DELAWARE RIVER PORT AUTHORITY
PORT AUTHORITY TRANSIT CORPORATION

FARE COLLECTION AND PARKING SYSTEM
VOLUME IV – PARKING EQUIPMENT

90% DRAFT TECHNICAL SPECIFICATIONS
April 28, 2003
# TABLE OF CONTENTS

5 PARKING EQUIPMENT - GENERAL ........................................................................................................ 1

5.1 REMOVAL AND INSTALLATION OF PARKING CONTROL EQUIPMENT ........................................... 2
5.2 SYSTEM COMPONENTS ...................................................................................................................... 3
5.3 SYSTEM FUNCTIONALITY ................................................................................................................... 4
5.4 OPERATION ........................................................................................................................................ 6
  5.4.1 Smart Card Validity Check ........................................................................................................... 6
  5.4.2 Barrier Opening ............................................................................................................................. 6
  5.4.3 Out of Service ................................................................................................................................. 6
  5.4.4 Exiting the lot .................................................................................................................................. 6
5.5 GRAPHICS AND DISPLAYS ................................................................................................................. 7
  5.5.1 Graphics ........................................................................................................................................ 7
  5.5.2 Smart Card Status Display .......................................................................................................... 7
  5.5.3 Performance Requirements of Smart Card Status Display .......................................................... 7
5.6 PARKING APPLICATION ..................................................................................................................... 8
  5.6.1 Data to be Stored ............................................................................................................................ 8
  5.6.2 Reports .......................................................................................................................................... 9
5.7 SYSTEM CLOCK ................................................................................................................................ 9
5.8 MAINTENANCE MODE ........................................................................................................................ 10
  5.8.1 Maintenance Diagnostic Capability ............................................................................................... 10
5.9 INTERFACE WITH CENTRAL SYSTEM ............................................................................................. 10
  5.9.1 Data to be transmitted ................................................................................................................... 10
  5.9.2 Polled Data .................................................................................................................................... 11
  5.9.3 Commands ..................................................................................................................................... 12
  5.9.4 Downloading ................................................................................................................................. 12
  5.9.5 Wireless LAN ................................................................................................................................. 13
5.10 CONTACTLESS SMART CARD INTERFACE .................................................................................. 14
5.11 DETAILED SPECIFICATIONS FOR KEY PARKING SYSTEM COMPONENTS .................................... 14
  5.11.1 Automatic Gate ........................................................................................................................... 14
  5.11.2 Electrical Characteristics And Components .............................................................................. 15
  5.11.3 Barrier Arm .................................................................................................................................. 15
  5.11.4 Card Reader Unit ....................................................................................................................... 15
  5.11.5 Vehicle Detection ....................................................................................................................... 16
5 PARKING EQUIPMENT - General

PATCO operates public parking lots for transit users. These lots are located at PATCO transit stations as detailed in the Exhibit 1-1

EXHIBIT
1.1-1

<table>
<thead>
<tr>
<th>Station</th>
<th>Intersection / Municipality</th>
<th>Distinct Paid Lots</th>
<th>Entry Gates</th>
<th>Exit Gates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferry</td>
<td>Ferry and Davis Ave.</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Collingswood</td>
<td>Atlantic and Bilson Ave.</td>
<td>None: Free lots &amp; meters only</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Westmont</td>
<td>Crystal Lake and Haddon Ave.</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Haddonfield</td>
<td>Washington Ave. and Kings Hwy.</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Woodcrest</td>
<td>Oak &amp; Tindale Rds., Cherry Hill</td>
<td>6</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Ashland</td>
<td>Burnt Mill and Evesham Rds., Chadwick Ave.</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lindenwold</td>
<td>Berlin and New Rds., Voorhees</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
<td>30</td>
<td>27</td>
</tr>
</tbody>
</table>

Currently, the parking fee is $1.00 per day at paid parking lots, which is in effect from 5:00 AM to 10:00 AM. The lots are free at all other times.

