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UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2010

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DIVISION 34 - TRANSPORTATION

SECTION 34 41 26.00 10

ACCESS CONTROL POINT CONTROL SYSTEM

02/09

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wrong way detection zones, Closed Circuit Television (CCTV) camera coverage areas, Intrusion Detection Sensor locations, traffic signal and warning beacon locations, actuated gate arm locations, and incidental construction. Also, include active barrier control panels and control schematics.

Standard Drawing E1.03 can be used for required control panels, and appropriate drawing among drawings E1.04 through E1.06 can be used for the control schematic. However, if changes to the control panels from drawing E1.03 are made, the designer is responsible for changing the control schematic (drawing E1.04, 5, or 6) to provide the security and safety measures required in the Army Standard for ACPs.

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO GDHS-5	(2004) A Policy on Geometric Design of Highways and Streets, 5th Edition
AASHTO LTS-5	(2009; Errata 2009) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals
AASHTO RSDG-3	(2002; Errata 2006) Roadside Design Guide

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

- IEEE 142 (2007) Recommended Practice for Grounding of Industrial and Commercial Power Systems - IEEE Green Book
- IEEE 802.3 (2008) Standard Information Technology--Telecommunications and Information Exchange Between Systems--Specific Requirements Part 3: CSMA/CD Access Method and Physical Layer Specifications
- IEEE C62.41.1 (2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
- IEEE C62.41.2 (2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)

- ITE ATC (2006; v5.2b) Advanced Transportation Controller (ATC) Standard

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

- IEC 60068-2-27 (2008) Environmental Testing - Part 2-27: Tests - Test EA and Guidance: Shock
- IEC 60068-2-30 (2005) Environmental Testing - Part 2-30: Tests - Test Db: Damp Heat, Cyclic (12 H + 12 H Cycle)
- IEC 61000-4-5 (2005; Errata 2009) Electromagnetic Compatibility (EMC) - Part 4-5: Testing and Measurement Techniques; Surge Immunity Test

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- NEMA 250 (2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
- NEMA ICS 1 (2000; R 2005; R 2008) Standard for Industrial Control and Systems: General Requirements
- NEMA TS-1 (1989; R 2005) Traffic Control Systems (not recommended for new designs)
- NEMA TS-2 (2003) Traffic Controller Assemblies with NTCIP Requirements - Version 02.06

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- NFPA 70 (2008; AMD 1 2008) National Electrical Code

U.S. ARMY (DA)

DA AR 55-80

(2003) DOD Transportation Engineering Program

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1

(2008) Safety and Health Requirements Manual

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD

(2000) Manual of Uniform Traffic Control Devices

NCHRP 350

(1993) Recommended Procedures for the Safety Performance Evaluation of Highway Features

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

21 CFR 1040

Performance Standards for Light-Emitting Products

UNDERWRITERS LABORATORIES (UL)

UL 1076

(1995; R 1996 thru 2005) Standard for Proprietary Burglar Alarm Units and Systems

UL 796

(2006; R 2006 thru 2009) Standard for Printed-Wiring Boards

1.2 ACRONYM LIST

- a. ACP - Access Control Point
- b. ACPCS - Access Control Point Control System
- c. AIE - Automated Installation Entry
- d. AVB - Active Vehicle Barrier
- e. AVBCS - Active Vehicle Barrier Control System
- f. BMS - Balanced Magnetic Switch
- g. CCTV - Closed Circuit Television System
- h. CPU - Central Processing Unit (Computer)
- i. CSMS - Central Security Monitoring Station (e.g., Installation Police Station)
- j. DTS - Data Transmission System
- k. EFO - Emergency Fast Operate (active barrier emergency fast close control)
- l. FAT - Factory Acceptance Test
- m. GCC - Gatehouse Control Console
- n. IDS - Intrusion Detection System
- o. PLC - Programmable Logic Controller
- p. PVT - Performance Verification Test
- q. RSM - Remote Status Monitor
- r. SDC - Standard Design/Criteria
- t. SDDC - Surface Development and Distribution Command
- u. TCU - Traffic Controller Unit
- v. UPS - Uninterruptible Power Supply
- w. VCC - Visitors Control Center
- x. VPD - Vehicle Presence Detector

1.3 SYSTEM DESCRIPTION

Furnish and install a complete and functional ACPCS for the Access Control Point including active vehicle barriers, active vehicle barrier controls, traffic signals, traffic signal controls, traffic warning signals, traffic signs and pavement markings, actuated traffic arms, vehicle over speed and wrong-way detectors, vehicle presence detectors, building intrusion detectors, duress alarms, Alarm Display, Alarm Panel(s), Sequence of Events Recorder, CCTV system, data transmission, and all interconnecting conduit and wiring. Provide a Health and Safety Plan in accordance with EM 385-1-1.

1.3.1 Design Strategy

The primary objective of the ACP is to prevent an unauthorized vehicle from entering the Installation. The overall design strategy to meet this objective is to detect the vehicle as early in its attack as possible and to delay the threat vehicle a sufficient amount of time to allow ACP guards time to deploy the active vehicle barriers before the threat vehicle enters the Installation.

1.3.1.1 Detection

ACP guards in the Gatehouse, Guard Booths, and Overwatch Position (if provided) are the primary means of detecting a threat vehicle. The ACP design includes technology to aid guards in detecting possible threat vehicles. Detection technology includes over speed detection of a threat vehicle attempting to run the gate and wrong-way detection of a threat vehicle attempting to enter the Installation in the outbound lanes. Assessment technology includes CCTV.

1.3.1.2 Deploy the Barrier

Once ACP guards detect a threat vehicle, they will initiate the Emergency Fast Operate (EFO) command on their respective control panel. The EFO command will start a sequence to close all active vehicle barriers in the barriers' emergency fast operate mode. The active barrier close sequence will include safety features to ensure that innocent vehicles obtain sufficient warning of barrier deployment such that they can either clear the barrier before it deploys or stop safely in front of it.

1.3.1.3 Delay

The ACP design includes features to delay the threat vehicle to allow guards time to deploy the active vehicle barriers. Delay features take into consideration the point in the ACP where the threat vehicle is detected, the speed of the threat vehicle at the point of detection, the maximum acceleration rate of the threat vehicle, and any ACP features that will limit the acceleration of the threat vehicle or require it to slow down, e.g., turns, chicanes, serpentine, etc. Delay features are included in the overall ACP design and are not part of this specification.

1.3.2 Over-speed and Wrong-Way Sensors

Overspeed and wrong-way detectors are used to detect a potential threat vehicle attempting to gain unauthorized entry to Installation. In order to maximize the effectiveness of overspeed and wrong-way detectors, the speed limit in all inbound and outbound lanes of the ACP shall be no greater than 40 km/hr 25 mph except in the inbound lanes from the ID Check Point to 75m

250 feet in front of the ID Check Point, where it shall be no more than 24 km/hr 15 mph.

NOTE: Choose on of the following three over speed sensor paragraphs in accordance with the ACP design.

[1.3.2.1 Point Over Speed

Over speed detectors shall be installed to detect any vehicle traveling over the posted ACP speed limit at a point or points in the approach zone. Sensors can be induction loops, radar, lidar, video motion, or other technologies capable of detecting the speed of vehicles as they enter the ACP. Sensor ranges and settings are shown on the drawings.

]1.3.2.2 Continuous Over Speed Detection - One Zone

NOTE: See Appendix D of the SDC for method to determine over speed settings and range.

Over speed detectors shall be installed to detect a vehicle traveling over the posted ACP speed limit in any of the inbound lanes anywhere between the ID Check Point and a specified distance ahead of the ID Check Point. Over speed detectors shall be mounted from the canopy roof, from trusses spanning over the entry lanes, from light poles, or from other locations that provide unobstructed view of the detection area. Speed detectors shall be forward or reverse looking. Sensors shall use radar, lidar, video motion, or other technologies capable of detecting a speeding vehicle over a continuous range. Sensor ranges and settings are shown on the drawings.

]1.3.2.3 Continuous Over Speed Detection - Two Zones

NOTE: See Appendix D of the SDC for method to determine over speed settings and range.

Two sets of over speed detectors shall be installed. The first set shall cover a zone (Zone 1) between 2 points in front of the ID Check Area. The Second Set shall cover a zone (Zone 2) from the end of Zone 1 to the ID Check Area. Over speed detectors shall be mounted from the canopy roof, from trusses spanning over the entry lanes, from light poles, or from other locations that provide unobstructed view of the detection area. Speed detectors shall be forward or reverse looking. Sensors shall use radar, lidar, video motion, or other technologies capable of detecting vehicle speeds over a continuous range in the zones described above. Sensor ranges and settings are shown on the drawings.

]1.3.2.4 Wrong Way Detection

Wrong way detectors shall be installed to detect vehicles traveling the wrong way in the outbound lanes. As a minimum, wrong way detectors shall be installed at the ACP entrance and at each turn-around in the ACP. Sensors shall be induction loops, radar, lidar, video motion, or other technologies capable of detecting a vehicle traveling the wrong way.

1.3.3 Active Vehicle Barrier Safety System

NOTE: Select one of the following barrier safety systems. Include the appropriate Appendix, at the end of this specification, in the Performance Specifications.

The [Signs and Signals][Presence Detection][Normally Deployed] Safety System, as approved by the Surface Development and Distribution Command (SDDC), shall be installed and programmed to ensure the safety of innocent motorists. See Appendix A for the required features and operational sequences of this safety system.

1.4 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the bracketed Government approval only when needed. Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [Information Only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Group I Technical Data Package[; G][; G, [_____]]

- a. Functional System Block Diagram, identifying all major equipment, interconnecting wire types and quantities, approximate distances, and communications protocols.
- b. Block and Wiring Diagrams of each subsystem.
- c. Drawing showing layout and dimensions of the Gatehouse Control Console with the Alarm Display, CCTV monitor and controls, and the barrier Master Control Panel.
- d. Drawing showing equipment layout in the Gatehouse including the Gatehouse Control Console, UPS, and other hardware intended to be located in the Gatehouse.
- e. Drawing showing equipment layout around the active vehicle barriers including the active vehicle barriers, active vehicle barrier control box(es), vehicle presence detectors, Stop Lines, Traffic Signals, Wig-Wag warning signals (if applicable), and Traffic Arms (if applicable).
- f. Device wiring and installation drawings.
- g. Point to point wiring diagram of complete interconnected system including database listing of wire numbers, to and from designations, and wire characteristics.
- h. Details of connections to power sources, including power supplies and grounding.
- i. Details of surge protection device installation.
- j. Intrusion Detection System block diagram and sensor layout.
- k. Over speed, wrong-way, and vehicle presence detector locations and sensor detection patterns.
- l. Traffic signals and traffic signal supports.

Group IV Technical Data Package[; G][; G, [_____]]

- a. Color print of the graphical user interface (GUI) screens on 216 x 292 mm 8-1/2 by 11 inch paper.
- b. ACP Processing and Control database on 216 by 292 mm 8-1/2 by 11 inch paper.
- c. Control diagrams and programming flow charts showing complete control details of the active vehicle barriers, traffic signals, and over speed and wrong way annunciation system.

Group V Technical Data Package[; G][; G, [_____]]

Final system drawings, as specified.

SD-03 Product Data

Group I Technical Data Package[; G][; G, [_____]]

a. The software data package consisting of descriptions of the operation and capability of all subsystem software.

b. Key control plan for all Contractor provided enclosures requiring locks and all keyed control switches. The key control plan shall include the following: 1) Procedures that will be used to log and positively control all keys during installation. 2) A listing of all keys and where they are used. 3) A listing of all persons allowed access to the keys.

c. Quality Control Plan for approval. The QC Plan shall describe all Contractor and subcontractor activities during design, manufacture, and installation of the ACPCS. The QC Plan shall include all Contractor and subcontractor technical data reviews, inspections, certifications, and approvals and the QC documentation procedures.

Group II Technical Data Package[; G][; G, [_____]]

Current site conditions report, as specified.

