7 EQUIPMENT REQUIREMENTS**

- A. Provide complete operational parking system with all necessary components. It is PARCS Contractor's SOLE RESPONSIBILITY to provide every component necessary for complete functioning system.
- B. Provide County with two sets of keys for each piece of equipment with locks and two sets of master keys. Keys shall be unique to this parking equipment unless noted otherwise in this paragraph. They shall not fit any other equipment in same city or metropolitan area. Cash drawers shall have set of keys unique to each drawer.
  - 1. Each key for all APM doors within same facility shall be identical and unique to this facility.
  - 2. Each key for release of APM vaults within all Montgomery County facilities shall be identical.
  - 3. Each key for APM vaults within same facility shall be identical and unique to this facility.
- C. Spare Components: Furnish following spare components, complete and ready to use, prior to commencement of operational testing and maintain inventory of spare components at this level as components are used during warranty period. After expiration of warranty period, County will pay for replacement of parts as used from this inventory.
  - 1. Automatic Payment Machine:
    - a. Two note dispensers
    - b. Two note acceptors
  - 2. ACS
    - a. One ACS reader/controller
  - 3. For gates
    - a. Two loop detectors (if not onboard, solid state)
  - 4. For primary component (fee computer, ticket dispenser, APM, exit verifier, ACS reader, gate)
    - a. One ticket mechanisms/printer
    - b. One each controller/board
    - c. One each communication/port controller
    - d. One each local/remote lane controller
    - e. One circuit board
    - f. One intercom remote station
- D. Stock: Furnish following operating stock items prior to commencement of operational testing.  
Provide samples for County approval prior to final order of any item that is custom printed. County must approve color and artwork of tickets and ACS ID devices. County will provide camera-ready artwork for logos.
  - 1. 500,000 tickets printed to County's specifications

2. 500 Standard Proximity Cards (ACS ID devices)
  - a. PARCS ACS ID devices shall have different number sequence than PACS ACS ID devices.
3. 20 Roving Cashier Cards
4. 50 rolls paper for fee computer
5. 50 rolls paper for APM receipt printers
6. Three spare ribbons for each printer requiring ribbon
7. Two extra cash drawers per fee computer
8. Five replacement gate arms.
9. Automatic Payment Machine:
  - a. Two coin and banknote dispenser lockable vaults per each denomination per each APM. Dispenser vaults shall have lockable lids.
  - b. Two coin and banknote acceptor lockable vaults per each denomination per each APM. Acceptor vaults shall have lockable lids.

#### **7B.8 LICENSING**

- A. Supply all required operating system and application software licenses in sufficient quantities to accommodate the number of users and equipment in the installed system.

#### **7B.9 SECURITY**

- A. FMS and all subsystem controllers shall have security protocols, password protection and reports to exception transaction logs that prevent unauthorized access to and manipulation of data and reports, including individual transactions.
- B. All databases of transactions, ACS users, reports, etc. shall be secured by means of password from unauthorized entry and tampering from either within or outside FMS.
- C. The System must include minimum of 4 levels of access authorization to all operational, administrative and reporting functions and provide the following security features:
  1. Define individual user and group based security
  2. Ability to assign a unique user ID for each person authorized to use the system
  3. Ability to assign a unique password and periodically change that password for each authorized user ID
  4. Ability to establish an expiration period for passwords
  5. Ability to disable a user ID following successive long-on failures exceeding a specific limit
  6. Ability to view and report user and group level security rights
  7. Ability to de-activate codes from former users and internal and external customers
  8. Available user-defined fields

#### **7B.10 SOFTWARE AND COMPUTER PERFORMANCE SPECIFICATIONS**

- A. General: Primary components of PARCS shall meet following specifications:
  1. Components: Microprocessor controlled, in on-line, real-time communication with FMS.
  2. Each component shall communicate complete transaction log to FMS. In event of

communication failure with FMS devices shall continue to operate in off-line mode and shall store minimum of 1,000 transactions, or have sufficient system redundancy, to insure availability of transaction data upon restoration of FMS. In event of failure during communication error checking and recovery program shall be employed to prevent corruption of data files.

3. All field programmable functions of each device shall be reprogrammed from FMS (password protected), and any and all reprogramming changes shall be reported to daily log.

B. Facility Management System:

1. Facility Management System (FMS): Network of computers and/or servers that provide on-line monitoring and control of all PARCS equipment using individual and/or multiple software packages.
2. Warning alarms are required within FMS to alert parking manager of atypical lane activity, equipment malfunctions, equipment vandalism, vehicle occupancy thresholds, and insertion of stolen, void, or back out ticket at fee computer stations. These alarms are to be visual and audible at each computer workstation provided. When alarm is turned off, visual and audible signal shall stop at all workstations. Daily log report shall be produced which identifies all system alarms as reported to each cashier and to parking manager.
3. FMS: Configured with subsystems. Each Subsystem: Password protected to restrict access to individual functions of each subsystem to authorized users. Subsystems are:
  - a. Revenue Reporting
  - b. ACS
  - c. Occupancy Monitoring
  - d. Equipment Monitoring
4. System shall accommodate a minimum of five simultaneous users of the FMS.
5. FMS shall include redundancy of hardware and software so that failure of any functional component of system shall not result in the loss of data, nor compromise the ability of the system to operate as specified.
6. FMS servers, task computers, workstations, and all ancillary equipment shall have sufficient power, capacity, and communication bandwidth sufficient to meet the functional performance demands of the PARC system software without loss of responsiveness to user input or slowing of any end node device or workstation.
7. FMS shall be capable of operating across the County's Local Area Networks (LANs) and shall be accessible, with proper user ID and password, to all authorized users' workstations with installed FMS software modules on County's LAN. System shall maintain secure connection while active, and automatically log-off after programmable period of inactivity. Remote access to the FMS shall be over standard TCP/IP connection and may use web browser-based applications.
8. System shall provide the ability to remove outstanding tickets from ticket file with appropriate password and authorization level. A record of outstanding tickets removed from ticket file shall be stored on system server for audit and reporting purposes.
9. All user-interface modules shall be browser-based utilizing client/server technology or equivalent. The following general requirements apply to all components or modules of the System.

- a. The System must have a Windows-based graphical user interface.
  - b. The System must allow for both standard and custom report formats.
  - c. The System must have adequate security to allow for different classifications of users.
- C. Revenue Reporting: Subsystem shall accomplish following tasks from any workstation in FMS, with appropriate password:
- 1. Remote programming of fee computers and APM's.
  - 2. Test fee structure against existing facility usage statistics.
  - 3. Uploading and consolidating reports from fee computers and APM's.
  - 4. Retrieval and review of individual transactions. Retrieval shall be based upon user-defined parameters. Reports shall be displayed on monitor, printed on printer, and/or converted to ASCII file.
  - 5. Consolidating and retaining data that allow for report generation. Following are minimum required reports. Reports shall be either viewed on workstation monitor or printed.
    - a. **Daily Event Log** - Listing of changes to system and users who made changes. It shall include print communication messages, facility lane equipment alarms, remote gate opening, and system log on/off's.
    - b. **Cashier Shift Reports** - Summary report of one cashier's activity by shift.  
Reports shall provide:
      - 1) Gate, transaction and closing loop counts.
      - 2) Transactions processed at exit lane without vehicle present.
      - 3) Revenue total with cash subtotals and credit card subtotals by card type.
      - 4) Number of No Sale Key activations.
      - 5) Summary of non-revenue by transaction type.
      - 6) Summary of revenue by transaction type and date.
      - 7) Summary of number of transactions by type including cash subtotal and credit card subtotal.
    - c. **Daily and Monthly Cashier Shift Reports** - Summary report of one cashier's daily or monthly activity, by shift. Report shall provide:
      - 1) Revenue total with cash subtotals and credit card subtotals by card type.
      - 2) Summary of non-revenue by transaction type.
      - 3) Summary of revenue by transaction type and rate.
      - 4) Summary of number of transaction by type including cash subtotal and credit card subtotal.
      - 5) Exit lane count totals (equipment "vend" for exit verifier, ACS access, fee computer, gate, activation loop, and closing loop counts)
      - 6) Processing errors. This report is used to balance or audit cashier shift.
    - d. **Detailed Transaction Report** - Provide chronological listing of each transaction processed by cashier, shift and lane. This report is used to audit cashier information at transaction record level.
    - e. **Detailed Credit Card Report** – Provide sum total and chronological listing