DRPA/PATCO is interested in procuring a state-of-the-art new parking control system incorporating cashless smartcard-based payment. Contactless smartcard used for parking payment at the entrance to transit parking lots shall be the same smartcard used to pay for transit fares. For information on smartcard requirements refer to Specification Section 4 – SMART CARD AND COMPUTER SYSTEMS.

The Contractor shall design and implement a fully integrated automatic parking lot system and all system components required for unattended operation based on contactless smartcard type of payment. The parking lot system shall be fully integrated with PATCO Automatic Fare Collection (AFC) System.
5.1 REMOVAL AND INSTALLATION OF PARKING CONTROL EQUIPMENT

The Contractor shall provide the labor for the removal of existing PATCO equipment as necessary for the installation of the new parking lot traffic and revenue system. All removal of existing revenue collection equipment must be scheduled and approved by PATCO Project Manager at least five business days in advance. The Contractor shall notify the PATCO Project Manager and appropriate Service and Revenue Collection
authorized personnel to coordinate revenue collection and uninterrupted service to PATCO customers.

The Contractor shall provide all labor and material for new parking control equipment installation, system integration and testing. The contractor shall provide a detailed installation plan as part of the Transition Plan that shall be submitted for DRPA/PATCO review in increasing levels of detail at the CDR, PDR and FDR “Transition Plan”, as CDRL 501.

5.2. SYSTEM COMPONENTS

The typical parking lot system components are listed below. However, the contractor may propose a system consisting of these and/or other equivalent components required to fulfill the functionality of the parking operation as detailed in this and other applicable PATCO specifications pertaining to the integrated AFC and parking system. The system design shall be submitted as CDRLs 502, “Parking System Design”.

A. Entry gate controller with CID equipped with customer information display capable of displaying fee debited and balance remaining on the card. For display requirements refer to Section 5.2.1.3 “Passenger Display/Indicator”. The CID shall be capable of Autoload. Design shall be submitted as CDRL 503, “Parking Entry Gate Controller with CID”.

B. Parking gate with the automatic barrier arm. Design shall be submitted as CDRL 504 “Parking Gate”.

C. Vehicle detectors at entry and exit gates. Design shall be included in CDRL 504 “Parking Gate”.

D. Parking control application on the Central System. Design shall be submitted as CDRL 505 “Parking Control Software”.

E. Electronic customer information signs, with “Lot Full” red indicator and “Enter” green indicator. Design shall be submitted as CDRL 506 “Parking Information Signs”.

F. Communications interface for data transfer to the Central System, using RF modems to communicate to a Wireless Network access point or a router at the transit station connecting to the Central Data System. Design shall be submitted as CDRLs 507 “Design of the wireless LAN” for CDR, PDR, and FDR.

Each separate parking lot system must be able to track vehicle counts, entries, exits and lot occupancy, aggregate them at the lot level and be capable of transmitting the lot’s data via the station’s computer to the Headquarters Computer System and to the Central Data System.

The typical parking control system architecture is depicted in Exhibit 1.1-2.
5.3 SYSTEM FUNCTIONALITY

Parking barrier gate system shall separate the paid parking lot areas from the free areas. The automatic barrier arms shall serve to control vehicle entry upon customer paying the parking fee by presenting (tagging or waving) a contactless smart card to the card reader and to allow free exit from the facility with a capability to track vehicle entries, exits and lot occupancy. The parking control system shall provide for an automatic operation of the barrier at the entry gates with a manual override feature to allow for emergency opening and closing from the central system or locally, key controlled by PATCO employees. Exits out of the lots shall be controlled by an exit gate, which shall monitor and record all exits. All transactions generated by vehicle movement shall be sent to the Central System via the HCS.