Group IV Technical Data Package[; G][; G, [_____]]

- a. Computers and peripherals.
- b. User enrollment.
- c. System start-up and shutdown procedures.
- d. Use of system and application software.
- e. Recovery and restart procedures.
- f. Use of report generator and generation of reports.
- g. Data entry.
- h. Operator commands.
- i. Alarm and system messages and printing formats.
- j. System entry requirements.

Group V Technical Data Package[; G][; G, [_____]]

Finalized Group IV Manuals, as specified in Group IV Technical Data Package.

SD-05 Design Data

Group I Technical Data Package[; G][; G, [_____]]

The data package including system descriptions, analyses, and calculations used in sizing equipment specified. Descriptions and calculations shall show how the equipment will operate as a system to meet the performance of this specification. The data package

shall include the following:

- a. Communications speeds and protocol descriptions.
- b. CD-ROM/CD-RW/DVD-RW drive speed and protocol descriptions.
- c. Alarm response time.
- d. Command response time.
- e. Start-up operations including system and database backup operations.
- f. Expansion capability and method of implementation.
- g. Sample copy of sequence of events report.
- h. Uninterruptible Power Supply (UPS) Calculations.
- i. Design calculations for traffic signal supports.

SD-06 Test Reports

Group III Technical Data Package[; G][; G, [_____]]

- a. Test Plan for the Factory Acceptance Test.
- b. Test Plan for Contractor Field Test.
- c. Factory Acceptance Test Report.
- d. Contractor Field Test Report.

Group IV Technical Data Package[; G][; G, [_____]]

- a. Test Plan for the Performance Verification Test.
- b. Test Plan for the Endurance Test.
- c. Performance Verification Test Report.
- d. Commissioning Report.

SD-07 Certificates

Group I Technical Data Package[; G][; G, [_____]]

Certifications from the manufacturers of the following equipment shall be submitted with the data package: Active Vehicle Barrier, Traffic Controller Unit, Traffic Arm, Warning Signal, Annunciator, Sequence of Events Recorder, Alarm Panels, CCTV system, and all sensors including over speed, wrong-way, vehicle presence, intrusion detection, and tamper.

Technical Specialists[; G][; G, [_____]]

Names and qualifications for each of the technical specialists for the Active Vehicle Barriers, the Traffic Controller Unit subsystem, and the CCTV subsystem.

SD-08 Manufacturer's Instructions

Group I Technical Data Package[; G][; G, [_____]]

The data package shall include manufacturer's data for all equipment and end devices provided under these specifications.

1.5 QUALITY ASSURANCE

1.5.1 Project Manager Qualifications

Designate a Project Manager for all work under this specification. The Project Manager shall provide technical and managerial leadership to all contractor personnel and subcontractors during the design, manufacturer, and installation phases of this specification. The Project Manager shall be the primary point of contact for the Government for this specification. The Project Manager shall have a minimum of 5 years of experience in the design, manufacture, and installation of similar systems.

1.5.2 Installation Superintendent Qualifications

Designate an Installation Superintendent responsible for onsite installation team direction and leadership. The Superintendent shall provide first line supervision of tradesmen and subcontractors. The Superintendent shall be responsible for job planning and shall coordinate the work with trades, subcontractors, vendors, and site personnel. The Superintendent shall be responsible for scheduling materials, equipment, and labor to maintain the flow of work commensurate with the task schedule. The Superintendent shall administer and execute the provisions of the Accident Prevention Plan. The Superintendent shall have a minimum of 5 years of experience in the installation, operation, and testing of similar systems.

1.5.3 QC Representative Qualifications

Provide a Quality Control Representative responsible for establishing, executing and reporting on the Government approved Contractor Quality Control Plan as required in the Group I Technical Data Package. Quality Control Representative shall report independently to the Project Manager on matters of quality control. The Quality Control Representative shall have a minimum of 5 years experience in performing quality control duties.

1.5.4 Technical Specialists Qualifications

Provide the services of technical specialists for the Active Vehicle Barriers, the Traffic Controller Unit subsystem, and the CCTV subsystem. The technical specialists shall have a minimum of 5 years of experience in the installation, operation, and testing of all components, software, and interconnecting wiring of their particular equipment/subsystem. In addition, the technical specialist for the Traffic Controller Unit subsystem shall have valid International Municipal Signals Association (IMSA) certifications for Traffic Signals and Work Zone Safety. Submit the names and qualifications (including proof of IMSA certifications for the Traffic Controller Unit subsystem technical specialist) of the candidate technical specialists to the Contracting Officer for approval. Each technical specialist shall be present in the factory during manufacture and assembly of the subsystem, during Factory Tests of the subsystem, during subsystem installation in the field, and shall serve as the Contractor's

Commissioning Specialist for their designated equipment/subsystem for the commissioning tests as specified.

1.5.5 Line Supervision

1.5.5.1 General

All signal and Data Transmission System (DTS) lines shall be supervised by the system. The system shall supervise the signal lines by monitoring the circuit for changes or disturbances in the signal and for conditions as described in [UL 1076](#) for line security equipment. The system shall initiate an alarm in response to a current change of [5][10] percent or greater. The system shall also initiate an alarm in response to opening, closing, shorting, or grounding of the signal and DTS lines.

1.5.5.2 Data Transmission System (DTS)

NOTE: Include in the project specification one or more of the UFGS for the appropriate Data Transmission required at the project site

Provide DTS as specified in Section [27 15 19.00 10 WIRE LINE DATA TRANSMISSION SYSTEM] [27 21 10.00 10 FIBER OPTIC DATA TRANSMISSION SYSTEM] [33 82 33.00 10 COAXIAL CABLE DATA TRANSMISSION SYSTEM].

1.6 DELIVERY OF TECHNICAL DATA AND COMPUTER SOFTWARE

NOTE: The acquisition of technical data, databases, and computer software items that are identified herein will be accomplished in accordance with the Federal Acquisition Regulation (FAR) and the Department of Defense Acquisition Regulation Supplement (DOD FARS).

Those regulations, as well as the specific Service implementation thereof, should also be consulted to ensure that a delivery of critical items of technical data is not inadvertently lost. Specifically, the Rights in Technical Data and Computer Software Clause, DOD FARS 52.227-7013, and the Data Requirements Clause, DOD FARS 52.227-7013, as well as any requisite software licensing agreements will be made a part of the CONTRACT CLAUSES or SPECIAL CONTRACT REQUIREMENTS of the contract. In addition, the appropriate DD FORM 1423 Contract Data Requirements List, will be filled out for each distinct deliverable data item and made a part of the contract. Where Necessary, DD FORM 1664, Data Item Description, shall be used to explain and more fully identify the data items listed on the DD FORM 1423.

It is to be noted that all of these clauses and forms are required to assure the delivery of data in question and that such data is obtained with the requisite rights to use by the Government. Include

with the request for proposals a completed DD FORM 1423, Contract Data Requirements List. This form is essential to obtain delivery of all documentation. Each deliverable will be clearly specified, both description and quantity being required. Include a payment schedule in the SPECIAL CONTRACT REQUIREMENTS of the request for proposals. This payment schedule will define payment milestones and percentages at specific times during the contract period.

The designer must show all salient features of the ACPCS on the drawings. Also, show any work required in restricted or hazardous locations and include the type of hazard, class, and group.

All items of computer software and technical data (including technical data which relates to computer software), which is specifically identified in this specification shall be delivered in accordance with the CONTRACT CLAUSES, SPECIAL CONTRACT REQUIREMENTS, and in accordance with the Contract Data Requirements List (CDRL), DD FORM 1423, which is attached to and thereby made a part of this contract. All data delivered shall be identified by reference to the particular specification paragraph against which it is furnished.

1.6.1 Group I Technical Data Package

Provide the Group I Technical Data Package 30 days after receipt of the Notice to Proceed. The data package shall include the items listed in the Submittals paragraph as required.

1.6.2 Group II Technical Data Package

Submit the Group II Technical Data Package within 60 days of Notice to Proceed. Prepare and submit a report of "Current Site Conditions" to the Government documenting site conditions that significantly differ from the design drawings or conditions that affect performance of the system to be installed. Provide specification sheets, or written functional requirements to support the findings, and a cost estimate to correct those site changes or conditions. Do not perform any field work until the "Current Site Conditions" report is approved by the Government. Do not correct any deficiencies identified in the report without written permission from the Government.

1.6.3 Group III Technical Data Package

Submit Test Plans, as specified in the Submittals paragraph, a minimum of 30 days before the scheduled start of all factory acceptance tests and 15 days before the scheduled start of the Contractor Field Tests. Submit the Factory Acceptance Test Report and Contractor Field Test Report no more than 1 week after the completion of each test.

1.6.4 Group IV Technical Data Package

Provide the Group IV Technical Data Package 30 days prior to the start of the Performance Verification Test. The data package shall include the items specified in the Submittals paragraph as required. Submit the Performance Verification Test Report no more than 1 week after the test.

Submit the Commissioning Report no more than 2 weeks after completion of the Endurance Test. The data package shall contain an Operator's Manual fully explaining all procedures and instructions for the operation of the system, including:

1.6.4.1 Active Vehicle Barrier Controls

Describe operation of barrier control modes, barrier control switches, barrier normal and emergency operation, traffic signals, warning beacons, vehicle presence detectors, and actuated traffic arms. Include descriptions of security strategy for defeating a threat vehicle and the SDDC approved barrier safety system for protecting innocent vehicles from barrier operations.

1.6.4.2 Over-speed and Wrong-way detection

Include descriptions of the security strategy for detecting potential threat vehicles, the coverage and operation of the sensors, and the man machine interfaces for over-speed and wrong way alarms.

1.6.4.3 Traffic Control Plan for the Maintenance of Traffic During Construction

Provide a Traffic Control Plan for maintenance of traffic during construction per Section 08C of [EM 385-1-1](#).

1.6.4.4 Traffic Control Plan During Active Vehicle Barrier Maintenance

Describe plans for taking one or more active barriers out of service for maintenance or testing purposes, while other barriers at the ACP remain in service. As a minimum, include requirements for traffic signal indications and for temporary passive barriers and signage, e.g., Type 3 passive barriers, per [MUTCD](#). Include both short term (less than an hour) and long term plans.

1.6.4.5 Application Software

Where an application software installed on a computer (computers) is involved, provide the default (manufacturer's standard) software installation package on CD (CDs). Provide also, on CD (CDs) separate from the default software, the complete image of the installed software, with all custom changes and configuration data specific for the installed system. The software image shall be the same as that of the system used when it is put in operation before the final acceptance tests, and a subsequent one that is used for the final (30-day) acceptance tests, after all pending corrections and adjustments have been implemented.

1.6.4.6 Software Manual

The software manual shall describe the functions of all software and shall include all other information necessary to enable proper loading, testing, and operation. The manual shall include:

- a. Definition of terms and functions.
- b. Use of system and application software.
- c. Procedures for system initialization, start-up and shutdown.

- d. Alarm reports.
- e. Reports generation.
- f. Database format and data entry requirements.
- g. Directory of all disk files.
- h. Description of all communication protocols, including data formats, command characters, and a sample of each type of data transfer.
- i. Interface definition.

1.6.4.7 Hardware Manual

The hardware manual shall describe all equipment furnished including:

- a. General description and specifications.
- b. Installation and checkout procedures.
- c. Equipment electrical schematics and layout drawings.
- d. System schematics and layout drawings.
- e. Alignment and calibration procedures.
- f. Manufacturer's repair parts list indicating sources of supply.
- g. Interface definition.

1.6.4.8 Functional Design Manual

The functional design manual shall identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. A description of hardware and software functions, interfaces, and requirements shall be included for all system operating modes.

1.6.4.9 Maintenance Manual

The maintenance manual shall include descriptions of maintenance for all equipment including inspection, periodic prevention maintenance (include specific time intervals for each recommended preventative maintenance tasks), fault diagnosis, and repair or replacement of defective components.

1.6.4.10 Training Documentation

Lesson plans and training manuals for the training phases, including type of training to be provided, and a list of reference material, shall be delivered for Government approval.