- of each credit card transaction by credit card company, by equipment location, or by cashier for selected time period. Report shall include credit card payments made to all machines within PARCS. This report is used to reconcile credit card transactions with processor payments and with cashier reports.
- f. **Exception Transaction Report** - Provide all exception transactions in chronological order or by transaction type. Report: Available for selected time period and also by cashier. This report is used to audit cashier activity and performance.
    - 1) **Manual Transaction Report** – Exception transaction report filtered to list only manual transactions.
    - 2) **Revenue Alarms Report** – Provide report to include at a minimum remote gate vends and manual gate open counts.
  - g. **Clear Key Report** – Provides original date, time, transaction type, and fee for both cleared transaction followed by completed transaction. Report: Available for selected time period and also by cashier. This report is used to audit cashier activity and performance.
  - h. **Daily and Monthly Summary Reports** - Provide daily and monthly summary of cashier shift reports including daily grand totals of all information from cashier shift reports. This report provides overview of day's activity.
  - i. **Daily and Monthly Lane Activity Report** – For each exit lane, provide summary of revenue by rate type and number of normal and exception transactions by rate type. This report provides trend analysis of transactions by type.
  - j. **Daily and Monthly Non-Revenue and Void Transaction Report** - Provide all non-revenue and void transactions in chronological order, by type, and/or cashier for specified time period up to monthly. This report is used to audit cashier performance and for statistical information.
  - k. **Automatic Payment Machine Report** – Summary report of APM daily activity from for each APM and totals of all APM's:
    - 1) Revenue total and summary of revenue by transaction type (credit card, cash) and parking rate.
    - 2) Summary of number of transactions by type.
    - 3) Summary of change dispensed.
  - l. **Failed Exit Report** – Reconciles expired grace period and failure to pay-on-foot attempts at exit verifier to non-vehicle transactions at cashier fee computers. This report shall be available for selected time period and also by cashier.
  - m. **Monthly Lane Volume Report** - Provide entry and exit counts by date. This report is used for management planning and statistical information.
  - n. **Monthly Duration Report** - Provide duration of stay (variable by County) based on patrons' elapsed parking time and patron time of entry. This report is utilized in rate structure and facility usage analysis, management planning, statistical information, rate analysis, and revenue analysis.





cannot be used out-of-sequence

until programmable time period has elapsed from last ACS use) is not acceptable. Password-protected "resynchronization" of all users to one access before return to anti-passback control shall be provided.

- d. Link users to each other to allow one entity to be identified with and/or pay for group of users. Up to 100 such ACS groups shall be provided.

3. Central ACS controller, independently and in concert with FMS, shall:

- a. Issue and reprogram ID devices.
- b. Allow authorized supervisor to create, store, send and receive user programming from ACS readers. Access to programming shall be password protected, with multiple levels of access. System: Password-protected access to any and all information regarding specific blocks and/or suites of cards.
- c. Provide data base for ACS management including following:
  - 1) Provide at least 20 programmable record fields on each monthly parker, frequent parker and commercial vehicle tag holder.
  - 2) Provide at least 12 programmable record fields on County vehicles.
  - 3) Allow specific parker record files to be retrieved, displayed and/or printed based on selectable criteria, such as current ACS status, access group, access level, and/or ID numbers (except data that is password protected.)
  - 4) Allow searching, sorting and printing of database by any field for routine and special forms such as invoices or mass-mailings.
  - 5) Consolidating and retaining data that allow for report generation. Following are minimum required reports. Reports shall be both viewed on workstation monitor and printed on demand.
    - a) **Activity Usage Reports** – Provide chronological list of ACS usage and include date, time, card number, and location of entries and exits. Data shall be capable of being sorted by date, time, card number, and entry/exit lane.
    - b) **Count Reports** – Monitor and report counts of ACS holders present on hourly basis by group, lot and total occupancy. Track occupancy and report peak occupancy during each hour to FMS. Provide for reports to show daily and/or weekly peak occupancy by access level, group and lot.
    - c) **Active Card User Report** – Listing of all cards that have access into or out of facility whether they are County, courtesy maintenance, or revenue generating. Report shall be in numerical order, include sum total of all active cards, and can be generated on demand. Report is used to compare revenue generated to card users.
    - d) **Card Activity Exceptions Report** – A listing of card activity exceptions to include at a minimum hard-passback, soft-passback, shared account, debit card, hotel guest pass and nesting violations. Data shall be capable of being sorted by date, time, ACS ID number, entry/exit lanes and violation type.
    - e) **Card User Changes Report** – Provide report of changes to

card access user accounts to include at a minimum debit card rate changes, and status changes, and status changes (e.g. card placed in neutral with no charges applied at exit).

- d. System: Capable of collection of fees from parkers on monthly prepayment, decrementing, end of month billing, and/or credit card basis. Fee schedule for ACS parkers shall be same as or discounted from schedule employed for RCS parkers.
  - 1) System: Monitor and report revenue associated with ACS system to FMS. **Revenue Report:** Separate revenue by type of payment (prepayment, decrementing, monthly billing or credit card) and shall indicate ACS ID device number(s), account number(s), and month(s) for which payment was received.
  - 2) System: Provide for positive posting of payments and automatic lockout of ACS users within programmable grace period after expiration of prepaid account.
- e. Invoicing Package – System: Issue billing invoices for monthly accounts as well as separate and/or consolidated violation billing invoices for ACS transactions that exceed prepaid or prearranged amounts. Each Invoice: Include ACS ID device number(s), account number(s) and monthly rate associated for each ACS ID device being invoiced. System: Provide monthly report listing total number of ACS ID device numbers invoiced and total dollar amount invoiced.
- f. System: Provide credit card billing interface to allow automated credit card billing for those electing that payment option. Credit card number shall be "on file" rather than swiped for each transaction. Credit Card File: Password protected independently from other ACS data and be in compliance with credit card data security requirements of Payment Card Industry Council (PCI).
- g. Accounts Receivable package shall handle all normal accounting functions associated with ACS revenue. Package: Include such functions as invoice report, cash receipts journal, accounts receivable ledger with supporting subsidiary ledgers for each account, accounts receivable aging report for selectable time periods, account history reports, indicating invoices and payments by customer, general ledger, adjustment ledgers, general ledger interface for County mainframe and all invoicing features included in invoicing package within paragraph describing Central ACS Controller. Efficient monitoring of Accounts Receivables shall be provided through series of management and audit reports.
- h. System: Automatic on-line real-time monitoring of ACS usage with USB storage of transaction data for audit and analytic purposes.
- i. System: Allow supervisor user with appropriate password to change rate structures and selectively activate trips charges, recirculation charges and dwell time charges, separate rate structures for routing and anti-passback violations.
- j. System: Capability of monitoring and reporting of alarm conditions to FMS.
- k. System: Ability to register and utilize compatible foreign tags in ACS just as if County issued them.
- l. All Administrative Actions: Password protected and report to FMS in daily log.