The parking barrier gate system shall control the automatic barrier arms by sending a signal upon vehicle detection and validation of a contactless smart card. It shall be microprocessor controlled, and communicate via wireless communication to an access point located in each station, that communicates to the HCS and Central System over DRPA’s network infrastructure. The parking entry gates shall be controlled by a Card Interface Device (CID) that shall allow the gate controller to process contactless smart cards (Refer to Volume III Section 4 for card requirements). The CID shall be equipped with a programmable customer display, capable of displaying fee debited and balance remaining on the card. The card acceptance capability shall be operational in stand-alone (off-line) mode, even when communications are not available with the traffic and revenue transactions recorded. Entry parking gates shall be capable of being programmed for automatic operation for opening and closing on a pre-programmed time of day. Parking gates shall be electrically operated upon activation by the gate controller after validation of smart cards at a CID and detection of vehicle by sensing loop buried in pavement. An automatic arm reversing switch shall be activated if an obstacle is sensed in downward motion.

The parking barrier gate system shall:

A. Be protected with concrete-filled steel bollard pipes to ensure safety of the equipment and maintenance personnel against impact by vehicles, without hindering traffic flow;
B. Send or “upload” all of its activities to the Central System in real-time or at a pre-set time interval, as required by PATCO;
C. Have patron displays visible in all light conditions at all the entry locations and designed to be easily read;
D. Display “Lot Full” Red color messages at the facility entry lanes, when occupancy of the lot has reached capacity and “Enter” green color messages when accepting vehicles.
E. Reject “hot” listed or invalid smart cards and store a minimum number as required by the Section 4 of “hot” listed smart cards as specified in the Volume III;
F. Provide pictogram instructions as to how and where to present smart card;
G. The system shall include an anti-passback control feature for period parking passes (Anti-pass back feature requires a customer’s vehicle to exit the lot prior to allowing a card to be used again);
H. The system shall be capable of generating trouble alarms locally and at the Central System in real time.
I. Be placed into and taken out of service allowing for manual override both locally and from the PATCO designated Control Center,
J. Account for all of its activities in the form of activity logs and files both locally at the device level and at the Central System;
K. Have the capability to retain at least three parking fee tables (e.g., past, present, and future),
L. Display alphanumeric diagnostic status messages locally, at the Central System;
M. Allow for time-of-day day-of-week programmable automated paid or free entrance to and exit from the gated areas;
N. Provide for portable field computer plug-in interface allowing maintenance personnel to conduct in-field diagnostics and programming of the equipment. The contractor shall furnish two laptop computers with all software and cabling required for gate maintenance.
O. In the event of a loss of communications with the Central System, be able to continue to accept vehicles in a stand-alone (off-line) mode for a minimum of thirty (30) days or 100,000 transactions. The Contractor will insure that the data will be uploaded to Central Computer when the communication is restored. Transfer of data and/or tables shall also be possible using a laptop computer or other approved portable device.
P. Provide secure lock, key and password maintenance access. An employee shall unlock equipment, present a smart card and enter a password within a PATCO (software configurable table driven parameter) defined time frame or an audible alarm will sound at the device and an alarm (message) will be sent to the Central System on a real time basis;
Q. Be designed so that tampering which interferes with the proper operation of the device shall be detectable and reported back to the Central System.
R. The overall design of the parking lot system and all system components shall be presented in the design reviews as the following submittals: CDRL 502 “Parking System Design”, (CDR) 502 “Parking System Design” (PDR) and CDRL 502 “Parking System Design” (FDR).
S. The entry gate controller and the barrier shall be configured so as to allow vehicles to easily exit from the lane if their card is not accepted at the reader.
T. All gates shall be independently programmable to remain in the open position at certain times of the day, days of the week, and on user defined holidays. For example, PATCO can choose to open the exit gates at 10 am until 5 AM next day, all day Sunday, etc.
U. In the event of a loss of power, all devices must have sufficient reserve power to complete any transactions in progress and place all barriers in the open position.
V. All parking equipment shall communicate through a contractor supplied Wireless Local Area Network (WLAN) with an Access Point or a Wireless Router (as required for reliable operation) in each station with similarly equipped RF modems in each device.
5.4 OPERATION