1.6.4.11 Data Entry

Enter all data needed to make the system operational. Deliver the data to the Government on data entry forms, utilizing data from the contract documents, Contractor's field surveys, and other pertinent information in the Contractor's possession required for complete installation of the database. Identify and request from the Government, any additional data

needed to provide a complete and operational ACPCS. The completed forms shall be delivered to the Government for review and approval at least 30 days prior to the Contractor's scheduled need dates. When the ACPCS database is to be populated in whole or in part from an existing or Government furnished electronic database, demonstrate the field mapping scheme to correctly input the data.

1.6.5 Group V Technical Data Package

NOTE: The designer will specify the correct number of manuals on DD FORM 1423. Unless the installation has a specific requirement, specify 2 copies of all manuals, except the Operator's Manual, which should be specified to be 6 copies.

Provide the Group V Technical Data Package within 30 days after completing the Endurance Test. The data package shall include:

1.6.5.1 Group IV Manuals

Final copies of the Group IV Manuals bound in hardback, loose-leaf binders. The draft copy used during site testing shall be updated with any changes required prior to final delivery of the manuals. Each manual's contents shall be identified on the cover. Each manual shall include names, addresses, and telephone numbers of each subContractor installing equipment and systems, and the nearest service representative for each item of equipment. The manuals shall have a table of contents and tab sheets. Tab sheets shall be placed at the beginning of each chapter or section and at the beginning of each appendix. The final copies delivered after completion of the endurance test shall include modifications made during installation, checkout, and acceptance. The number of copies of each manual to be delivered shall be as specified on DD FORM 1423.

1.6.5.2 Final System Drawings

Maintain a separate set of drawings (including site, civil, electrical, mechanical, structural, and architectural plans, elevations, and details), elementary diagrams, wiring diagrams, control diagrams, and programming flow charts of the system to be used for final system drawings. This set shall be accurately kept up-to-date with all changes and additions to the ACPCS and shall be delivered to the Government with the final endurance test report. In addition to being complete and accurate, this set of drawings shall be kept neat and shall not be used for installation purposes. Final drawings submitted with the endurance test report shall be finished drawings on CD-ROM in [Microstation Version 8][AutoCAD 2006][or more recent][_____] format.

1.7 WARRANTY

NOTE: The maintenance and service to be provided during first year's warranty period will be included as a separate bid item, and must be funded with O & M funds. The designer will coordinate funding requirements with the installation.

Provide all labor, equipment, and materials required to maintain the entire system in an operational state as specified, for a period of two years after formal written acceptance of the system to include scheduled and nonscheduled adjustments.

1.8 MAINTENANCE AND SERVICE

1.8.1 Description of Work

The adjustment and repair of the system includes all vehicle barriers, traffic arms, traffic signals, warning signals, computer equipment, CCTV system components, sequence of events recorder, software updates, communications transmission equipment and DTS, local processors, over speed and wrong-way sensors, vehicle presence detection sensors, IDS sensors, facility interface, and support equipment. All repair, calibration, and other work shall be provided and performed in accordance with the manufacturer's documentation and instruction. Responsibility shall be limited to Contractor installed equipment.

1.8.2 Service Personnel

Service personnel shall be certified in the maintenance and repair of the specific type of equipment installed and qualified to accomplish work promptly and satisfactorily. The Government shall be advised in writing of the name of the designated service representative, and of any change in personnel.

1.8.3 Schedule of Work

Perform two minor inspections at 6 month intervals (or more often if required by the manufacturer), and two major inspections offset equally between the minor inspections to effect quarterly inspection of alternating magnitude.

1.8.3.1 Minor Inspections

Minor inspections shall include visual checks and operational tests of active vehicle barriers (cleaning pit if necessary), traffic arms, traffic signals, console equipment, peripheral equipment, local processors, sensors, and electrical and mechanical controls.

1.8.3.2 Major Inspections

Major inspections shall include work described under paragraph Minor Inspections and the following work:

- a. Clean interior and exterior surfaces of all system equipment and local processors, including workstation monitors, keyboards, and console equipment.
- b. Perform diagnostics on all equipment.
- c. Check, walk test, and calibrate each sensor.
- d. Run all system software diagnostics and correct all diagnosed problems.
- e. Resolve any previous outstanding problems.
- f. Purge and compress data bases.

g. Review network configuration.

1.8.3.3 Scheduled Work

Scheduled work shall be performed during regular working hours, Monday through Friday, excluding federal holidays.

1.8.4 Emergency Service

NOTE: In some cases the designer may determine a less rapid response time is acceptable when weighed against the cost of the service. The designer must insert a time based upon input from the user.

The Government will initiate service calls to the Contractor when the system is not functioning properly. Qualified personnel shall be available to provide service to the complete system. The Government shall be furnished with a telephone number where the service supervisor can be reached at all times. Service personnel shall be at site within [2] [4] [_____] hours after receiving a request for service. The system shall be restored to proper operating condition within 8 hours after service personnel arrive onsite and obtain access to the system.

1.8.5 Operation

Performance verification test procedures shall be used after all scheduled maintenance and repair activities to verify proper component and system operation.

1.8.6 Records and Logs

Maintain records and logs of each performed task and organize cumulative records for each component and for the complete system chronologically resulting in a continuous log to be maintained for all devices. The log shall contain all initial settings. Complete logs shall be kept and shall be available for inspection onsite, demonstrating that planned and systematic adjustments and repairs have been accomplished for the system.

1.8.7 Work Requests

Record separately each service call request, as received. The form shall include the serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing what has to be done, the amount and nature of the material to be used, the time and date work started, and the time and date of completion. Deliver a record of the work performed within 5 days after work is accomplished.

1.8.8 System Modifications

Make any recommendations for system modification in writing to the Government. System modifications shall not be made without prior approval of the Government. Any modifications made to the system shall result in the updating of the operation and maintenance manuals as well as any other documentation affected.

1.8.9 Software

Provide a description of all software updates to the Government, who will then decide whether or not they are appropriate for implementation. After notification by the Government, implement the designated software updates and verify operation in the system. These updates shall be accomplished in a timely manner, fully coordinated with system operators, and shall be incorporated into the operation and maintenance manuals, and software documentation. Make a system image file prior to implementing any software update so the system can be restored to its original state if the update adversely affects system performance.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Materials and Equipment

Units of equipment that perform identical, specified functions shall be products of a single manufacturer. All material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's model and serial number in a conspicuous place.

2.1.2 Field Enclosures

2.1.2.1 Interior Sensors

Sensors to be used in an interior environment shall have a housing that provides protection against dust, falling dirt, and dripping non-corrosive liquids.

2.1.2.2 Exterior Sensors

Sensors to be used in an exterior environment shall have a housing that provides protection against windblown dust, rain and splashing water, and hose directed water. Sensors shall be undamaged by the formation of ice on the enclosure.

2.1.2.3 Interior Electronics

Systems electronics to be used in an interior environment shall be housed in enclosures which meet the requirements of NEMA 250, Type 12.

2.1.2.4 Exterior Electronics

Systems electronics to be used in an exterior environment shall be housed in enclosures which meet the requirements of NEMA 250, Type 4X.

2.1.2.5 Corrosion Resistant

System electronics to be used in a corrosive environment as defined in NEMA 250 shall be housed in non-metallic non-corrosive enclosures which meet the requirements of NEMA 250, Type 4X.

2.1.3 Nameplates

Nameplates shall be provided for major components of the system. Nameplates shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a corrosion resistant plate

secured to the item of equipment. Nameplates will not be required for devices smaller than 25 by 75 mm1 by 3 inch.

2.1.1.4 Tamper Switches

Equipment enclosures for the AVBCS, RSM, CCTV, and the active vehicle barrier shall have hinged doors or removable covers. The doors or covers shall be provided with cover operated, corrosion-resistant tamper switches, arranged to initiate an alarm signal when the door or cover is moved. The enclosure and the tamper switch shall function together and shall not allow direct line of sight to any internal components before the switch activates. Tamper switches shall be inaccessible until the switch is activated; have mounting hardware concealed so that the location of the switch cannot be observed from the exterior of the enclosure; be connected to circuits which are under electrical supervision at all times, irrespective of the protection mode in which the circuit is operating; shall be spring-loaded and held in the closed position by the door or cover; and shall be wired so that the circuit is broken when the door or cover is disturbed.

2.1.1.5 Locks and Key-Lock Switches

NOTE: Either round key or conventional key type locks are acceptable for use in the system. Selection should be based on hardware availability at the time of design and the requirements for matching locks currently in use at the site. If the locks do not have to be matched to locks in use, and the designer has no preference, all brackets may be removed.

2.1.1.5.1 Locks

Locks shall be provided on system enclosures for maintenance purposes. Locks shall be UL listed, [round-key type with 3 dual, 1 mushroom, 3 plain pin tumblers][or][conventional key type lock having a combination of 5 cylinder pin and 5-point 3 position side bar]. Keys shall be stamped "U.S. GOVT. DO NOT DUP". The locks shall be arranged so that the key can only be withdrawn when in the locked position. Maintenance locks shall be keyed alike and only 2 keys shall be furnished for all of these locks. These keys shall be controlled in accordance with the key control plan as specified in paragraph Key Control Plan.

2.1.1.5.2 Key-Lock-Operated Switches

Key-lock-operated switches required to be installed on system components shall be UL listed, [round-key type, with 3 dual, 1 mushroom, and 3 plain pin tumblers][or][conventional key type lock having a combination of 5 cylinder pin and 5-point 3 position side bar]. Keys shall be stamped "U.S. GOVT. DO NOT DUP". Key-lock-operated switches shall be 2 or 3 position, with the key removable in specified positions. All key-lock-operated switches shall be keyed differently and only 2 keys shall be furnished for each key-lock-operated-switch. Keys shall be removable in the positions described in these specifications or as shown on the drawings. Keys shall be controlled in accordance with the key control plan as specified in paragraph Key Control Plan.

2.1.5.3 Construction Locks

A set of temporary locks shall be used during installation and construction. The final set of locks installed and delivered to the Government shall not include any of the temporary locks.

2.1.6 System Components

System components shall be designed for continuous operation. Electronic components shall be solid state type, mounted on printed circuit boards conforming to [UL 796](#). Printed circuit board connectors shall be plug-in, quick-disconnect type. Power dissipating components shall incorporate safety margins of not less than 25 percent with respect to dissipation ratings, maximum voltages, and current carrying capacity. Control relays and similar switching devices shall be solid state type or sealed electro-mechanical.

2.1.6.1 Modularity

Equipment shall be designed for increase of system capability by installation of modular components. System components shall be designed to facilitate maintenance through replacement of modular subassemblies and parts.

2.1.6.2 Maintainability

Components shall be designed to be maintained using commercially available tools and equipment. Components shall be arranged and assembled so they are accessible to maintenance personnel. There shall be no degradation in tamper protection, structural integrity, EMI/RFI attenuation, or line supervision after maintenance when it is performed in accordance with manufacturer's instructions.

2.1.6.3 Interchangeability

The system shall be constructed with off-the-shelf components which are physically, electrically and functionally interchangeable with equivalent components as complete items. Replacement of equivalent components shall not require modification of either the new component or of other components with which the replacement items are used. Custom designed or one-of-a-kind items shall not be used without explicit approval from the Contracting Officer. Interchangeable components or modules shall not require trial and error matching in order to meet integrated system requirements, system accuracy, or restore complete system functionality.

2.1.6.4 Product Safety

System components shall conform to applicable rules and requirements of [NFPA 70](#). System components shall be equipped with instruction plates including warnings and cautions describing physical safety and any special or important procedures to be followed in operating and servicing system equipment.

2.1.7 Controls and Designations

Controls and designations shall be as specified in [NEMA ICS 1](#), Special Test Equipment. Provide all special test equipment, special hardware, software, tools, and programming or initialization equipment needed to start or maintain any part of the system and its components. Special test equipment

is defined as any test equipment not normally used in an electronics maintenance facility.

2.1.8 System Integration

The ACPCS shall be supplied as an integrated system, and shall include all sub systems specified hereafter. Hardware and software integration shall be required for the ACPCS to function as one integrated system. The Contractor is responsible for all integration and appetencies required for the system to behave as one system. Supply of separate sub systems without integration is not acceptable. The extent and nature of integration shall be extensively documented and demonstrated in the Group 1 Technical Data Package.