- E. Occupancy Monitoring Software: Subsystem shall provide following counting functions:
1. Every vehicular entry or exit lane from each area or floor designated as zone shall serve as counting location. Each counting location shall be equipped with two vehicle detection loops to provide directional logic at each location and shall transmit counting pulses to FMS. Each entering vehicle shall subtract count of one from number of available spaces. Each exiting vehicle shall add count of one to number of available spaces. Directional logic shall be installed so that vehicle entering area through entrance lane or through exit lane shall be counted as inbound vehicle. Vehicle exiting area through exit lane or through entrance lane shall be counted as outbound vehicle.
  2. Total number of parking spaces within areas shall be field programmable. Number of available parking spaces within each area shall be tracked and displayed, upon demand, on computer monitor(s). Anti-coincidence packages shall be provided which accurately monitors entering and exiting traffic that may occur simultaneously.
  3. Each Area: Two programmable thresholds. One threshold shall be used to trigger "full status." When full status is reached count system shall operate in one of two modes, selectable by County. Mode one signals alarm and relies on human intervention to activate appropriate dynamic signs and gate status changes. Mode two automatically activates appropriate dynamic signs and gate status changes. Second Threshold: Used to trigger "open status". Two operating modes also apply to open status threshold. Software shall allow for manual overriding of "full status" of each area.
    - a. Count Subsystem: Maintain and display separate counts for each parking facility, lot or zones within facility, each with total occupancy or spaces available, total RCS and ACS occupancy and total RCS and ACS spaces available.
  4. Count Subsystem: Activate any and all electronic signs, individually controlling lots, facilities or zones within lots. This includes pedestal mounted "FULL" signs and lane control lights provided by PARCS Contractor as well as "FULL" signs at facility entrances provided by others. Provide capability to automatically disable ticket dispensers at entry lanes when facility is full. Full status shall be capable of being overridden from FMS.
  5. Count subsystem shall maintain for each entry and exit lane:
    - a. Non-resettable counters tracking monthly, transient and total parking patron usage.
    - b. Counts of illegal entry/exit for each lane.
    - c. Vends, loops, and gate counts.
  6. System: Store lane, facility and zone counts at hourly intervals in daily files. This data shall be available for specialized reports to analyze lot utilization and activity levels.
  7. Transaction Counts: Count System: Provide, display and compare three separate counts related to each transaction. At entry lanes ticket dispenser and access reader counts shall be compared against directional loop counter and gate counter. Gate counter records number of gate operations. Similar counts are also necessary to track activity first at central payment area and then through exit lane. Fee computer

and APM count records number of transactions processed. At exits, exit verifiers and access readers also vend counts. Loop counter records number of vehicles passing through lane. Gate counter records number of gate operations.

F. Equipment Monitoring Software: Subsystem shall have following characteristics:

1. Monitor operational status of all entry and exit lanes with equipment supplied by this contract.
2. For each entrance lane indicate and display:
  - a. Lane status; open or closed.
  - b. Gate failure.
  - c. Gate up.
  - d. Low-ticket supply.
  - e. Ticket in throat.
  - f. Illegal exit - reverse direction through lane.
  - g. Back Out.
3. For each exit lane indicate and display:
  - a. Lane status; open or closed.
  - b. Gate failure.
  - c. Gate up.
  - d. Illegal entrance - reverse direction through lane.
  - e. Back Out.
4. For each APM, indicate and display:
  - a. APM status; open or closed.
  - b. Door status, open or closed.
  - c. Receipt paper supply.
  - d. Note and coin vault status.
5. Abnormal status conditions shall be flashed on monitor(s) and accompanied with audible alarm. Display: Continue to flash until abnormal condition is corrected. Audible Alarm: Continue until it is turned off by command issued through monitoring computer(s). Acknowledgement and turning off of any alarm condition shall be able to be performed at any of workstation connected to FMS. It shall not be necessary to acknowledge alarm condition at every workstation. System: Record abnormal status condition and acknowledgement of alarm condition by time, workstation and operator.
6. Monitor electrical circuits and frequency of operational error in PARCS components to identify maintenance actions that would prevent later failure of component.

G. Computer System For FMS:

1. FMS Computer System:
  - a. Each garage shall have separate server/host computer. Server/host computer shall be installed in lockable rack, off ground, free from dust and debris.

- b. Equipment: Furnish and install all computer equipment needed for PARCS.  
Equipment: Meet or exceed recommendations of software vendor and allow ability of access, monitoring and report generating as approved by password by following:
  - 1) Parking Shift  
Supervisor
  - 2) Parking  
Auditor
  - 3) Parking Systems  
Administrator
  - 4) Finance  
Department
  - 5) Security  
office
- c. Separate workstation with monitor, keyboard, processor and printer shall be provided in facility parking office.
- d. Redundancy of hardware and software so that failure of any part of system shall automatically cause redundant system to operate. No operation, transaction or data shall be lost.
- e. Performance: Equipment shall meet performance needs of software and accommodate for growth and expansion as specified herein. Systems: Capable of processing all required functions as specified for each task. Performance of any specified function shall not be slowed or delayed by performance of any other function or task. The following are minimum requirements:
  - 1) System back up in less than three hours.
  - 2) Report generation at minimum of 25 pages per minute.
  - 3) Workstations shall provide the following features:
    - a) With appropriate password authorization, allow viewing both real-time and historic records of transaction data, generate reports and perform system administrative tasks.
    - b) Provide system alarms. Alarms shall be selectable at individual workstations with proper password control.
    - c) Provide ability to print reports at local or network printers as specified.
    - d) Allow other applications to run concurrently on the workstation.

2. Data Storage:

- a. Data: Stored as actual data, not in report format. Data needs to be archived in format readable by report generator.
- b. Archived every six months with first archive after first 18 months, so that server always has most recent 12 months of data.
- c. Online storage shall be redundant such as RAID (Level One) Technology.
- d. Archive storage shall:

- 1) Be on industry standard media i.e. DLTs.
  - 2) Be redundant.
  - 3) Archive or restore shall take less than one hour.
3. FMS shall periodically or on demand download revenue reports in flat ASCII file to County's financial department via Virtual Private Network (VPN) to County's computer network. Supply all network interface equipment.
  4. Provide capability to export reports to an Excel spreadsheet or save in PDF format.
  5. All software shall have Graphical User Interface (e.g. Microsoft Windows).
  6. All printers shall be Hewlett Packard Laser Jet 4000, equal, or better, printing minimum of 25 pages per minute.

## **7B.11 EQUIPMENT PERFORMANCE SPECIFICATIONS**

### **A. General Conditions**

1. All devices shall have compatible communication ports for all communications and connections to all computer hardware.
2. Primary components shall incorporate crystal controlled time clock/calendar that is updated at least once daily by FMS. Clock shall keep military time and be accurate to at least one minute per month.
3. All lane devices shall be ergonomically designed for ease of use by patrons.
4. Cabinets: Fabricated of material that is strong and durable such as, but not limited to, composite, stainless steel, aluminum alloy, or welded 12-gauge steel. Mounting holes shall only be accessible from inside of cabinet. All surfaces shall be corrosion resistant and exterior of cabinet shall be finished in color chosen by County.
5. Internal Components: Modular and plugged for easy maintenance and replacement.
6. Control logic and communication relays shall be provided for required counts.
7. Corrosion resistant connection boxes shall be provided for all wiring connections.
8. Gates, ticket dispensers, and exit verifiers shall have:
  - a. Hinged door away from traffic lane.
  - b. 115 VAC grounded convenience outlet.
  - c. A heater with control switch and preset thermostat or heater not thermostatically controlled which shall not damage other components or performance of unit.