5.4.1 Smart Card Validity Check
Upon presenting the card to the CID, the card is checked for validity. The validation process shall be programmable from the Central System and would typically consist of the following checks:

A. Check product type (stored value, stored number of uses or a period pass, such as monthly permit;
B. Compare card serial number with the “hot” list numbers;
C. Check if card is valid for Autoload
D. Check if the value is greater or equal to a minimum amount or the parking fee;
E. Check the validity period or expiration date and time on a period pass;
F. Check if the card issuer is valid;
G. Differentiate between revenue card and maintenance card;

If the card is not valid, the barrier gate remains down, and the indication of “INVALID CARD” shall be displayed.

5.4.2 Barrier Opening
The gate controller shall be easily programmable to allow the barrier arm to open and remain open during free period (10 AM to 5AM next day or programmable by DRPA/PATCO as desired) without using card. During paid time, the following process may be implemented: Upon customer tagging the smart card and its validation, the barrier shall go up and “Enter” indication and the remaining value or number of trips shall be displayed. An audible beep or a voice prompt shall accompany the “Enter” display. The volume of this tone or a voice prompt shall be adjustable and suitable for the PATCO parking lot environment. If the smart card is not accepted, an appropriate message and tone as approved by PATCO, will be generated. Other messages may be required by DRPA/ PATCO, therefore the Contractor shall confirm message requirements during design submissions of CDRLs 508 “Parking Gate Graphics and Displays”.

5.4.3 Out of Service
When the parking gate is not functioning properly and is in out of service mode, the message “OUT OF SERVICE.” shall be displayed. This message shall also be displayed in the event of a power failure. The display message shall be easily programmable by PATCO personnel to allow changing as required. The “Parking gate out of service - Maintenance required” message with indication of gate location and number shall be sent to the Central System.

5.4.4 Exiting the lot
The automatic barrier arm shall also control the egress of vehicles from the gated area of the lot. Exit through an exit gate shall be allowed upon detection of a vehicle by the
detection loop. All vehicles exiting shall be counted for traffic tracking purposes to determine the number of spaces occupied in the lot.

5.5 GRAPHICS AND DISPLAYS

The design of the parking gate graphics and displays shall be subject to PATCO review and approval and shall be submitted as part of the design reviews CDRLs 508 “Parking gate graphics and display” (CDR), CDRL 508 “Parking gate graphics and display” (PDR) and CDRL 508 “Parking gate graphics and display” (FDR) and shall include:

5.5.1 Graphics

The graphics shall include pictograms to indicate how patrons should “tag” the CID.

5.5.2 Smart Card Status Display

The smart card status display shall be located at the top of the gate cabinet near the CID so as to be viewable by the patron when tagging a smart card. The display shall be used for the following indications:

- A message to inform the customer to present the smart card to the card reader.
- A message to inform the customer of the fee deducted and balance remaining on the card
- A message to inform the customer if their balance is negative and their card needs to refilled.
- “Card is not accepted”—a message that is displayed whenever the smart card cannot be processed in the normal manner.

The Smart Card Status Display shall be programmable and shall contain sufficient quantity of LEDs to display a minimum of 24 alphanumeric characters per line with two lines of text, to inform customers of smart card status and remaining value or trips on their card.