2.1.9 Environmental Conditions

2.1.9.1 Interior Conditions

Equipment installed in environmentally protected interior areas shall meet performance requirements specified for the following ambient conditions:

- a. Temperature: 0 to 50 degrees C 32 to 120 degrees F. Components installed in unheated security protected areas shall meet performance requirements for temperatures as low as -17 degrees C zero degrees F;
- b. Pressure: Sea level to 4,573 m 15,000 feet above sea level;
- c. Relative humidity: 5 to 95 percent;
- d. Fungus: System components located in fungus growth inductive environments shall be completely treated for fungus resistance. Treating materials containing a mercury bearing fungicide shall not be used. Treating materials shall not increase the flammability of the material or surface being treated. Treating materials shall cause no skin irritation or other injury to personnel handling it during fabrication, transportation, operation, or maintenance of the equipment, or during use of the finished items when used for the purpose intended; and
- e. Acoustical noise: Components shall be suitable for use in high noise areas above 100 dB, such as boiler rooms, power plants, and foundries without adversely affecting their performance.

2.1.9.2 Exterior Conditions

Exterior Conditions Components mounted in locations exposed to weather shall be housed in corrosion-resistant enclosures with appropriate environmental protection. Component performance shall not degrade because of improper housing design. Components in enclosures shall meet performance requirements when exposed to the following ambient conditions:

- a. Temperature: -32 to 60 degrees C -25 to 140 degrees F;
- b. Pressure: Sea level to 4,573 m 15,000 feet above sea level;
- c. Solar radiation: Six hours of solar radiation at dry bulb temperature of 60 degrees C 120 degrees F including 4 hours of solar radiation at 0.00112 watts per square mm 104 watts psf;

- d. Sand and dust: Wind driven for up to [9.6] [_____] km/hour [6] [_____] mph;
- e. Rain: 50 mm 2 inches per hour and 125 mm 5 inches per hour cyclic with wind plus one period of 300 mm 12 inches per hour;
- f. Humidity: 5 to 95 percent;
- g. Fungus: Warm, humid atmosphere conducive to the growth of heterotrophic plants;
- h. Salt fog: Salt atmosphere with 5 percent salinity;
- i. Snow: Snow loading of 234 kg/square m 48 pounds psf per hour; blowing snow of 22.5 kg/square m 4.6 psf per hour;
- j. Ice accretion: Up to 13 mm 1/2 inch of radial ice;
- k. Wind: Up to 80 km/h 50 mph with gusts to 106 km/h 66 mph, except that fence sensors shall detect intrusions up to 56 km/h 35 mph; and
- l. Acoustical noise: Components shall be suitable for use in high noise areas above 110 dB, such as flight lines, run up pads, and generator sites without adversely affecting their performance.

2.2 ACTIVE VEHICLE BARRIER CONTROL SYSTEM (AVBCS)

2.2.1 General Requirements

NOTE: Check for approved version of the Advanced Traffic Controller Standard.

The AVBCS shall collect alarm, status, and control switch inputs at the ACP and provide control signals to the Active Vehicle Barriers, Traffic Signals, Traffic Arms, and Warning Beacons. The AVBCS shall provide alarm, status, and control information to the Gatehouse Control Console, each Guard Booth Control Panel, the Overwatch Position Control Panel, the Local Control Panel at each AVB, the CCTV subsystem for controlling camera presets, and to the Installation's Central Security Monitoring System (CSMS) for annunciating alarms at both the CSMS alarm monitoring point and a CSMS provided annunciation panel at the Gatehouse.

2.2.2 AVBCS Processor

The AVBCS processor shall be a Traffic Controller Unit (TCU) with a real time operating system and mapable inputs and outputs (I/O). The AVBCS TCU shall conform to the requirements of the Advanced Transportation Controller (ATC) Standard (Ballot Copy for the Joint Committee on the ATC for Joint Adoption by AASHTO, ITE, and NEMA, ITE ATC dated 26 June 2006) or the NEMA TS-1, NEMA TS-2-Type 1, or NEMA TS-2-Type 2 Standard TCUs. The AVBCS TCU shall be housed in a NEMA TS-1 or NEMA TS-2-Type 2 cabinet with terminal block connections for external wiring. A single AVBCS TCU shall be capable of managing 4 AVBs and their associated traffic and warning signals simultaneously.

2.2.3 Timing Requirements

- a. The processing and update time for the total number of required input and output points shall be 1 mili-second or less. Compliance of this requirement shall be specifically supported with manufacturer's documentation during the shop-drawing approval phase, demonstrated during the FAT at the supplier's premise, and demonstrated during acceptance testing on site after completion of the installation.
- b. The AVBCS real time clock shall be synchronized within 1 second of the correct time at least once per day automatically (without operator intervention and without requiring system shutdown) using a nationally recognized clock reference, e.g., NIST, WWV, GPS, etc.
- c. The AVBCS shall annunciate or record alarms, status changes, and guard control actions in no more than 100 mili-seconds after the condition occurs (e.g., alarm, status point, or switch contact closure).
- d. The AVBCS shall provide date and time (with 1 second resolution) stamps for all discrete alarm and status changes.

2.2.4 Conflict Monitor

The AVBCS TCU shall be equipped with a conflict monitor. Upon detection of a conflict, the conflict monitor shall instruct the AVBCS to go into a fail safe mode where all barrier controls are locked out and all traffic signals change to Flashing Red.

2.2.5 Configuration

The AVBCS shall be configured to alert ACP guards of unauthorized entry attempts through the ACP and unauthorized entry attempts into secured ACP facilities, to provide video surveillance of selected ACP areas, and to provide video assessment for alarm activations. The AVBCS shall include a gatehouse control console (GCC), control panels for each guard booth and the overwatch position, local control panel for each AVB, alarm panels for the ID Check area, facility IDS sensors, duress alarms, over speed detectors, wrong-way detectors, CCTV system, communications and processing equipment, data transmission systems (DTS), and tamper detection as described below. The AVBCS shall provide alarm and status information and CCTV video images to the Installation's Central Security Monitoring Station (CSMS) through local interface points at the ACP. The AVBCS shall provide totally automatic communication of status changes, commands, field initiated interrupts and any other communications required for proper system operation. System communication between the AVBCS and all external devices shall not require operator initiation or response. System communication shall return to normal operation after any partial or total network interruption such as power loss or transient upset. The AVBCS shall automatically annunciate communication failures to the operator with identification of the communication link that has experienced a partial or total failure. See Drawing 1 for configuration of AVBCS components and communication paths.

2.2.6 Communications

Means and format for the communication between the AVBCS TCU and other CPU's and PLCs used by the Contractor shall be IEEE 802.3 parallel based Ethernet communication or EIA232 or EIA485 serial. Provide media and format converter system as applicable. The TCU and all other CPUs and PLCs

for this project shall be purchased close to the time of installation. Coordination with the Government is essential in completing the system integration in a timely manner such that the latest technology is installed.

2.3 TRAFFIC CONTROLLER UNIT (TCU) PROCESSING AND CONTROL SOFTWARE

2.3.1 General

The software shall provide the communication, programming and control capabilities necessary to support all specified points and functions, plus a minimum expansion of 50 percent of the current number of points, complete with their point database. The TCU shall be online at all times and shall perform all required functions as specified. The software shall consist of one or more standard software modules. Where multiple modules are used, the modules shall be capable of sharing data and operating together seamlessly. The system shall support multiple user operations with multiple tasks for each user and shall support operation and management of all peripheral devices. All configuration modifications shall be capable of being made on-line, while the system is operating. It shall be possible to upgrade the software to newer versions using an automatic mechanism provided by the software manufacturer. The software shall provide complete user documentation online, including examples of how to operate the various modules within the software. The TCU software shall be "off-the-shelf" standard software products of a company (companies) specializing in such products, supplemented by custom-developed software codes for integrating the different sub systems and implement the required functionalities. Documentation of all implemented software, including the custom-developed software codes shall be supplied to the Government after formal system acceptance, but prior to the endurance tests. The Government shall have the right of use for the provided software for future enhancements and additions to the installed system.

2.3.2 Load and Adjust Software

Load software required for an operational control and processing system, including databases, operational parameters, and system, command, and application programs. Adjust, tune, debug, and commission all software and parameters for controlled systems to assure proper operation in accordance with the sequences of operation and database tables.

2.3.3 Display Information

The TCU shall display information necessary to support all requirements specified, including: guard control commands; alarm notification; status point changes; and report generation

2.3.4 TCU Utility Programming

All utility programs shall be object oriented with a mouse driven or touch screen graphical user interface (GUI). The graphical user interface shall include a set of desktop utilities including the following: file management, shell tool, calculator, text editor, and icon library. Program elements shall be able to be combined into a custom template which can then be used as a standard function. Program checkout and debug facilities shall include display of dynamic and/or simulated system variables and points on the programming screens. The user shall be able to fix or force values of variables to enable program checkout during debugging. The programming shall allow for the use of a portable tester for loading files directly into the TCU and uploading and downloading control programs and

database information.

2.3.5 Command Software

The software shall provide for defining and selecting I/O, parameters, and all other functions associated with operation. The operator commands shall be usable from keyboards with individual operator passwords as specified.

2.3.6 Command Input and Errors

Command menus shall utilize full words and acronyms selected to allow programmers/technicians to use the TCU without extensive training or data processing backgrounds. The TCU shall prompt the programmer/technician. The TCU shall supervise programmer/technician inputs to ensure they are correct for proper execution. Programmer/technician input assistance shall be provided whenever a command cannot be executed because of input errors.

2.3.7 Special Functions

The TCU shall support the following special functions by using a mouse, in addition to all other commands specified:

- a. Help shall produce a display of all commands available to the operator. The help command, followed by a specific command, shall produce context sensitive listing with a short explanation of the purpose, use, and system reaction to that command.
- b. Start/Enable shall manually start equipment and enable monitoring and control of points.
- c. Stop/Disable shall manually stop equipment and disable monitoring and control components.
- d. Dynamic displays shall provide real time status of functions, timers, and I/O.
- e. Auto/Override shall override automatic operation of a point or return a point to automatic operation.
- f. Print Report shall allow the operator to print reports.

2.3.8 System Access Control

A minimum of 20 passwords shall be usable with the control system software. The TCU shall maintain a log of programmers/technicians logged onto the system. Each password shall be definable as to the functions that the programmer/technician can perform.

2.3.9 Alarms

The software shall notify a programmer/technician of the occurrence of an alarm condition. The TCU alarm history shall be stored and shall be callable by the programmer/technician using the report generator. Alarm messages shall take precedence over other functions. A minimum of the most recent 1000 alarms shall be directly available at the TCU. Digital alarms shall be subject to immediate reporting, within the alarm response time.

2.3.10 Report Generator

Software shall be provided to generate and format standard and custom reports for displaying and storing on disk. Reports shall use database values and parameters, values calculated using the real time static database or historical data base; with the reports subsequently stored on removable media. Dynamic operation of the system shall not be interrupted to generate a report. The report shall contain the time and date when the report was printed.

2.3.11 Periodic Automatic Report

The system shall allow for specifying, modifying, or inhibiting the report to be generated, the time the initial report is to be generated, the time interval between reports, end of period, and the output peripheral. The system (through the Request Report Mode) shall allow for the operator to request, at any time, an immediate display of any report.

2.3.12 ACP Processing and Control Database

The database shall be stored on disk and in non-volatile RAM. The static database shall be downloadable to backup devices.

2.3.13 Database Definition Process

Software shall be provided to define and modify each point in the database using operator commands. The definition shall include all physical parameters and constraints associated with each point. Each database item shall be callable for display or printing, including EEPROM, ROM and RAM resident data. Each point shall be defined and entered into database by the Contractor.

2.3.14 Historical Data Storage and Retrieval

A historical data storage and retrieval function shall be provided to collect and store dynamic data. This function shall be in addition to other data storage requirements. The function shall have the capability to collect and store alarm status changes, point values, events and operator commands, and system responses. This function shall have the capability to retain historical data on non-volatile RAM for pre-specified time periods, up to forty-five days using last day roll over, for short-term analysis, and then output the data to the utility software for long-term retention. The operator shall also be able to selectively recall short-term data stored on non volatile RAM. Retrieval of the contents of any selected historical data file through utility programs shall be available using the data retrieval and report generation program. The output of the report generation program shall be capable of being viewed on the screen, transferred to removable media, or stored.