### **B. Non-Cash Payment Options: RCS shall accept and process following non-cash payment options: credit card, debit cards and checks.**

1. Credit Card Approval System: credit card reader with each fee computer, automatic payment machine and exit verifier shall be connected to server that is dedicated to credit card approval system. Equipment must be Payment Card Industry Council (PCI) compliant. Information from each credit card transaction shall be transmitted to server that shall be in direct communication with authorizing agencies via T1 or DSL connection, to provide on line real-time approvals for each transaction.
2. Authorization for credit card transactions from swipe to authorization shall not be greater than ten seconds. Be responsible for confirming record formats required by County's financial institution that shall be determined.
3. County will negotiate with processor minimum fee requiring patron's signature. Receipts shall print with signature line only when greater than negotiated minimum fee

or if credit card information was entered manually.

4. Each machine shall be equipped automatic credit card reader used for processing credit card transactions. Fee computers shall also be equipped with keypad for processing manual credit card transactions. Separate but connected device is acceptable. Credit card transactions shall accommodate as minimum:

- a. VISA
- b. Master Card
- c. American Express
- d. Discover
- e. Checking Account Debit Cards

- C. Ticket Dispenser: Independently and in concert with FMS, ticket dispenser shall have following features:

1. Operational Description for typical RCS Patron Entry:

- a. Normal Transaction:

- 1) In lanes that have ticket and ACS entry, ACS reader shall read ACS ID when presented and automatically disable ticket dispenser until ACS device is identified and its validity for this system is confirmed. If an ID is not read or not valid for this system, ACS reader shall not send pulse to vend gate.
- 2) In lanes that offer both ticket and ACS entry, when the ticket issue button is depressed and the presence of vehicle over detector loops in proper sequence is detected by loops, ticket dispenser shall issue a time and date stamped ticket, encode machine readable ticket and place such information into memory of FMS. Issuance of ticket shall automatically disable ACS system until current transaction is completed. An audible signal shall sound as ticket is issued and continue until ticket is removed. Upon removal of ticket, a pulse shall be sent to open entrance gate.

- b. Back Out and Ticket Taken: If ticket is removed from ticket dispenser, and loop sequence is violated revealing that vehicle backed out of entrance lane, audible alarm shall sound at FMS and the barrier gate shall automatically return to the closed position without any timed delay. Ticket issued shall be reported as stolen ticket and invalidated within the system. 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.
- c. Back Out But Ticket Not Taken: If ticket is not removed from the ticket dispenser, the barrier gate shall remain closed and the ticket shall be retracted and retained in the Entry Station. The ticket shall be invalidated 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.
- d. Full Status: When occupancy system considers lot as full, ticket issuing machine shall automatically be disabled until such time as occupancy drops below programmed lower threshold. Only ACS patrons shall be allowed access during full occupancy status.



2. Ticket Dispenser: Issue machine-readable ticket with lane, time and date in man-readable print on ticket. Ticket encoder module shall utilize machine-readable encoding method that is compatible with all other RCS components. Machine-readable technology shall be magnetic stripe. Lane time and date of entry shall be encoded in mag-stripe on ticket.
  3. Ticket Printer: Designed for easy ticket loading with minimum 5,000-ticket capacity. Ticket dispensing/printing mechanism(s) shall be removable as unit by not more than four bolts and one keyed connector plug. Dispensing mechanism shall have self-sharpening ticket-cutters or bursting mechanism.
  4. When ticket dispenser is low on tickets, alarm shall be produced at FMS, notifying status and location.
  5. Easily readable "Please Take Ticket" sign shall be provided on approach side of dispenser.
  6. Including typical patron delays, ticket/gate control system shall be capable of maintaining minimum processing rate of 400 transactions per hour for push-button operation. Ticket Dispenser: Issue ticket within three seconds after activation of inductive loops.
  7. Ticket Dispenser: Include provisions for County programmable audible instructions during ticket issuing process.
- D. Fee Computer: Independently and in concert with FMS shall be machine-readable electronic cashier terminal capable of computing parking fees, automatically or from manual input, on basis of time and pre-programmed rate structure.
1. Operational Description:
    - a. Normal Transactions:
      - 1) Cashier will insert machine-readable ticket into fee computer. Fee: Displayed to patron, payment collected and change made. Receipt Issue: Selectable (password protected) as "on request" or every transaction. Completion of transaction shall cause amount, transaction number and other data to be printed on ticket and sent to FMS.
    - b. Exception Transactions: Include lost tickets, stolen tickets, non-revenue tickets, disputed fee transactions, insufficient funds transactions, back-out transactions, cancelled or voided transactions.
      - 1) All exception transactions shall be processed at central cashier at facility. There shall be individual keys or codes on fee computer to identify each exception transaction as it occurs. Fee Computer: Have "CLEAR" key that shall delete each previous step and/or "CLEAR ALL" key. No sale and void transaction keys shall be provided but can be activated or inactivated from FMS. Use of clear and clear all keys shall be tracked and reported by cashier in FMS.
      - 2) All exception transactions shall require presence of exception ticket throughout validation process. Exception transactions shall be posted to daily exception transaction report, daily lane activity report, cashier shift report and cashier summary report.
      - 3) Additional functional requirements for certain exception transactions are

as follows:

- a) **Mutilated Tickets:** If mutilated ticket is presented to cashier, cashier shall first attempt to process ticket. If this does not process transaction, and ticket has legible pre-printed ticket number and/or man-readable entry date/time, cashier shall manually perform transaction by entering it into cashier terminal and process transaction. If ticket is so mutilated that neither of above steps can process transaction, cashier shall process lost ticket transaction.
- b) **Lost Tickets:** If patron claims lost ticket, cashier shall depress lost ticket key. System: Determine maximum daily fee based on system input. System: Display maximum daily fee and transaction shall proceed.
- c) **Stolen Tickets:** If system identifies ticket as having been stolen, alarm shall immediately sound at fee computer and FMS to alert manager. Manager: Assist cashier in determining correct fee due and completion of transaction. Data on ticket time and place of entry shall be recorded in exception transaction log.
- d) **Non-Revenue Transactions:** System: Provide key or code to be entered by cashier to report following sub-types of non-revenue transactions: police/maintenance/ tow, employee badge, and courtesy exit.
- e) **Disputed Fee:** If patron disputes fee, disputed fee key shall be depressed. Local alarm shall immediately sound at FMS to alert manager. Manager: Assist cashier in determining correct fee due and completion of transaction. Data on ticket time and place of entry shall be recorded in exception transaction log.
- f) **Insufficient Funds:** If cashier enters insufficient funds transaction, system shall determine amount of insufficiency and record it in exception transaction log.
- g) **Voided/Cancelled Transaction:** When cashier cancels transaction, and does not initiate another type of transaction for same patron such as courtesy exit, alarm shall immediately sound at FMS to alert manager. When cashier initiates another type of transaction following cancellation for that same patron, system shall proceed to process new transaction as specified herein, but transaction shall be recorded as canceled transaction and cross-referenced to transaction ultimately processed.
- h) **Expired Grace Period:** When ticket was processed at APM but grace time expired before being presented at exit verifier, the patron shall have the ability to pay at the exit verifier via credit card. If patron chooses to pay in cash, they can re-park their car and walk to a facility parking office and make payment to the cashier. System will recognize ticket as having been previously presented and rejected by exit verifier and allow for appropriate resolution, as well as tracked as exception transaction.
- i) **Failure to POF:** When patron is rejected at exit verifier for not having paid-on-foot, the patron shall have the ability to pay at the exit verifier via credit card. If patron chooses to pay in cash, they

can re-park their car and walk to a facility parking office and make payment to the cashier. System will recognize ticket as having been previously presented and rejected by exit verifier and allow for appropriate resolution, as well as tracked as exception transaction.