5.5.3 Performance Requirements of Smart Card Status Display

- The displays shall have a viewing angle optimized for all drivers (those with low height subcompact vehicles and those with high-riding such as SUVs) and all light conditions. The design shall be reviewed at PDR.
- The message content, timing and duty cycle of the flashing messages shall be easily programmable from Central Computer.
- The size of the programmable display characters shall be easily readable from all types of vehicles, and shall be subject to DRPA/PATCO approval at CDR.
- The displays shall be vandal resistant by the use of scratch and impact resistant transparent polycarbonate.
- The display illumination device shall be the lowest level of field replaceable unit, to meet the modular design requirements of the Specifications.
5.6 PARKING APPLICATION

The parking Control Application shall control and monitor all functions of the parking lot system. The application shall be fully equipped to handle all functions required by this specification. The application shall be designed for the industry-standard PC compatible machine. Each parking control device shall be able to operate in a stand-alone mode (off-line); however, these devices shall also be able to communicate with the Central System via the private wireless LAN.

Communications will allow for uploading of entry and exit data, status messages; and downloading of control information. It shall be to possible to download all configuration parameters, rate tables and applicable smart card software into the parking control devices remotely from the Central System or locally from a portable field computer by PATCO designated staff. There shall be no dependency on maintaining communications with the Central System for normal operation. Non-volatile RAM storage shall be provided at the individual device level to store critical data in non-resettable registers to serve as backup in the event of failures in the communication link or the Central System. The RAM storage shall record all transactions and event data as they occur, and shall be designed to be polled from Central System and to allow local extraction of stored data when connected to the portable field computer. Upon loss of communications, data shall remain at the device level for 30 days after which the oldest entries will be overwritten first. The RAM storage shall be adequate for the storage capacity indicated plus a reserve of 300 percent of the capacity used. Expansion shall be possible with the simple addition of memory boards or chips.

5.6.1 Data to be Stored

The parking control application shall store full transactional data on all card transactions and vehicle counts processed. Specific fields to be stored are to be determined at the Preliminary Design Review, but may include, at minimum, the following:

- Product type (stored value, number of uses, period pass)
- User class
- Serial number
- Manufacturer information (ID, mfr date, work order #, run #, machine #)
- Third-party billing code
- Hourly vehicle count
- Vehicle entries by hour
- Vehicle exits by hour
- Daily vehicle exits
- Issued date
- Issued time
- Issued value
- Issuing station
- Issuing machine number
• Parking lot
• Current value
• Last use date
• Last use time
• Last use location
• Last use amount
• Last use agency
• Total number of uses
• Uses and value remaining
• 2nd previous use date
• 2nd previous use time
• 2nd previous use location
• 2nd previous use amount
• 2nd previous use agency
• Security data

5.6.2 Reports

The Contractor shall provide software capable of generating reports indicating numbers of vehicles entering and exiting a lot and numbers of vehicles and percent occupied by hour for a weekly period. The system must be capable of producing length of stay (duration reports) when the data required is available via individual card exit tracking if in the future PATCO desires to track exits with exit CIDs. The software has to be capable of tracking and storing these figures for a period of one year.

5.7 SYSTEM CLOCK

Each parking gate shall have an internally maintained time and date clock that is synchronized with the Central System’s date and time clock. The clock shall have an accuracy of +/- 1 minute per year. The clock shall have the capability of being set and synchronized locally and remotely over the data communication lines and shall provide the following time and date information:

A. Time and date stamping of Messages—to be included as needed with transmitted data to the Central System;
B. Time and Date Stamping to the appropriate smart card file;
C. Time/Date Information for smart card passes shall consist of:
   • Time in hours, minutes, and seconds in both 12-hour and 24-hour formats
   • Julian date
   • Day of week
   • Day of month
   • Month
   • Year
   • Leap Year
   • Daylight Savings Time
   • Month code
5.8 MAINTENANCE MODE

Each device shall have a maintenance mode. When in the maintenance mode, a parking gate controller shall accept PATCO maintenance smart cards as well as customers’ smartcards. Access by PATCO vehicles using maintenance card or key override shall not affect the status of gates and lots. When a maintenance mode smart card is processed, all functions shall be performed for that type of smart card except that the transaction as stored in the non-volatile memory and transmitted to Central Computer shall be identified as a Maintenance Mode Transaction. A display shall indicate that the device is in maintenance mode. The device shall automatically return to revenue mode when maintainer logs off and the access door is locked.