2.3.15 Security Management

The software shall support a user based security system. When enabled, the security system shall allow for the creation of users with certain rights and/or privileges. When user based security is enabled, an audit trail shall be generated in the system which shall tag every programmer/technician logon with user identification (ID). The following functions shall be supported within the security management application:

- a. Define users.

- b. Define groups which users may belong to.
- c. Define user and/or group rights/privileges.

2.4 GATEHOUSE CONTROL CONSOLE (GCC)

NOTE: Coordinate with Installation and select two means of communications between Gatehouse, each Guard Booth, the Overwatch Position, Search Area, VCC, and the CSMS. Include requirements for the selected communications systems at the Gatehouse in the Gatehouse Control Console

Provide a GCC with all necessary displays and controls to allow the operator to view real-time ACP alarms, discrete point status changes, and CCTV video images and to control ACP equipment including the Active Vehicle Barriers. The GCC shall be mounted in the gatehouse in a manner to allow a Gatehouse guard to easily use the controls and monitor the displays while, at the same time, oversee ACP operations. The GCC shall include the following:

- a. Alarm Display. See next paragraph for description and requirements.
- b. Overspeed and Wrong Way Annunciation Panels. Provide a back lit annunciation window for displaying OVERSPEED alarms and a back lit annunciation window for displaying WRONG WAY alarms. Provide volume adjustable sound indication for each alarm. Alarm display and sound indication shall occur in no less than 100 mili-seconds after the sensor detects the overspeed or wrong way condition.
- c. CCTV Monitor and Controls. Provide CCTV system monitors and controls. See paragraph CCTV SYSTEM for requirements.
- d. Active Vehicle Barrier Controls. Provide Active Barrier Master Control Panel, as shown on the drawings.

2.5 ALARM DISPLAY IN THE GCC

NOTE: Reference Appendix B. Some alarms listed in Appendix B must annunciate on both the Annunciation Panel in the GCC and on the Installation's Central Security Monitoring System (CSMS). Coordinate with the Installation's Director of Emergency Services (DES) and/or Director of Public Works (DPW) to determine the optimum method of interfacing the AVBCS with the CSMS and include the requirements for the AVBCS here. Also ensure the DES/DPW initiates appropriate requirements for the CSMS. Revise Standard Drawing E1.08 to reflect the AVBCS/CSMS interface requirements.

Provide an Annunciation Panel in the GCC for displaying alarms identified in Appendix B for annunciation at the Gatehouse. [_____].

2.6 SEQUENCE OF EVENTS RECORDER

All alarms and events listed in Appendix B shall be collected by the AVBCS TCU and stored with the following data: identification of the alarm/event, date and time to the nearest second of occurrence, date and time of acknowledgement (alarm points only), date and time of reset (alarm points only), and an alarm/event message. Events may have multiple messages to describe all possible states, e.g., AVB #1 in EFO mode, AVB #1 in Test mode, or AVB #1 in Local mode. Provide means and user-initiated procedure to export the stored alarms and events to a removable storage device for printing in a standard Windows application such as Excel Spreadsheet. All alarms and status changes shall be received and stored in the TCU database with the appropriate time tags in no more than 100 mili-seconds after the condition occurs (e.g., alarm/status point contact closure).

2.7 ALARM PANELS AT THE GUARD BOOTHS

One or more Alarm Panels consisting of back-lit OVER SPEED and WRONG WAY messages shall be mounted outside of but near the Guard Booths. Alarm Panels shall include an audible alarm. The number and location of Alarm Panels shall be such as to allow any ACP guard either sitting in a Guard Booth or standing along side a Guard Booth at the ID Check position to see and hear at least one panel. The audible alarm shall be loud enough to be heard over ambient traffic noise. Overspeed and wrong-way alarms shall clear automatically 3 seconds (adjustable) after the alarm condition ends with no action required by guard. Overspeed and wrong-way alarms shall be recorded on the Alarm and Events Recorder.

2.8 GUARD BOOTH AND OVERWATCH POSITION CONTROL PANELS

Provide a Control Panel for each Guard Booth and the Overwatch Position. Control Panels shall include the EFO control switch, indicating lights, and back lit alarm windows for OVER SPEED, WRONG WAY, and DURESS (Overwatch Position only) alarms (see Standard Drawing E1.03). Control Panels shall include a volume adjustable audible alarm. The audible alarm shall be loud enough to be heard over ambient traffic noise. Alarm acknowledgement and clearing of a DURESS alarm shall be from the Gatehouse alarm controls, except a control switch at the Overwatch Position shall be provided to silence the audible alarm. Overspeed and wrong-way alarms shall clear automatically 3 seconds (adjustable) after the alarm condition ends. For an Overwatch Position without a permanent building, the Control Panel shall be portable with a cord for plugging into a companion receptacle in the Overwatch Position junction box.

2.9 CCTV SYSTEM

**NOTE: Edit Section 28 23 23.00 10 CLOSED CIRCUIT
TELEVISION SYSTEMS to include appropriate project
features of the CCTV System.**

**Coordinate with Installation to determine storage
requirements for digital CCTV images and to
determine communications requirements.**

Provide a CCTV System to monitor designated areas of the ACP, present critical CCTV images to the ACP guards, and record and store ACP images for future evaluation by security personnel. The CCTV system shall meet the

requirements listed in Section 28 23 23.00 10 CLOSED CIRCUIT TELEVISION SYSTEMS, and the following:

- a. The CCTV system shall provide Video Surveillance of the ACP areas shown on the drawings. The CCTV system shall also provide Video Assessment of IDS, Tamper, Duress, Overspeed, and Wrong-way alarms. For Video Surveillance, the cameras and CCTV system shall operate full time to monitor the required ACP areas. For Video Assessment, the appropriate camera or cameras shall automatically focus on the alarmed area and the CCTV system shall automatically bring the camera image to one of the guard's monitors when an alarm is activated.
- b. CCTV monitoring and controls shall be included in the GCC to provide monitoring and display control of live CCTV images from any ACP camera. The CCTV subsystem shall also provide controls to display and view recorded video imagery.
- c. The CCTV system shall provide digital video recording of all ACP video imagery cameras 24 hours per day, seven days per week. The CCTV system shall be capable of storing up to seven days of video information of all connected CCTV cameras.
- d. Provide an interface with the CSMS to allow the CSMS to monitor live CCTV images from any ACP camera or recorded images from the digital video recorder.

2.10 UNINTERRUPTABLE POWER SUPPLIES (UPS)

Provide UPS in the event of loss of normal electrical power for the following functions:

- a. Primary communications system.
- b. Security Monitoring subsystem including CCTV, GCC, Alarm Panels, and all sensors for duress, IDS, over speed, wrong-way, tamper, etc.
- c. AVBCS subsystem including all controls for active barriers, traffic signals, gate arms, and warning signals.
- d. Active barrier activation systems for one complete operation cycle (open to close and close to open).
- e. Lighting. One luminaire for each ID Check Lane located near the guard position and one luminaire for each CCTV camera required at the Active Vehicle Barrier.

UPS shall be capable of carrying required loads for a minimum of 10 minutes. Submit calculations for all proposed UPS systems identifying all connected loads plus 50% spare capacity and submit in accordance with Group I Technical Data Package.

2.11 OVER SPEED, WRONG-WAY, AND VEHICLE PRESENCE DETECTORS

2.11.1 Photoelectric Type

Photoelectric sensors shall meet the requirements listed below. Photoelectric sensors shall be used for vehicle presence detection [and over-height detection] as shown on the drawings.

- a. Photoelectric detectors shall consist of separate transmitter and receiver units. Detector design or arrangement requiring reflector is not acceptable.
- b. Light beam: laser or infrared, modulated and synchronized between the transmitter-receiver pair to minimize cross talk with adjacent detectors or other light sources. Where laser is used, the light source shall be rated laser Class II or lower as per 21 CFR 1040.10.
- c. Provide shield cones for beam path to minimize and isolate interference from other light sources outside the detector aim cone and from other adjacent light sources.
- d. The photoelectric detector set, including the mounting post shall be of robust design to withstand mechanical abuse such as plowed snow from roadway snow removal operations.
- e. Provide Transient Voltage Surge Suppression (TVSS) for the power and sensor wire terminations. Ground the TVSS with minimum 10AWG insulated ground wire of high strand-count to the closest ground termination point.
- f. Provide matching cable connector as required
- g. Detector shall have a range of minimum 1.8 m 6 feet to no less than 19.5 m 65 feet.
- h. Detector tuning shall be automatic, with temperature compensation.
- i. Detector shall have user selectable sensitivity settings.
- j. Detector response time shall be 15 milliseconds or less.
- k. Detector output shall be a dry form C contact set, rated a minimum of 0.25 A at 24 Volts dc.
- l. Detector enclosure rating shall be NEMA 4X or better.
- m. Detector shall be capable of operating in a humidity range of 0 to 95 percent and a temperature range of -40 to +77 degrees C -40 to +170 degrees F.
- n. Detector shall be capable of operating from 120V/60Hz power, or be provided with appropriate power module/assembly and appurtenance, which are suitable for operation with 120V/60Hz.

2.11.2 Induction Loops

Induction loops may be used for vehicle presence detection, wrong-way detection, and point over-speed detection. Induction loops shall be capable of detecting passenger vehicles, motorcycles, and high bed trucks. Tests for all three types of vehicles shall be conducted on each installed loop during the Performance Verification Test.

- a. Tuning: automatic, with temperature compensation.
- b. Loop input: to withstand minimum 2000V, both normal and common modes.
- c. Loop Sensing frequency: minimum four user selectable frequencies to

minimize cross talk with adjacent loops.

- d. Sensitivity: user selectable, minimum 12 ranges, 20 to 2500 micro henries with a Q factor of minimum 5.
- e. Diagnostic: provide diagnostics and related indication for short and open loop circuit.
- f. Detector output: dry form C contact set, rated a minimum of 0.25 A at 24 Volts dc.
- g. Operating humidity: 0 to 95 percent.
- h. Operating temperature: -40 to 77 degrees C -40 to 170 degrees F.
- i. Vibration: NEMA TS-2 -2.1.9 or better.
- j. Shock: NEMA TS-2 -2.1.10 or better.
- k. User selectable operation modes: presence, pulse on entrance, pulse on exit - factory set on presence mode.
- l. User selectable operation: Fail Safe or Fail Secure - factory set at Fail Safe.
- m. User selectable sensitivity boost feature, which boosts sensitivity after a presence detection and holds the increased sensitivity until the detection drops out, at which time sensor sensitivity returns to the original setting.
- n. Power requirement: 120V/60Hz, or be provided with appropriate power module/assembly and appurtenance, which is suitable for operation with 120V/60Hz.
- o. Loop Wire.
 - (1) Provide number of inductive loops as per manufacturer's recommendations based on loop size and distance between loop and loop amplifier.
 - (2) Ensure that the loop slots in which the loop wire is laid are free from debris, sharp objects, and are completely dry. Clean out slots with compressed air before installing loop wire.
 - (3) Install loop wire in layers. Install backer rods over top wire at a minimum of 300 mm 1 foot spacing to ensure uniform placement of wire in the slot. Fill the loop slots with sealant per recommendation of the loop wire manufacturer.
 - (4) Use 16AWG stranded cable with Cross Linked Polyethylene insulation installed in a PVC sleeve. Loop wire extending from the loop to the loop amplifier shall be twisted with a minimum twist pitch of 18 per m 6 per foot.
 - (5) Check conductor resistance to ground with "megger" of 500V or higher. Remove and replace the whole installation if ground resistance of less than 10 mega-Ohms is measured.
 - (6) Provide TVSS (Transient Voltage Surge Suppressor) for both

loop-wire terminations at or near the loop detector module.
Ground the TVSS with minimum 10AWG insulated ground wire of high strand-count to the closest ground termination point.