- c. Fee Computer: Minimum of 10 preset keys to differentiate between transaction types (accounts, tow trucks, validations, exception transactions, etc.). Keys: Programmable only by FMS. Key use shall generate separate counts on revenue control reports.
  - d. Courtesy Validations: Fee computer shall apply validations automatically entered from authorizations placed upon ticket to permit free or discounted parking. Provide manufacturer's standard number of validation account numbers with minimum of 99.
  - e. Fee Computer: Issue receipt which includes date, time, fee collected transaction number, lane number and facility name, printed on one line each, and approved by County. Receipt Function: Programmable for every transaction or only on demand. Cashier: Able to print receipt any time prior to start of next transaction.
2. Rate structure shall be programmable only from FMS, with ability to accommodate following:
    - a. At least six fee structures each of which have three rate increments or blocks for each of up to 60 fee segments. Each block is amount to be charged, duration for that charge and number of times that duration and charge shall be repeated over each 24-hour period of stay.
    - b. Automatic adjustment for daylight savings time and leap year in fee calculations.
    - c. 24-hour maximums.
    - d. Grace time parameters at start of each 24-hour period.
  3. Fee Computer: Include computer component, ticket mechanism, printer, and cash drawer, either integral or modular. It shall control exit barrier gate, cash drawer, and patron fee display. Cash Drawer: Automatically actuated by system and have removable trays and locking covers. Automatic Function: Capable of being disconnected and/or overridden from FMS.
  4. Fee Computer: Track validation, exception, and non-revenue transactions individually and separately from normal transactions. It shall report all transactions, shift summaries for each cashier, and daily totals to FMS. It shall maintain separate internal count of total transactions.
  5. Fee Computer: Operate only when cashier is individually logged onto system and when detector is activated. Device, method or procedure shall provide SIGN-ON and SIGN-OFF control that recognizes each cashier as authorized operator of terminal. Minimum of 50 individual cashiers shall be recognized by system.
  6. Fee Computer: Require that all tickets be entered into ticket mechanism, to be imprinted with time-in/time-out, fee, transaction number and lane number both man and machine readable. Ticket shall be voided. Other operations shall produce different imprints. For every operation standard ticket form shall be present in ticket mechanism to complete transaction.

7. Fee Computer: Minimum accuracy as defined below:
    - a. Ticket read accuracy: 99.9%
    - b. Fee calculation accuracy: 99.9% (accurate calculations divided by all calculations).
    - c. Data transmission error rates: Less than one message re-transmission per hour.  
Data received and accepted by computer system as valid shall have 100% accuracy.
    - d. Transaction counts: 99.9% (accurate counts divided by all counts).
    - e. Exception counts: 99.9% (accurate counts divided by all counts).
    - f. Revenue amounts: 99.9% (accurate counts divided by all counts)
  8. Fee Computer: Completely process each transaction in no more than three seconds. Fee computer/gate combination shall be capable of maintaining minimum processing rate of 180 ticket transactions per hour.
  9. Fee Computer: Locking anti-tamper devices to prevent unauthorized disconnection of both power and communications wiring.
  10. Fee Computer: Capability to issue decrementing Value Cards from ticket encoder. Ticket feeder to encode multiple tickets during one run shall be included.
  11. Fee Computer: Able to generate coupon/chaser tickets from ticket encoder. Coupon/chaser tickets shall be used at APM units for payment.
  12. Duress Alarm: Fee Computer: Key that when depressed, shall alert security of emergency situation. There shall be no sound or alarm status generated at fee computer. Alert shall give security location of duress signal.
- E. Patron Fee Display: Used to indicate fee due to patrons paying central cashier and fee and balance to decrementing ACS patrons as specified herein. Enclosure: NEMA Type IV weather resistant or equivalent. Metal Enclosures: Finished in acrylic enamel to match other equipment. Indicated fee characters shall be legible by driver of vehicle stopped at service position and visible under direct sunlight or at night. Fee Display: Protected with impact resistant window. Indicator Cabinet: Constructed for easy installation with provision for easy access to display unit. It shall be supplied with control cable and line voltage power cord of correct size and length so all electrical connections can be within one-inch rigid conduit.
- F. Automated Payment Machine: Capable of reading encoded tickets issued by ticket dispenser, computing parking fees at same fee schedule used for fee computers, accepting payment in cash or by credit card, and issuing machine readable tickets encoded for exit. Station: Operate automatically, completely unstaffed, 24 hours/day with following features:
1. Operational Description:
    - a. Patron will insert machine-readable ticket into Automated Payment Machine. If machine cannot read ticket or it is otherwise identified as exception transaction, unit shall return ticket and message shall be displayed that transaction cannot be processed at this station and instructing patron to proceed to cashier.
    - b. If ticket is recognized as valid ticket, fee shall be displayed to patron. Patron will insert notes into note acceptor and change shall be made by payment machine. If payment is made by credit card, credit card acceptor shall be activated by inserting credit card into station. Receipt shall be issued

- "on request" for every transaction. Completion of cash transaction shall cause amount, transaction number and other data to be printed on ticket in readable form, and ticket reprogrammed for use as exit ticket. All data shall also be sent to FMS.
- c. Completion of transaction shall prompt APM to audibly and on message screen remind patrons to take validated ticket with them.
2. Rate Structure: Programmable only from FMS, with ability to accommodate following:
    - a. At least six fee structures each of which have three rate increments or blocks for each of up to 60 fee segments. Each block is amount to be charged, duration for that charge and number of times that duration and charge shall be repeated over each 24-hour period of stay.
    - b. Automatic adjustment for daylight savings time and leap year in fee calculations.
    - c. 24-hour maximums.
    - d. Grace time parameters at start of each 24-hour period.
  3. APM: Minimum accuracy as defined below:
    - a. Ticket read accuracy: 99.9%
    - b. Fee calculation accuracy: 99.9% (accurate calculations divided by all calculations).
    - c. Data transmission error rates: Less than one message re-transmission per hour.  
Data received and accepted by computer system as valid shall have 100% accuracy.
    - d. Transaction counts: 99.9% (accurate counts divided by all counts).
    - e. Exception counts: 99.9% (accurate counts divided by all counts).
    - f. Revenue amounts: 99.9% (accurate counts divided by all counts).
  4. APM: Comply with all applicable ADA requirements including but not limited to reach of all slots and verbal cues.
  5. Construction of Station: Durable, weather resistant in accordance with environment indigenous to that in which it is placed and vandal resistant. Unit: Lock system and appropriate alarm contacts for tampering.
  6. APM: Concise customer instructions with pictograms where appropriate for user-friendly operation.
  7. APM: In on-line, real-time communication with FMS for monitoring of transaction data as well as alarm conditions such as door forcements, low change and low receipt levels.
  8. Station: Accept and recycle coins in nickel, dime, quarter and half-dollar denominations.  
Only when coin storage rack for that denomination is full will coins be stored in coin safe. System: Capable of accepting one, five, 10, and 20-dollar bills in any combination. Dollar bill acceptor shall contain separate safe/vault.
  9. Unit: Dispense change in notes and coins. Note Dispenser: Dispense two denominations. Note Dispenser: Integral to unit. Change: Dispensed in notes to nearest possible whole dollar and remainder in coin.
  10. Machine: Contain necessary hardware and software to accept credit cards for payment