5.8.1 Maintenance Diagnostic Capability

A durable portable field computer (laptop) shall be used to enable troubleshooting of the parking lot system. Safeguards shall be employed to assure that changes to the software cannot be performed unless a secure and pre-approved procedure is followed. Failure messages, which shall diagnose problems to a subassembly level, shall be displayed upon addressing by means of the keypad or a portable computer. There shall be meaningful failure messages available for each type of system device. Specific failure messages are to be determined at the Preliminary Design Review (PDR X). Diagnostics of the micro-sub logic and memory storage shall be continuous and automatic. Diagnostics shall also be possible remotely via the Central System or HCS. A port shall be provided for connection to a PC compatible handheld device or portable computer for additional testing, for local printouts of statistical data or for the uploading/downloading of transaction data and tables. It should be possible to use specific commands as listed in section 5.9.3 to control the individual gate that to which the device is connected.

The contractor shall furnish two (2) of the portable field computers and all associated software and cabling. Remote diagnostic capabilities shall also be provided via Central System.

5.9 INTERFACE WITH CENTRAL SYSTEM

Data to be exchanged with the Central Computer shall be defined at the Preliminary Design Review (PDR X). Data storage requirements are identified in above in Section 5.8. For purposes of sizing the system, the requirements of this section should be considered as the minimum.

5.9.1 Data to be transmitted

The data to be transmitted to the Central AFC Computer System maybe transmitted in real time or in batches. The data to be transmitted shall include but not be limited to the
data indicated below. The data transmission process shall be accomplished with no
degradation to system performance and transaction times.
Events to be transmitted:

- Device identification number
- Location
- Date
- Time in hours, minutes, seconds
- Hourly vehicle entries
- Hourly lot occupancy
- Hourly vehicle exits
- In-service
- Out of service
- Event code or Failure message
- Change in fare gate barrier open/close status
- Change in time/day override on/off status
- Time/date of occurrence
- Change in fee table in use (fare table number)
- Change in the mode of operation from service to maintenance mode
- Personnel ID code entered
- Performed function code

Equipment Condition and Summary Data: Sent when number of events of particular
types exceed preset parameters downloadable from the Central Computer;
programmable on an individual gate basis:

- Number of failure/malfunction incidents by type
- Number of service and warning incidents by type
- Number of maintenance access.

5.9.2 Polled Data

Data for either the current period or the previous period shall be sent to Central
Computer upon request (poll). The data shall include but not be limited to the
following:

- Transactional data
- Device identification number
- Lot location
- Date
- Time in hour, minute, second
- Number of entries since last successful poll, by smart card type
- Number of exits since last successful poll
- Cumulative number of entries since last successful poll, by smart card type
- Cumulative number of exits since last successful poll
• Amount of revenue collected since last successful poll, by smart card type
• Cumulative revenue collected, by smart card type
• Number of invalid transactions
• Complete list of events with date and time since last successful poll
• Entry/exit data for each transaction and Event Data
• Invalid card data

5.9.3 Commands

Commands shall be executable from the HCS or Central System, but shall be interfaced with detection loops to prevent closing of gate on a vehicle passing through at time command is sent. The commands shall include but not be limited to the following:

• Place a selected parking device in or out of service.
• Place a selected parking lot in or out of service.
• Open or close an individual gate.
• Open or close all gates.
• Override the entry/exit check.
• Override the day/time check.
• Synchronize the clocks.
• Request poll.
• Change peak/off peak fee.
• Change fare tables.
• Change year code setting.
• Change month code setting.
• Poll parking lot device

5.9.4 Downloading

Gate parameter and configuration files shall be downloadable from the Central Computer to all or any parking control device. The data shall include but not be limited to the following:

• Parking fee tables
• Time-of-day changes in lot operation
• Changes to system configuration parameters.