- (7) Loops shall be capable of detecting motorcycles, passenger vehicles, and high bed trucks with the same sensitivity setting.

2.11.3 Radar

**NOTE: Select either Point or Continuous over speed
detection as required**

Radar detection sensors may be used for vehicle over speed detection.[
Point Over speed Detection. The detector unit shall be capable of detecting the speed of one or more vehicles at a point in the ACP Approach Zone and closing an alarm contact if the vehicle speed is over a preset value.][Continuous Over speed Detection. The detector unit shall be capable of continuously detecting the speed of vehicles within preset zones as they approach the ID Check Area of the ACP. The Sensor shall close an alarm contact when the speed of any vehicle anywhere within the zone is above a preset value. See drawings for required detection zones and detector speed settings. For radar sensors which sense speed at multiple discrete points in the direction of travel instead of continuously, the distance between discrete points shall not be more than 5 m 15 feet.]
Radar detection sensors shall meet the requirements listed below.

- a. The detector unit shall have an operating temperature range of -40 to +77 degrees C -40 to +170 degrees F and a relative humidity range of 5 to 95 percent, non-condensing. The detector unit shall be equipped with means for automatic temperature compensation as is necessary to overcome adverse effects of temperature and humidity swings in the specified range.
- b. The detector unit shall be resistant to vibration in accordance with NEMA TS-1, IEC 60068-2-30 (test Fc), or approved equivalent. The detector unit shall be resistant to shock in accordance with NEMA TS-1, IEC 60068-2-27 (test Ea), or approved equivalent.
- c. The detector unit shall withstand voltage surge of minimum 1kV (rise time = 1.2 microsecond, hold = 50 microsecond) applied in differential mode to all lines, power and output, as defined by IEC 61000-4-5 standard.
- d. The detector unit shall not emit a noise at levels exceeding 55 dBa when measured at a distance of 1 meter 3 feet away from its surface.
- e. Each detector unit shall transmit on a frequency band of 10.525 GHz +/-25 MHz or another approved spectral band. The detector shall comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules or the appropriate Spectrum Management Authority. The detector unit shall not interfere with any known equipment. Transmitter power shall not exceed 10 mili-watts.
- f. The detector unit shall detect vehicle speed with 95 percent accuracy or greater independent of the vehicle's direction of travel through the detection zone.

- g. The field of view of the detector unit shall cover an area defined by an oval shaped beam with a beam height and width of 15 degrees minimum and a range of 3 to 70 m 10 to 200 feet minimum.
- h. The enclosure rating of the detector unit shall be NEMA 3R or better. The overall detector dimensions shall not exceed the nominal envelop of 200 by 254 by 150 mm 8 by 10 by 6-inch.
- i. The power requirement of the detector unit shall be 120V/60Hz, or be provided with appropriate power module/assembly and appurtenance, which is suitable for operation with 120V/60Hz.
- j. The detector unit output upon detection of a vehicle speed over the adjustable preset value shall be a dry form C contact set, rated a minimum of 0.25 A at 24 Volts dc.
- k. The detector unit shall have a blind zone of not more than 3 m 10 feet in front of the unit.
- l. The detector unit may be applied in either Side-fired or Forward-looking configuration.
- m. Detector units may be mounted on existing ACP structures or utility poles if suitable for this purpose. When existing structures and utility poles are not suitable, provide mounting trusses or poles for mounting detector units. The support structure and the mounted detector units shall deflect less than 13 mm 0.5 inch at exposure to 160 km/h 100 mph winds with a gust factor of 1.3.
- n. Set all detector unit parameters and adjust detectors to provide required zone coverages.

2.11.4 Video Detection

Video detectors may be used for vehicle presence, over speed, and wrong-way detection. Detection shall be derived from video image signals received from a CCTV video camera. The video vehicle detector set shall include the camera, hardware, software, and appurtenances required to perform the detection functions required on the drawings. The Video analytics system shall produce warning annunciation via alarm contacts when the required detection criteria are met. Refer to Section 28 23 23.00 10 CLOSED CIRCUIT TELEVISION SYSTEMS for requirement on the related video camera and video signal transmission system. Video detectors shall meet the requirements listed below.

- a. The detector unit shall have an operating temperature range of -40 to +77 degrees C -40 to +170 degrees F and a relative humidity range of 5 to 95 percent, non-condensing.
- b. The detector unit shall be resistant to vibration in accordance with NEMA TS-1, IEC 60068-2-30 (test Fc), or approved equivalent. The detector unit shall be resistant to shock in accordance with NEMA TS-1, IEC 60068-2-27 (test Ea), or approved equivalent.
- c. The detector unit when used for continuous speed detection shall sense speed at multiple discrete points in the direction of travel. In order to adequately simulate continuous speed detection, the distance between discrete points shall not be more than 5 m 15 feet.

- d. The detector unit when used for speed detection shall detect vehicle speed with a 95 percent accuracy or greater, independent of the vehicle's direction of travel through the detection zone. The detector unit when used for presence or wrong-way detection shall identify the required condition with a 95 percent accuracy or greater.
- e. The enclosure rating of the detector unit shall be NEMA 3R or better.
- f. The power requirement of the detector unit shall be 120V/60Hz, or be provided with appropriate power module/assembly and appurtenance, which are suitable for operation with 120V/60Hz. The detector unit output upon detection shall be a dry form C contact set rated a minimum of 0.25 A at 24 Volts dc.
- g. The detector unit may be applied in either Side-fired or Forward-looking configuration.
- h. Detector units may be mounted on existing ACP structures or utility poles if suitable for this purpose. [When existing structures and utility poles are not suitable, provide mounting trusses or poles for mounting detector units. The support structure and the mounted detector units shall deflect less than 13 mm 0.5 inch at exposure to 160 km/h 100 mph winds with a gust factor of 1.3.]
- i. Set all detector unit parameters and adjust detectors to provide required zone coverages.

2.12 BALANCED MAGNETIC SWITCH (BMS)

NOTE: Determine the type, number, and locations of BMS's and show them on the drawings.

Provide BMS detectors as shown on the drawings. The BMS shall detect a 6 mm 1/4 inch of separating relative movement between the magnet and the switch housing. Upon detecting such movement, the BMS shall activate and generate an alarm. BMS detectors shall meet the following requirements:

2.12.1 BMS Subassemblies

The BMS shall consist of a switch assembly and an actuating magnet assembly. The switch mechanism shall be of the balanced magnetic type or triple-biased reeds to provide detection of tamper attempts. The switches shall provide supervision and pry tamper capability. Each switch shall be provided with an overcurrent protective device, rated to limit current to 80 percent of the switch capacity. Switches shall be rated for a minimum lifetime of 1,000,000 operations. The magnet assembly shall house the actuating magnet.

2.12.2 Housing

The housings of surface mounted switches and magnets shall be made of nonferrous metal and shall be weatherproof. The housings of recess mounted switches and magnets shall be made of nonferrous metal or plastic.

2.12.3 Remote Test

A remote test capability shall be provided. The remote test shall be

initiated when commanded by the alarm annunciation system. The remote test shall activate the sensor's switch mechanism causing an alarm signal to be transmitted to the alarm annunciation system. The remote test shall simulate the movement of the actuating magnet relative to the switch subassembly.

2.12.4 Access/Secure

The BMS and all access/secure equipment for ACP facilities shall be provided by the contractor and wired to the local interface point at the ACP for the Installation's CSMS as shown on the drawings.

2.13 DURESS ALARMS

NOTE: Determine the type, number, and locations of duress alarms and show them on the drawings. Edit out the appropriate subparagraphs below for the types not required.

Duress alarm switches shall provide the means for an individual to covertly notify the alarm annunciation system that a duress situation exists. Provide the number and type(s) of the following Duress Alarms as required on the drawings:

2.13.1 Foot-rail

Foot-rail duress alarms shall be designed to be foot activated and floor mounted. No visible or audible alarm or noise shall emanate from the switch when activated. The switch housing shall shroud the activating lever to prevent accidental activation. Switches shall be rated for a minimum lifetime of 50,000 operations.

2.13.2 Push-button

Latching push-button duress alarm switches shall be designed to be activated by depressing a push-button located on the duress switch housing. No visible or audible alarm or noise shall emanate from the switch. The switch housing shall shroud the activating button to prevent accidental activation. Switches shall be rated for a minimum lifetime of 50,000 operations.

2.13.3 Wireless

Wireless duress alarm switches shall consist of portable alarm transmitters and permanently installed receivers. The transmitter shall be activated by depressing a push-button located on the housing. An alarm signal shall be transmitted to one or more receivers located within a protected zone. The receivers shall, in-turn, transmit an alarm signal to the alarm annunciation system. No visible or audible alarm or noise shall emanate from the transmitter or receiver when activated. The transmitter housing shall shroud the activating button to prevent accidental activation. The transmitter shall be designed to be unobtrusive and still be activated in a covert manner. Switches shall be rated for a minimum lifetime of 50,000 operations and have a range of at least 45 m 150 feet. Wireless switches shall be fully supervised, such that the transmitter automatically transmits (checks in) to the receiver on a regular basis to test the system for low battery, tamper, and inactive status.

2.14 ACTUATED TRAFFIC ARMS

NOTE: Traffic arms are required in each inbound lane at the ID Check Area for all Safety Systems. Traffic arms are also required in front of all active vehicle barriers in the Presence Detection Safety System. Edit the following paragraphs as necessary.

Traffic arms in the ID Check Area shall be controlled by control switches in the Guard Booths.[Traffic arms at the active vehicle barriers shall be controlled by the Traffic Controller Unit - see drawings for control logic.] The housing for the traffic arm controller shall be weather proof and constructed of stainless steel not less than 14 gauge, carbon steel not less than 3 mm 1/8 inch thick, or cast steel not less than 6 mm 1/4 inch thick. All seams, joints, and supports shall be electric bead welded. Access to the motor compartment shall be provided with a removable cover secured in a weather proof manner with a lock.

2.14.1 Traffic Arm Assembly

The traffic arm drive assembly shall be directly linked to the gear motor by a heavy duty connecting rod. The traffic arm travel shall not exceed 4 seconds for raising or lowering. Override stops shall be provided to limit the gate arm travel in vertical or horizontal position and shall operate through 90 degrees. The assembly shall be capable of a minimum of 500 duty cycles per hour. A motor of at least 1/3 HP shall be used to power the system. The traffic arm assembly shall consist of a hollow aluminum assembly, wood, steel or fiberglass material with a length of 2.74 m 9 feet. Provide a spare arm for each traffic arm assembly. The traffic arm shall be covered with retroreflective red and white sheeting. See MUTCD for proper orientation of sheeting. Each traffic arm shall be equipped with an obstruction detector that will automatically reverse the traffic arm motor when an obstruction is detected.

2.14.2 Presence Detection Safety System Only

The traffic arm shall have a minimum of three red warning lights a minimum of 100 mm 4 inch in diameter evenly spaced on the arm. Provide interlocks and appurtenances to [illuminate][flash] the lights when the arm is deployed.

2.15 TRAFFIC SIGNALS

Provide traffic signals with light emitting diode (LED) signal modules as shown on the drawings. The term "LED signal module" in this text shall refer to an array of LEDs and lens that are capable of providing a circular signal indication as specified herein and shown on the drawings. All LED signal modules shall conform to the Equipment Standards of the Institute of Transportation Engineers (ITE), chapter 2a. The arrangement and size of signal indications for each LED signal module shall be as shown on the drawings and shall be in conformance with MUTCD.

2.16 WARNING BEACONS

The warning beacon shall include two alternately flashing signal sections.

Each signal section shall have a standard traffic signal face with a flashing CIRCULAR YELLOW signal indication. Signal sections shall be mounted horizontally on the warning beacon. The visible diameter of each signal section shall not be less than 200 mm 8 inch. When illuminated, the beacon shall be clearly visible, to all drivers it faces, for a distance of at least 1.6 km 1 mile under normal atmospheric conditions unless otherwise physically obstructed. The yellow lens colors shall be in accordance with the requirements of MUTCD. All flashing contacts shall be equipped with filters for suppression of radio interference. Beacons shall be flashed at a rate of not less than 50 nor more than 60 times per minute. The illuminated period of each flash shall be 1/2 of the total cycle for each signal section. Operation should be programmable and permit continuous non-flashing operation through a supervisory signal from the Traffic Controller Unit (TCU). Provide day-light sensor and an automatic dimming system to reduce the brilliance of the beacon.