- of parking fees.
11. Auditing/report, fee structures and other control features shall be same as those required of staffed fee computer terminals.
  12. Unit: Accept credit card payment of monthly ACS parking fees. This function shall be globally enable or disabled from FMS.
  13. Unit: Equipped with programmable audible instructions in addition to audible prompt for patron to remove ticket, credit card and cash. Audible instructions shall be provided in English only.
  14. Ticket read accuracy shall be same as for fee computer.
  15. Including typical patron delays, machine shall be capable of maintaining minimum-processing rate of 120 transactions per hour.
  16. APM: Recognize origin of ticket and apply specific fee structure and grace time parameter for that facility. Grace Times: Programmable by facility.
  17. Unit: Able to accept chaser/coupon tickets as payment. unit shall be able to accept up to five chaser tickets in series. After patron inserts parking ticket, up to five coupon tickets can be inserted into APM. Parking Fee: Reduce by amount of coupon ticket.
- G. Exit Verifier: Capable, independently and in concert with FMS, of reading tickets encoded for exit by staffed fee computer and/or Automated Payment Machine, verifying that ticket is valid and time of exit is within grace period. Unit: Then send signal to control gate to open. Unit shall have following features.
1. Operational Description: Patron will retrieve vehicle and proceed to exit lane equipped with an exit verifier. If lane is not equipped for ACS, or if it is but no proximity card has been read, presence of vehicle over detector loops in proper sequence shall energize and allow for one operation. Patron will insert ticket into exit verifier.
    - a. If grace period has not expired, a pulse shall be sent to open exit gate and data shall be sent to the FMS. Ticket shall be retracted into exit verifier and retained for audit purposes. As vehicle leaves lane and passes closing loop, gate shall close.
    - b. If grace period has expired or ticket has not been validated as paid, machine shall prompt patron to pay remaining fee with a credit card. Or patron may press the intercom button and speak with the facility parking office. A roving cashier can be summoned to collect the fee in cash at the exit lane or patron shall move vehicle and proceed to the staffed cashier location. When patron presents a ticket with an expired grace period to a cashier, transaction shall be reported as an exception transaction.
  2. Exit verifier shall have following:
    - a. Processed ticket vault.
    - b. Easily readable "Please Insert Ticket" sign on approach side of machine.
    - c. Display instructing patrons with expired grace periods.
  3. Have ability for "hard interlock" to prohibit exit gate from raising when adjacent exit gate is in raised position. Hard Interlock: Capable of being activated or inactivated from FMS. Gate: Operate in manner that it is not possible for vehicles in two

adjacent exit lanes to be released at same time. There must be enough lag time that exiting vehicles will be staggered, even if valid tickets are processed at same time.

4. Including typical patron delays, validator gate control system shall be capable of maintaining minimum processing rate of 400 transactions per hour. Elapsed time from insertion of valid ticket into reader until gate is fully open shall not exceed three seconds.
  5. Grace Times: Programmable at FMS.
  6. Exit Verifier: Include provisions for programmable audible instructions during ticket exiting process.
  7. Exit Verifier: Capable of accepting any ticket paid or unpaid after programmable closing time. During programmed operating hours exit verifier will only accept paid tickets. This feature shall be programmable and activated or deactivated at FMS.
  8. All exit verifiers shall provide the ability to utilize a ROC to collect payment via cash at lane.
- H. Mass Validation Unit: Shall use a workstation to encode tickets based on discounted percentage, time, or no-charge. Tickets can be encoded automatically, high-volume, easily and quickly, from this workstation with appropriate password. A record of all chaser tickets produced including the value shall be stored on the FMS for reporting and auditing purposes. These encoded tickets (sometimes referred to as “chaser tickets”) will be utilized by parkers to apply a validation to as ticket as follows:
1. Manually at Cashier: Handed to cashier to electronically apply validation discount to patron’s ticket.
  2. Automatically at EV or APM: Inserted after parking ticket to electronically apply validation discount to ticket.
- I. Off-line Validator: Portable desktop device capable of re-encoding tickets with code identifying that one of three merchant validation fee schedules shall apply to this ticket. Only one machine readable code will be allowed per ticket; therefore validation device shall recognize when machine readable code had already been entered by another merchant. After being re-encoded, free tickets do not have to be validated in APM or fee computer. They can be used to exit directly at exit verifier. Validator: Non-resettable counter for every use. It shall have resettable counter for every use until fee has changed. Off-line Validators of a “Clam Shell” design are not acceptable.
- J. ACS System Description:
1. Operational Description:
    - a. ACS reader identifies that a vehicle equipped with an ID device has entered lane when a valid ACS ID device is presented to the ACS reader. Validity of vehicle for current authorization in this system shall be checked through ACS Controller and, if approved, a message sent to PARC system indicating a valid ID. A pulse shall then be sent to open gate.
    - b. Where ACS lanes are also equipped with ticket dispensers or exit verifiers, activation of reader shall automatically disable dispenser/verifier. Initiation of a ticket entry/exit validation transaction shall automatically disable ACS.
    - c. Decrementing Users:

- 1) Entry: when a decrementing ACS user's ID is presented at entry, system shall determine if the amount of available funds on the card has reached a preprogrammed low balance amount. If so, a red light shall be illuminated in lieu of green one at reader, letting patron know that there is a low balance. A pulse shall then be sent to open gate.
  - 2) Exit: when a decrementing ACS user exits, system shall calculate the fee due, display it on fee indicator, deduct fee from the patron's account balance, and then display the patron's remaining account balance. If sufficient funds are available, the signal pulse shall then be transmitted to open gate. If, however, the balance on a decrementing account is not sufficient to cover fee due, the system shall display fee due and inform patron that balance is insufficient. The system shall simultaneously sound a local alarm at the FMS to alert facility management of the insufficient funds issue. Management shall then communicate with the patron via intercom in order to resolve the issue. Should manager allow egress without further payment, system shall treat it similar to an insufficient funds transaction.
- d. If ACS ID is not valid for system or is not authorized for entry at that location and/or at that time, ACS controller shall send an invalid user attempt message to PARC system. Gate shall not open. An invalid ACS attempt alarm shall sound an audible alarm and display a message at FMS workstations. Invalid user ACS attempt shall also be posted to daily exception transaction log.

## 2. Proximity Card System

- a. Cards shall be of passive design and capable of being read when presented within 6 inches of sensor.
- b. Accuracy of card read shall be 99.5%.
- c. ACS shall read and process card within one second of presentation to reader.  
Card/gate system shall be able to maintain processing rate of 500 transactions per hour for period of at least four continuous hours of operation, including normal patron delays.
- d. System shall have checking protocol that identifies multiple reads of same card within a few seconds (due to users "waving" the card in front of reader) and corrects false anti-passback reads.
- e. System shall include protection from common and/or local sources of interference. System shall neither affect nor be affected by neighboring electronic systems or electronically controlled devices.
- f. When paired in-lane with any Revenue Control System device the card reader shall be designed for mounting to the face plate of the RCS device; ticket dispenser, exit validator, pay-in-lane machine, etc.