In the event of loss of communication with the Central Computer, the above commands shall be executable in the field by interfacing with the parking control devices and/or individual parking control devices from the portable field computer or the maintenance keypad.
5.9.5 Wireless LAN

A. The Contractor shall provide a wireless LAN for transmitting data between the parking lot equipment and the AFC system. The wireless LAN shall allow communication between the parking gates access points and a wireless router in the station communications room, with a range of at least 300’.

B. If any equipment external to the body of the gate is used for this system, it shall be configured so that it is as durable as the gate.

C. The contractor shall visit all parking lots and review the layouts and test the wireless data transfer system for adequate range.

D. Data transmission shall include exchanging basic operating parameters, such as fare tables, equipment status, configuration information and all customer transactions.

E. Data transmission systems must meet the following requirements:
   • All needed data must be transmitted between the gate and central system with 100% Accuracy, 100% of the time. This is to be confirmed through Acceptance Testing.
   • System must not interfere with other data communications (for example, telecommunications, RF, optoelectric, infrared or other) in use within or near the station facilities, including a wireless LAN that may be implemented separately.
   • Influence of the wireless LAN must be limited to the vicinity of the parking lots.
   • System must provide a means of assuring that all devices are polled and updated regularly.
   • System must not be subject to interruption, Malfunction, failure or data corruption due to use of electrical or electronic other devices including, but not limited to microwave ovens, computers, radios, RF LANs in close proximity, etc.

F. Design of the wireless LAN shall be provided in increasingly detailed levels of description for DRPA/PATCO review and acceptance at the Conceptual, Preliminary and Final Design Reviews. Required are CDRLs 507 “Design of the wireless LAN” (CDR), (PDR), and (FDR). These details shall include, at minimum:

G. Full system concept applicable to all parking lots (CDR)
   • Testing of system concept at each station, resulting in a detailed approach for each parking lot showing system components location and configuration. Testing is to include mockup parking gates (FDR)
   • Detailed installation plan drawings for each parking lot (50 days prior to installation)

H. Contractor shall coordinate with DRPA/PATCO in the design of the Wireless LAN to assure that the design meets the objectives described herein. Notwithstanding any Acceptance or approvals provided by DRPA/PATCO, the Contractor shall not be
relieved of providing a complete and working System that meets the language and intent of this specification.

5.10 CONTACTLESS SMART CARD INTERFACE

Smart Card Interface Devices (CID) for use with the contactless transit smart card media shall be provided on all parking entry gate controllers as indicated. The exit gate controller shall be CID ready with the option easily implemented when desired by PATCO. Requirements and design criteria for the smart card functionality are specified in Smart Card Requirements Section 4.

5.11 DETAILED SPECIFICATIONS FOR KEY PARKING SYSTEM COMPONENTS

All cabinets, structural members and fasteners shall be stainless steel or equivalent material to be able to withstand outdoor exposure and resist corrosion from exposure to weather elements and de-icing chemicals. All cabinets shall be provided with lights for nighttime servicing.

The Contractor shall perform a site survey and investigate available capacity and viability of the existing PATCO parking lot power distribution system. Any power, communication or architectural requirements must be presented at PDR along with recommended appropriate and cost-effective solutions.

5.11.1 Automatic Gate

A. Provide UL approved automatic barrier gate parking access-control system.
B. Cabinet: Stainless steel cabinet, welded and weather tight seams, reinforced internally with welded stainless steel angle framing, thermally insulated to permit heater to maintain cabinet temperature to equipment operating minimum, flush access doors and panels, tamper proof hardware, weather tight gaskets, master keyed locks; furnish two (2) keys for each gate, keyed alike. Conceal mounting bolts inside units.