2.17 TRAFFIC SIGNAL SUPPORTS

The design and installation of all traffic control supports shall be in accordance with AASHTO LTS-5 and applicable local and state standard specifications. Traffic signal supports consist of tubular members, mast arms, pole shaft, base plates, anchor bolts assemblies, foundations as well as associated connections and appurtenances. Loading evaluations shall be consistent with local and state guidelines. Ice and wind loads shall be determined based on the geographic location of the installation in accordance with AASHTO guidelines. Group loading analysis shall be consistent with local and state guidelines and section 1.2.6 of AASHTO LTS-5. Allowable stress shall be consistent with local and state guideline and section 1.4 of AASHTO LTS-5. Fatigue calculations shall be consistent with local and state guideline and section 1.9.6 of AASHTO LTS-5. It is the Contractor's responsibility to conduct soil borings for foundation design; otherwise, conservative soils assumptions shall be used in calculating foundation requirements. If local and state guidelines provide foundations designs for design conditions, these guidelines may be used provided all loading and design conditions fall within guideline parameters. Before forming and placing concrete, each foundation excavation shall be inspected and evaluated for the actual soil conditions encountered. Do not proceed with the work until the excavation is inspected and evaluated. If necessary, revise the foundation design based on the soil conditions encountered. Before submitting the revised design for approval, obtain the signature and seal of a Professional Engineer registered in the State. Foundation locations may be changed to avoid underground obstructions (see Group II Technical Data Package). All design calculations as well as shop drawings shall be submitted to the government for review and acceptance prior to installation (see Group I Technical Data Package).

2.18 ACTIVE VEHICLE BARRIERS

**NOTE: Edit Section 34 71 13.19 ACTIVE VEHICLE
BARRIERS and include it in the procurement documents
for the ACPCS.**

Furnish and install active vehicle barriers in accordance with Section
34 71 13.19 ACTIVE VEHICLE BARRIERS.

2.19 SIGNS AND PAVEMENT MARKINGS

All signs and pavement markings shall be installed in accordance with MUTCD per Joint Regulation (DA AR 55-80/OPNAVINST 11210.2, AFMAN 32-1017/MCO 11210.2D/DLAR 4500.19) of the Department of Defense (DoD) Transportation Engineering Program. In states with supplements to the Manual on Uniform Traffic Control Devices (MUTCD), signs and pavement markings shall also be in accordance with those supplements. Signs and pavement markings shall meet retroreflectivity requirements as defined by FHWA and/or as contained in the MUTCD section 2A.8 and 2A.9. State and local retroreflectivity requirements shall also be satisfied. A minimum sign sheeting of MUTCD (Section 6F.63) Type III sign sheeting shall be used for regulatory and warning signs. All sign posts shall be of breakaway design as set forth in AASHTO RSDG-3 or as required by the local/State DOT. A signing and pavement marking plan shall be submitted to the government for review and comment and is subject to review and comment by SDDCTEA (see Group I Technical Data Package).

2.20 WIRE AND CABLE

Provide all wire, cable, and conduit connecting all Contractor furnished and, where indicated on the drawings, Government furnished equipment. Wiring shall be in accordance with NFPA 70. The wiring shall be [fiber optic][or][copper] cable in accordance with the manufacturers' requirements. Copper signaling line circuits and initiating device circuit field wiring shall be No. [18][20][_____] AWG size conductors at a minimum. Wire size shall be sufficient to prevent voltage drop problems. Circuits operating at 24 VDC shall not operate at less than 21.6 volts. Circuits operating at any other voltage shall not have a voltage drop exceeding 5 percent of nominal voltage.

2.20.1 Above Ground Sensor Wiring

Sensor wiring shall be 20 AWG minimum, twisted and shielded, 2, 3, 4, or 6 pairs to match hardware. Multi-conductor wire shall have an outer jacket of PVC.

2.20.2 Direct Burial Sensor Wiring

Sensor wiring shall be 20 AWG minimum, twisted and shielded, 2, 3, 4, or 6 pairs to match hardware. The construction of the direct burial cable shall be as specified in Section 27 15 19.00 10 WIRE LINE DATA TRANSMISSION SYSTEM.

2.20.3 Cable Construction

All cable components shall withstand the environment in which the cable is installed for a minimum of 20 years.

2.21 POWER LINE SURGE PROTECTION

Equipment connected to alternating current circuits shall be protected from power line surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41.1 and IEEE C62.41.2. Fuses shall not be used for surge protection.

2.21.1 Sensor Device Wiring and Communication Circuit Surge Protection

Inputs shall be protected against surges induced on device wiring. Outputs

shall be protected against surges induced on control and device wiring installed outdoors and as shown. Communications equipment shall be protected against surges induced on any communications circuit. Cables and conductors, except fiber optics, which serve as communications circuits between systems shall have surge protection circuits installed at each end. Protection shall be furnished at equipment, and additional triple electrode gas surge protectors rated for the application on each wireline circuit shall be installed within 1 meter 3 feet of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two waveforms:

- a. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 Volts and a peak current of 60 amperes.
- b. An 8 microsecond rise time by 20 microsecond pulse width waveform with a peak voltage of 1000 Volts and a peak current of 500 amperes.

2.21.2 Power Line Conditioners

A power line conditioner shall be furnished for equipment in each subsystem. The power line conditioners shall be of the Ferro-resonant design, with no moving parts and no tap switching, while electrically isolating the secondary from the power line side. The power line conditioners shall be sized for 125 percent of the actual connected kVA load. Characteristics of the power line conditioners shall be as follows:

- a. At 85 percent load, the output voltage shall not deviate by more than plus or minus 1 percent of nominal when the input voltage fluctuates between minus 20 percent to plus 10 percent of nominal.
- b. During load changes of zero to full load, the output voltage shall not deviate by more than plus or minus 3 percent of nominal. Full correction of load switching disturbances shall be accomplished within 5 cycles, and 95 percent correction shall be accomplished within 2 cycles of the onset of the disturbance.
- c. Total harmonic distortion shall not exceed 3.5 percent at full load.

2.22 FACTORY ACCEPTANCE TEST

2.22.1 General

Provide personnel, equipment, instrumentation, and supplies necessary to perform a Factory Acceptance Test of the complete Active Vehicle Barrier Control System. The Factory Acceptance Test shall demonstrate the required barrier, traffic signal, and warning beacons controls. The test shall also demonstrate the required alarm annunciation, CCTV controls, and sequence of events recording. The test set-up must include the Traffic Controller Unit; the Gatehouse Control Console with all control panels, control switches, and CCTV monitors; and all Alarm Panels. The IDS, tamper, duress, overspeed, and wrong-way sensors; the active vehicle barrier open, close, and emergency close actuating devices; the active vehicle barrier open and close position switches; the VPDs; the traffic signals; and the warning beacons may all be simulated.

2.22.2 Test Plan

In accordance with the Group III Technical Data Package, submit a Test Plan

including a schedule, test procedures, equipment catalog cuts, one line diagrams showing interconnections of all subsystem components, and diagrams showing control logic for the barriers, traffic signals, warning beacons, and alarm and status points to the Contracting Officer 30 days prior to the proposed test start date of the Factory Acceptance Test.

2.22.3 Test

Upon Test Plan approval by the Contracting Officer, assemble the test system and perform the Factory Acceptance Test. The Factory Acceptance Test shall demonstrate that the subsystems comply with the requirement specified herein. The Factory Acceptance Test shall be conducted during regular daytime working hours on weekdays. The Contracting Officer reserves the right to witness all or a portion of the Factory Acceptance Test.

2.22.4 Test Report

Within seven days of successful completion of the Factory Acceptance Test, submit a Test Report to the Contracting Officer documenting the results of the test. The Test Report shall include the results of all test procedures showing all commands, stimuli, and responses to demonstrate compliance with the contract requirements. The Test Report shall also include a certification from Technical Specialists from the active vehicle barrier, the Traffic Controller Unit, and the CCTV subsystems that their subsystem meets the contract requirements. The Contracting Officer will notify the Contractor within 7 days of receipt of the Test Report whether the Test Report is approved. If disapproved, the Contracting Officer will note the specific procedures that are disapproved, and the Contractor shall retest those procedures. No equipment shall be shipped to the field until the Test Report is approved by the Contracting Officer.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with all details of the work, verify that site conditions are in agreement with the contract drawings. In accordance with Group II Technical Data Package, prepare a report describing any differences in site conditions or conditions that will affect performance of the system to the Contracting Officer. Do not take any corrective action without written permission from the Contracting Officer.

3.2 INSTALLATION

3.2.1 Oversight

The Contractor designated Technical Specialist from the AVBCS shall oversee installation.

3.2.2 Installation Schedule

Before beginning any site work, provide a schedule of all installation and testing activities. The project activities in the proposed schedule shall be arranged in chronological order. All installation and testing activities, specifically those requiring ACP outages, shall be coordinated with the Contracting Officer. No site work shall be done without an approved schedule by the Contracting Officer.

3.2.3 Wiring

Furnish and install all cables and conduits for all wiring interconnecting contractor furnished, and where indicated on the drawings, Government furnished equipment. Install all wiring per Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM and Section 33 70 02.00 10 ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND.

3.2.4 Grounding

Provide adequate grounding system for the following: Traffic Signal supports, Warning Signal supports, AVBCS enclosure, Active Vehicle Barrier frames, Active Vehicle Barrier control enclosure, and supports for over speed and wrong-way detectors. Ground rods installed by the Contractor shall be tested as specified in IEEE 142. Provide a ground wire from Active Vehicle Barrier frame to the Active Vehicle Barrier control enclosure.

3.2.5 Enclosure Penetrations

Enclosure penetrations shall be from the bottom unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer and in a manner that does not damage the cable.

3.2.6 Cold Galvanizing

Field welds and/or brazing on factory galvanized boxes, enclosures, conduits, etc., shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.

3.2.7 Other Requirements

Install the system in accordance with the standards for safety included in NFPA 70 and the appropriate installation instructions from the manufacturers of the equipment. Components within the system shall be configured with appropriate service points to pinpoint system trouble in less than 20 minutes.

3.2.8 Incidental Infrastructure

NOTE: Provide drawing showing all contract requirements for incidental infrastructure, e.g., shoulders, curbing, shoulder to curb transitions, guardrail, and other passive barriers. Passive barriers must transition towards active barriers in accordance with Standard Drawing C9.02. Gaps and offsets between active and passive barriers must prevent a threat vehicle from traveling between barriers. Active vehicle barriers must be installed in a curbed section. If no curbing exists, a shoulder to curb transition of 10:1 must be introduced prior to and after the active vehicle barrier. All appurtenances must have lateral offset

no less than 600 mm (2 feet) as noted on Standard Drawing C9.02 except in the absence of curbing or where speeds exceed 64 km/h (40 mph), in which case offsets and clearances must be compliant with AASHTO RSDG-3. All passive barriers not identified as crashworthy per NCHRP 350 and AASHTO RSDG-3 must be located outside of the clear zone as defined by AASHTO RSDG-3.

Provide all incidental construction as shown on the Drawings. Incidental construction shall be designed and constructed in accordance with local/state DOT requirements, AASHTO GDHS-5, AASHTO RSDG-3, NCHRP 350, and the MUTCD.

3.3 CONTRACTOR FIELD TEST

In accordance with Group III Technical Data Package, the Contractor's Commissioning Team shall submit a Test Plan including a test schedule. Calibrate and test all equipment, verify communications links between all subsystem components and between subsystems, place the integrated system in service, and test the integrated system using the approved test procedures for the Performance Verification Test. Deliver a report certifying that the installed complete system has been calibrated, tested, and is ready to begin performance verification testing. The report shall also include certifications from the Technical Specialists of the Active Vehicle Barrier, Traffic Controller Unit, and CCTV equipment/subsystems that the equipment/subsystems have been installed and tested and that they meet the requirements of the specifications.