## K. Roving Cashier System:



1. ROC system shall consist of ACS proximity or insertion reader integrated on faceplate of exit verifiers and software.
2. Operational Description:
  - a. ROC card will be set up in system and assigned to employee. ROC card number will be unique and grouped by series differently from other ACS or debit cards.
  - b. ROC card will be credited with balance as determined by parking manager per shift requirements.
  - c. Patron who inadvertently ends up at exit lane with unpaid ticket and is unable to pay via credit card or park vehicle and proceed to APM would summon parking management via exit verifier intercom.
  - d. ROC will be dispatched to lane where they will insert unpaid ticket into slot provided on exit verifier. Amount due would be displayed and collected in cash from patron by ROC.
  - e. ROC will “present” or “insert” ROC card at exit verifier to satisfy payment and raise gate for patron exit.
  - f. At end of shift ROC will “cash out” with their parking manager who will pull up report on FMS. ROC report will provide outstanding balance on ROC card which, along with detailed report showing all transactions made with ROC will be used to closeout ROC shift.

ROC cards may also be used by employees to collect additional fees from patrons with expired exit grace times at exit verifier.

- L. "TAKE TICKET WITH YOU" Signs: Provide at all ticket entry lanes, mounted on posts between ticket dispenser and entrance gate, and oriented to be easily seen by driver when ticket is taken. Sign: Activated automatically by FMS when ticket is dispensed. **Signs shall flash on and off during activation.**
- M. Traffic Controller Signs: Provided at all entry and exit lanes **under separate contract.** Sign: Activated automatically by FMS when lane is opened or closed, or manually.
- N. Automatic Barrier Gate - Gate system shall have safe guards to ensure that gates do not continue to lower onto any vehicle or person regardless of size. Gate shall provide method of rising immediately upon contact with anything under gate arm, without causing damage or injury. Control gates, shall meet the following requirements independently and in concert with FMS.
  1. Operational Description for Gated Entry and Exit Lanes: As a vehicle pulls into a lane, it is detected by inductive loops and a directional vehicle detector. A vehicle shall first be detected by loop A for any revenue transaction (ticket issue, exit validation or fee collection) to be processed. Upon satisfactory completion of each transaction, gate shall automatically open. After vehicle has passed over detector loop B, gate shall automatically close. Circuitry shall be such that gate has closed after preceding transaction before system shall accept transaction of another vehicle in same lane.
  2. Gates shall provide an effective one-way barrier to vehicles in entrance and exit lanes. Barrier arms shall retract quickly in a vertical plane on command signal and return to

lower position upon signal from detector beyond gate location. Gate shall have appropriate length aluminum barrier arm, employing breakaway design that can be easily and inexpensively replaced when broken. Height of gate arm shall be approximately 36 inches from drive level when in DOWN position. Articulating arms shall be provided in areas of limited headroom.

3. Gate shall incorporate in one housing all necessary components for functioning of unit. It shall have a heavy-duty gate motor and all other components circuit breaker protected.

Gate motor and other components shall be designed for heavy-duty use and shall be circuit breaker protected. Gate controller shall prevent damage to gate motor when gate

motion is blocked in any position. Gate shall not be able to be raised or lowered by any manual force applied to the gate arm. Stops or mechanism shall allow adjustment of gate arm travel. All parts shall be suitably treated to inhibit corrosion. Electrical power shall

be applied to torque motor at all times. Automatic gate reversal shall be provided.

4. Gate Barrier arm shall be provided with signage on both sides of arm clearly warning pedestrians not to pass through a gated lane. Signage shall incorporate both text and graphics to convey the hazards of not meeting this restriction.

5. Controller for gate shall have the following features:

- a. Separate momentary contact closures for each of the following counts: ACS patrons, RCS patrons, vehicle entries, and vehicle exits.
- b. Directional logic with electronic outputs to alarms, counters and to report atypical lane activity to FMS.
- c. Storage of at least three vend inputs and sequentially processing each vend. Gate arm shall remain up until stored vend input vehicles have cleared lane. This feature shall be selectable on/off from FMS.
- d. Ability to test gate operability and controller programming on-site without the use of special diagnostic equipment.
- e. "AUTO-MANUAL" switch, and "ON-OFF" switch for gate. Gate control unit shall contain power supplies, dust-proof relays, and other circuit components to control gate as well as manual control switches.
- f. Capability to integrate three loops within circuitry to provide directional logic.

- O. Vehicle Detectors: Intelligent detectors with directional logic where required herein. Detectors: Contain microprocessor logic to differentiate direction of traffic flow, and can send violation alert signal when vehicle backs out of lane. Detectors shall:

1. Automatically maintain peak sensitivity regardless of rain, snow or other environmental conditions. Different sensitivity settings shall be provided to allow tailgating vehicles of varying height and size to be optimally detected.
2. Fit within ticket dispenser, gate housings or in remote lane/ramp controller.
3. Have light on front panel to indicate presence of vehicle.
4. Modular plug-in construction or built in, and easily serviced.
5. Be self-tuning and self-compensating, and tune to its loop environment, rather than relying upon conditioning to crystal controlled frequencies. Analog detectors that

- require periodic manual tuning are not acceptable.
6. Require no tools or meters for setting unit that is completely automatic except for initial settings.
  7. Have three-position frequency switch. No two frequencies shall be same, to prevent crosstalk or interference between loops in proximity of each other.

P. Inductive Loops:

1. Loops may be either embedded or saw cut into paving surface. Coordinate saw cut loops with Engineer to avoid damage to structure or work of other trades.
2. Be formed by three to four turns of 16-gauge single-conductor wire recommended by loop detector manufacturer.
3. Not be spliced.
4. Have loop leads which are:
  - a. Limited to a length of 100 feet.
  - b. Have a four-twist minimum per foot and located at a minimum of 18 inches from electrical power lines.
  - c. Be contained in separate conduit to prevent interference from electrical signals.
5. Cut-in loops shall be placed in saw cuts 0.25 inch wide and  $\frac{3}{4}$  to 1 inch deep into paving surface and filled with sealant approved by Engineer/Architect.

Q. Intercom and Camera System:

1. The Contractor must provide a turn-key IP intercom system that consists of host intercom stations, an integrated camera system, and an integrated microphone and speaker in each Entry Station, Exit Station, Automated Pay on Foot Stations, etc. Stations shall be located so that they can be easily accessed by patron on foot or from open window of standard passenger vehicle as required herein. Stations shall include "Press for Assistance" signs and visual verification that assistance has been requested, and that assistance has been dispatched. Intercom system shall comply with current Americans with Disabilities Act requirements.
  - a. Entire system shall operate without malfunction due to climatic conditions stated herein.
  - b. The intercom system shall use regular phone lines or a PBX system. The intercom system shall have a built-in auto dialer that can dial a minimum of two numbers, if first number does not answer or is busy. The intercom system shall have the ability to call an outside phone, ring a local phone or alternate between the two. The intercom system shall have the ability to set calls in queues based on first come first serve basis, the next call in line is immediately connected.
  - c. The system shall be configured and programmable to ring at times and locations as programmed by County

- R. Safe: Provide one drop safe in manager's office. Drop Safe: Bolted down securely to structure with bolts accessible from interior of safe only. Safe: "C" rated safe with

minimum interior dimension of 18" x 18" x 26". Steel: Finished to inhibit corrosion. Safe: Equipped with drop slot for depositing cash without unlocking safe. Drop Slot: Designed to prevent removal of cash through slot. Safe: Equipped with combination lock.

S. License Plate Recognition Specifications:

1. System will have License Plate Recognition (LPR) integrated at the parking facility(s). The intent of this system is to:
  - a. Capture a vehicle's license plate/image on the front and /or back of the vehicle as it enters;
  - b. Connect the license plate number to a transient ticket (if taken) or verified against the pre-paid credential that is presented;
  - c. Store the plate/image and transient ticket number (if taken) in a database;
  - d. Have the ability to view the plate/image when exiting;
  - e. Verify the plate matches the image so:
    - i. The transient ticket number is verified and the proper fee is assessed or;
    - ii. The PARC system is notified if the ticket was paid previously at a Pay on Foot station or a pre-paid credential was used to enter the facility.
  - f. All images/plates shall be time stamped on entry and exit.
2. The Contractor must ensure that the proposed PARCS LPR solution successfully integrates with the LPR camera system, Pay on Foot stations, mobile payment providers and County's parking enforcement software.