1. Arm Control: Mechanism to raise and lower arm by instant reversing electric motor, enclosed speed reducer operated by self contained, plug-in replaceable controller. Design mechanism with slip clutch to prevent breakage if arm is forced, and to permit manual operation if required. Arm movement to stop and start at reduced speed. Arm control shall allow detection of obstruction when lowering arm and instantly reverse arm to up direction.

2. Cabinets shall have high security locking mechanism furnished with stainless steel Best Lock 7 pin cylinders. PATCO will furnish interchangeable Best 7 pin cores to match its key system.

C. Electrical Components: Self-contained, plug-in, replaceable components. Include wiring for control units, zinc plated connection box, GFI protected convenience
outlet, switch for automatic or manual operation, switch to disconnect power unit, thermostatically controlled minimum 250 Watt heater strip with control switch and preset thermostat, and thermal protection disconnect for motor.

5.11.2 Electrical Characteristics And Components

A. Electrical Characteristics:
   1. Provide a minimum of 1/3 hp motor
   2. Provide 115 volts AC, single three phase, 50 Hz.

B. Motor: Instant reversing motor for operation of gate arm.

C. Controls: Transmit power to gate arm drive shaft through a harmonic acting crank and connecting rod. Fabricate cranks, rod, and drive shaft of galvanized solid bar steel.

D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

E. Disconnect Switch: Factory mount disconnect switch in control panel.

5.11.3 Barrier Arm

A. Gate Arm: Fabricate gate arm of nominal 25 mm (1 inch) thick, length as indicated, of weather-proof wood or aluminum, one piece arm, articulating arm with internal counterbalance, (with safety rubber bottom edge and automatic instant reversing arm mechanism that stops downward motion of gates if arm strikes an object, and returning arm immediately to upward position. Safety rubber bottom edge on gate arm shall not cause damage if strikes vehicle in downward motion. Equip mechanism with a 0 to 50 second variable time reset device.

1. Barrier Arm finish should be diagonal stripes in black and reflective safety yellow on both faces. Furnish one spare arm per gate.

B. Arm Clamp: Cast metal, quick change clamp and hub bracket, to permit rapid replacement of arm without fitting or drilling. Provide breakaway feature to ensure clean break if arm is struck.

5.11.4 Card Reader Unit

A. General: Provide pedestal mounted card control units to activate barrier gates.

B. Control Unit: To activate gate arm by tagging or waving a contactless smart card in the range of up to five inches away from the smart card reader (target).

C. Cabinet: 1.9 mm (0.075 inch) minimum stainless steel, weather tight seams; thermally insulated to permit heater to maintain cabinet temperature to equipment operating minimum, flush access doors and panels, tamper proof flush mounted lock hardware and two (2) keys master keyed to operate access panel, weather tight gaskets. Conceal mounting bolts inside units.

1. Mount housing on a 50 mm (2 inch) square steel tube pedestal with a curved top to receive housing, and a trim plate to cover anchor bolts.

2. Finish interior and exterior of cabinet with manufacturer’s standard baked enamel finish over primer. Color to be coordinated.

D. Card Interface Device (CID): Smart card target and gate heights shall be adjustable to accommodate reach requirements for subcompacts and SUVs as
well as varying curb heights above pavement. The target shall be clearly visible and illuminated in the dark and protected with projecting weather shield.

5.11.5 Vehicle Detection

A. Vehicle Detection: For use in temperature range of -40 to 71 °C; (-40 to 150) °F) to consist of detector unit in conjunction with sensing loop to activate card control and or barrier gate when vehicle enters or exits.

B. Loop Wire: 14 gage, XHWN or THWN copper; loop size of 200 X 800 mm. ((48 X 72) inches.) or equivalent

C. Loop Groove Fill: Same material as pavement: hot poured asphalt or cold poured rubberized asphalt emulsion.

D. Treadle Plate: Steel, galvanized, or Stainless steel, /3300 X 1800 mm size, (// 12 X 72 inches; to consist of weatherproof sensor detector to activate card control and/or barrier gate when vehicle enters or exits.