## 7B.12 PROJECT COORDINATION

- A. General: Meet with County, Engineer/Architect, and General Contractor within 30 days of contract award to verify all details of PARCS. Schedule shall be achieved with adequate time for hookup, testing, and trial period as specified herein.
- B. Submittals: Provide those responsible for related work with:
  1. Installation diagrams, details and templates for setting mounted equipment.
  2. Templates and cast-in inserts to anchor freestanding equipment to curbs and bases.
  3. Electrical wiring diagrams and details.
  4. Electrical installation requirements.
  5. Electrical power requirements.
- C. Meetings: Meet with Electrical Contractor, before any rough-in work begins.
  1. To review building plans as they relate to PARCS equipment.
  2. To explain details or precautions necessary to assure that all parking and revenue control equipment shall work properly.
  3. To determine that all required conduits and wiring are properly laid out.
- D. Additional Wiring: Provide all additional conduit and wiring which is needed for total system performance but which was not noted on Contract Documents. There shall be no additional cost to the County for these items.

### **7B.13 INSPECTION OF WORK BY OTHERS**

- A. Upon written notice from Contractor that entire work or agreed portion thereof is complete, County representative(s) and Contractor shall make final inspection of Work. County and/or County's representative will then notify Contractor in writing of all particulars in which Work has been found incomplete or defective. Immediately take such measures as are necessary to remedy such deficiencies.

### **7B.14 INSTALLATION OF PARCS**

- A. Install PARCS in accordance with manufacturer's recommendations and approved Shop Drawings.
- B. Installation and Start-Up: Be responsible for installation of all control and communication wiring, Contractor supplied equipment and its interfacing and interconnection with County supplied equipment. Authorize and accept responsibility for application of power to equipment and initiation of operation, be responsible for running all initial diagnostics and system generation programs necessary to provide complete working system.

### **7B.15 TEST AND ACCEPTANCE PROGRAM**

- A. General: Schedule and format for all system acceptance testing shall be submitted to Engineer/Architect and County and shall be approved prior to start of Installation Tests. Provide checklist of testing of each lane of equipment for all functions.
- B. Inspections and Testing: Inspections and tests observed by County and Engineer/Architect shall not relieve Contractor of responsibility for providing hardware, software and documentation in accordance with this Specification.
- C. Installation Test Demonstrations: Upon installation of each lane of equipment, APM or office equipment, installation test shall be performed. This test shall exercise equipment in accordance with specific test procedures document required to test every function of equipment. County's representative may witness tests. Notify County and Engineer/Architect in writing at least one week prior to each official test session. In event that first test is not successful, correct noted deficiencies and notify County and Engineer/Architect, at least two days in advance, that test session is ready to resume. Promptly correct all problems encountered at Contractor's expense.
- D. Substantial completion includes following:
  - 1. All PARC equipment included in project or phase has passed installation test.
  - 2. All communications from equipment to FMS and workstations has passed installation test.
  - 3. FMS produces all required reports and has passed installation test.
  - 4. All UPSs have passed installation test.
  - 5. All electronic signage interfaces complete and has passed operations test.
  - 6. All spare parts, stock and manuals are on site and have been approved.
  - 7. All training is complete to County's satisfaction.
  - 8. County has been given all test checklists and training evaluation forms.

- E. **Thirty-Day Operational Test and Final Acceptance:** Upon completion of all installation tests, demonstrations and training required herein, County or its agents shall operate complete system for test period of thirty days. When installation is phased, completion of all installation tests, demonstrations and training of each phase shall be designated at beginning of thirty-day test period. Have qualified and experienced technician on site eight hours per day during 30-day test. When not on site, technician shall be on call with one-hour response time to emergency call. During this period, following performance standard shall be met in order for final acceptance to be issued:
1. All mechanical components shall be operational without downtime. For each downtime period of four hours or more, one working day will be added to acceptance cycle.
  2. All electronic components shall be operational without downtime or programming problems for complete monthly reporting cycle. For each downtime period of more than one hour but less than eight hours or programming problem that delays report cycle, two working days will be added to acceptance cycle.
  3. All test reports shall correlate 100% with cash receipts in each fee computer and APM for test period.

#### **7B.16 TRAINING PROGRAM**

- A. Contractor shall develop and implement comprehensive training program for County's personnel. Such training program shall be implemented through use of formal classroom training and/or other forms of training that Contractor shall propose.
- B. Curriculum shall be designed so that each group of trainees shall be trained in full repertoire of system commands that they may have to use in course of performing their designated functions. Trainees shall receive training no more than two weeks prior to their use of equipment. Training should be accomplished through use of lectures, visual presentations, hands-on operation of equipment and any materials necessary to perform job. Each student shall be provided with complete set of training materials and operating manuals during training session, which he/she shall retain for use on job at completion of training.
- C. Conduct required training at times and locations coordinated by County. County/Operator shall make personnel available to receive training. Class size shall be no more than can benefit from training materials at once. Full complement of training courses shall be conducted over five- day period, as required to accommodate shift personnel. Additional schedule for delivery of all training courses shall be included in submittal. Training: Include, but not be limited to, following groupings of staff:

##### **Labor Category**

Cashiers/Operators  
Supervisors  
Maintenance Personnel  
System Managers/Administrators

- D. At conclusion of maintenance training session(s), submit to County list naming qualified County/Operator maintenance personnel. List shall detail level of maintenance/repair functions each of County/Operator personnel are qualified to perform.

E. Training shall consist of following:

1. Cashiers/Operators: Trained to operate cashier terminal. Operation of cashier terminal shall include ability to process normal and exception transactions, and to understand any and all system messages provided by cashier terminal.
2. Supervisors: Supervisors shall be trained to:
  - a. Operate cashier terminal.
  - b. Perform primary maintenance on PARCS components (trouble shoot/replenish supplies).
  - c. Understand any and all system messages provided by FMS, including but not limited to alarm messages, indications of attempts to compromise PARCS and explanations of atypical lane activity displayed by count system, revenue control system.
  - d. Be able to correlate tickets issued with vehicles present, time parked with revenue generated.
  - e. Be able to understand purpose and data contained within any and all reports produced by FMS.
  - f. Be able to operate FMS.
  - g. Be able to process exception transactions occurring at exit verifiers.
  - h. Be able to load and remove coins and bills, clear note jams, and trouble shoot Automated Payment Machine.
3. Maintenance personnel: Trained to perform primary maintenance on all major components of system. Additionally, maintenance personnel shall be trained to:
  - a. Replenish all system supplies.
  - b. Clear ticket and other paper jams.
  - c. Reset system after power failure.
  - d. Replace internal elements such as circuit boards.
  - e. Lubricate and clean internal components.
  - f. Remove and replace gate arms and adjust gate arm travel.
  - g. Be certified by contractor to trouble shoot all systems and perform primary maintenance.
4. System Administrators: Same basic training as Supervisors. In addition to such training, System Administrators shall be trained to operate FMS and to understand statistical reports which reveal trends in revenue generation, facility utilization, and based on information available from FMS, to perform checks and balances over actions of Supervisors and their subordinates. Three and six months after Final Acceptance, System Administrators shall have one day's additional training.