3.4 COMMISSIONING

3.4.1 General

Commissioning shall consist of successfully completing a Performance Verification Test, the training of Installation security and maintenance personnel, and successfully completing an Endurance Test as described below. Commissioning shall begin only after the Contracting Officer approves the Test Report from the Contractor Field Test and all materials in the Group IV Technical Data Package.

3.4.2 Commissioning Team Leader

Designate a Commissioning Team Leader to be responsible for scheduling all tests, coordinating attendance of all required Commissioning Team members, conducting the tests, and preparing appropriate Test Reports and the final Commissioning Report.

3.4.3 Commissioning Team

The Commissioning Team shall consists of the Commissioning Team Leader; the Technical Specialists from the Active Vehicle Barrier supplier, the Traffic Controller Unit subsystem, and the CCTV subsystem; a representative of the design agent; a Contracting Officer's representative; a representative from the Installation; [a representative of the Electronic Security Systems Center]; and a representative of the USACE Protective Design Center. The programmer of the Traffic Controller Unit shall also be present during commissioning tests if he/she is not the Traffic Controller Unit Technical Specialist.

3.4.4 Training

3.4.4.1 General Requirements

**NOTE: Coordinate the training requirements with the
Installation and designate the number of persons to
be trained.**

Conduct training courses for designated personnel in the operation and maintenance of the ACPCS. The training shall be oriented to the specific system being installed. Training manuals shall be delivered for each trainee with 2 additional copies delivered for archiving at the project site. The manuals shall include an agenda, defined objectives for each lesson, and a detailed description of the subject matter for each lesson. Furnish audio-visual equipment and other training materials and supplies. Where the Contractor presents portions of the course by audio-visual material, copies of the audio-visual material shall be delivered to the Government either as a part of the printed training manuals or on the same media as that used during the training sessions. A training day is defined as 8 hours of classroom instruction, including two 15-minute breaks and excluding lunchtime, Monday through Friday, during the daytime shift in effect at the training facility. For guidance in planning the operator training for the guards, the Contractor shall assume that guards will have a high school education or equivalent and are familiar with Access Control Points operations. For maintenance training, the Contractor shall assume mechanical and electrical maintenance personnel typically employed at military installations. Approval of the planned training schedule shall be obtained from the Government at least 30 days prior to the training.

3.4.4.2 Guard's Training

The Guard Training Course shall be taught at the project site for a period of up to eight hours during or after the Contractor's field testing, but before commencing the performance verification test. A maximum of [12] [_____] personnel shall attend the course. No part of the training given during this course will be counted toward completion of the performance verification test. The course shall include instruction on the specific hardware configuration of the installed system and specific instructions for operating the installed system. Upon completion of this course, each student shall be able to operate the ACPCS including the following:

- a. Operate the active vehicle barriers in both the Test, Local and EFO modes.
- b. Understand the differences between the normal and EFO operation of the barriers.
- c. Understand when to use Test, Local and EFO modes for each barrier.
- d. Understand all requirements for putting a barrier in either the Test or Local modes including required actions in the roadway ahead of the barrier and actions at the barrier.
- e. Understand the active vehicle barrier safety scheme including operation of all Vehicle Presence Detectors, Traffic Signals, signs, and warning signals.

- f. Understand operation of the Traffic Signal including all signal indications for various operational modes and barrier positions.
- g. Reconfigure barriers after an EFO activation.
- h. Understand the operation and coverage of all over speed and wrong-way sensors.
- i. Monitor, acknowledge, and reset alarms.
- j. Monitor and control CCTV system

3.4.4.3 Maintenance Personnel Training

The Maintenance Personnel Training Course shall be taught at the project site for a period of up to eight hours during or after the Contractor's field testing, but before commencing the performance verification test. A maximum of [12] [_____] personnel shall attend the course. The course shall include the following:

- a. Instruction on each equipment and its configuration in the installed system.
- b. Trouble shooting and diagnostic procedures.
- c. Component repair and replacement procedures.
- d. Emphasis on the importance of periodic testing and preventative maintenance. Provide a list of periodic preventative maintenance tasks for the active vehicle barriers and other critical equipment.
- e. Calibration procedures.
- f. Review of system drawings to identify device locations, communications, topology, and flow.

3.4.4.4 System Manager Training

[_____] System managers shall be trained for a minimum of 8 hours in addition to the Guard and Maintenance Personnel described above. System Manager Training shall provide training for trainers, such that, system managers will be able to train new guards and maintenance personnel in the future. System Manager Training shall also include the following:

- a. Enrollment/deactivation process including the assignment of operator passwords.
- b. Change database configuration.
- c. Modify graphics, if provided.
- d. Print reports, e.g., Sequence of Events reports.
- e. Any other functions necessary to manage the system.

3.4.5 Performance Verification Test (PVT)

3.4.5.1 Test Plan

In accordance with the Group IV Technical Data Package, the Contractor's Commissioning Team Leader shall submit a Test Plan including a schedule, test procedures, equipment catalog cuts, one line diagrams showing interconnections of all subsystem components, and diagrams showing control logic for the barriers, traffic signals, warning beacons, and alarm and status points to the Contracting Officer 30 days prior to the proposed start date of the Performance Verification Test. For each test in the PVT, the test procedures shall clearly indicate which Commissioning Team members must witness and certify the test. Coordinate PVT tests with the testing requirements for the Active Vehicle Barriers in Section 34 71 13.19 ACTIVE VEHICLE BARRIERS.

3.4.5.2 Test Equipment

The Contractor shall have the following equipment available for all PVT tests:

- a. A minimum of 4 hand held radios/walkie-talkies.
- b. Safety vests for all participants.
- c. Stop watch.
- d. Flash lights.
- e. Multi-meter.

3.4.5.3 Test

Per approved test procedures and under the direction of the Contractor's Commissioning Team Leader, the Commissioning Team shall perform a Performance Verification Test of the installed Access Control Point Control System. The PVT shall demonstrate that the system complies with the requirements specified herein. Where possible, the PVT shall be conducted during regular daytime working hours on weekdays. At the successful completion of each test in the PVT, appropriate Commissioning Team Members shall sign the completed test procedure to certify that the test was successful.

3.4.5.4 Test Report

Within seven (7) days of successful completion of the PVT, the Contractor's Commissioning Team Leader shall submit a Test Report to the Contracting Officer documenting the results of the test. The Test Report shall include the results of all test procedures showing all commands, stimuli, and responses to demonstrate compliance with the contract requirements. The Test Report shall also include a certification from each Commissioning Team member that the tests were successful. The Contracting Officer will notify the Contractor, within 7 days of receipt of the Test Report, whether the Test Report is approved. If disapproved, the Contracting Officer will note the specific procedures that are disapproved, and the Contractor shall retest those procedures. The Endurance Test shall not begin until the PVT Test Report is approved by the Contracting Officer.

[3.4.5.5 Opposite Season Test

NOTE: If temperature lows at the site dip to below freezing in the winter time, specify an opposite season test. If the initial pvt test is done in the winter, specify an opposite season test in the summer. If the initial pvt is done in the spring, summer, or fall; specify an opposite season test in the winter.

Coordinate with the Commissioning Team to conduct an opposite season PVT in the [summer] [winter] months. All PVT tests and test reports required for the initial PVT shall be required for the opposite season PVT.

]3.4.6 Endurance Test

3.4.6.1 General

In accordance with the Group IV Technical Data Package, the Contractor's Commissioning Team Leader shall submit a Test Plan including a schedule, test description, list of personnel required to conduct the test, and a list of all data to collect and observances to be made in order to demonstrate system reliability and operability of the completed Access Control Point Control System. The Endurance Test shall be conducted in phases as specified. The Endurance Test shall not be started until the Contractor notifies the Contracting Officer, in writing, that training as specified has been completed and that the correction of all outstanding deficiencies has been satisfactorily completed. The Contracting Officer may terminate the testing at any time the system fails to perform as specified. Upon termination of testing by the Contracting Officer or by the Contractor, the Contractor shall commence an assessment period as described for Phase II below.

3.4.6.2 Phase I Testing

The test shall be conducted 24 hours per day for 15 consecutive calendar days, including holidays, and the system shall operate as specified. Make no repairs during this phase of testing unless authorized by the Contracting Officer in writing. If the system experiences no failures during Phase I testing, the Contractor may proceed directly to Phase III testing after receipt of written permission from the Contracting Officer.

3.4.6.3 Phase II Assessment

After the conclusion of Phase I, identify all failures, determine causes of all failures, repair all failures, and deliver a written report to the Contracting Officer. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and shall recommend the point at which testing should be resumed. After delivering the written report, convene a test review meeting at the jobsite to present the results and recommendations to the Contracting Officer. The meeting shall not be scheduled earlier than 5 business days after receipt of the report by the Contracting Officer. As a part of this test review meeting, demonstrate that all failures have been corrected by performing appropriate portions of the performance verification test. Based on the Contractor's report and the test review meeting, the Contracting Officer will determine the restart date, or may require that Phase I be repeated. If the retest

is completed without any failures, proceed directly to Phase III testing after receipt of written permission from the Contracting Officer.

3.4.6.4 Phase III Testing

The test shall be conducted 24 hours per day for 15 consecutive calendar days, including holidays, and the system shall operate as specified. Make no repairs during this phase of testing unless authorized by the Contracting Officer in writing.

3.4.6.5 Phase IV Assessment

After the conclusion of Phase III, identify all failures, determine causes of failures, repair failures, and deliver a written report to the Contracting Officer. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and shall recommend the point at which testing should be resumed. After delivering the written report, convene a test review meeting at the jobsite to present the results and recommendations to the Contracting Officer. The meeting shall not be scheduled earlier than 5 business days after receipt of the report by the Contracting Officer. As a part of this test review meeting, demonstrate that all failures have been corrected by repeating appropriate portions of the performance verification test. Based on the Contractor's report and the test review meeting, the Contracting Officer will determine the restart date, and may require that Phase III be repeated. Do not commence any required retesting until after receipt of written notification by Contracting Officer. After the conclusion of any retesting which the Contracting Officer may require, the Phase IV assessment shall be repeated as if Phase III had just been completed.

3.4.7 Commissioning Report

Upon successful completion of the Endurance Test, the Contractor's Commissioning Team Leader shall prepare a Commissioning Report documenting that the Contractor has successfully completed the PVT and Endurance Test and recommending that the completed system be accepted. The Commissioning Report shall include signatures of the Commissioning Team.

3.5 APPENDICES

**NOTE: There are 3 possible Appendix A, of which the
Designer must choose one.**

APPENDIX A
Normally Deployed Active Barrier Safety System

[NOTE TO DESIGNER.

1. Include drawings showing the control switches and control logic for this scheme. Use Drawing E1.07 in the Standard Design or provide a new drawing if the control switches on Drawing E1.07 are modified. If the controls are modified from Drawing E1.07 and the control sequences described below, provide narrative descriptions of the controls in the same detail as provided below.

2. Include drawings showing locations of all required features including Gatehouse, Guard Booths, active vehicle barriers, stop lines, traffic signals, vehicle presence detectors, signs, and pavement markings.]

1 NORMALLY DEPLOYED SYSTEM FEATURES. Provide the following features for the Barrier Normally Closed Safety System:

1.1 One or more sets of Active Vehicle Barriers in the inbound and outbound lane or lanes. Each set of barriers will consist of an initial and final barrier(s) separated by a selected distance to form an entrapment area, in which either the initial barrier(s) or final barrier(s) is always closed.

1.2 Passive barrier on a raised island separating the inbound entrapment area from the outbound entrapment area to prevent vehicle crossover.

1.3 Passive barriers along the ACP corridor to contain vehicles within the corridor.

1.4 One three-light Traffic Signal located on each side of each active vehicle barrier (or roadway if there is more than one barrier across the roadway) as shown on the Drawings. The three lights in each Traffic Signal shall be Red-Yellow-Green top to bottom.

1.5 A 2 foot wide stop line placed 10 feet in front of each barrier(s) as a driver normally approaches the barrier(s).

1.6 Vehicle presence detectors located immediately before and immediately after each barrier. Presence detectors can be induction loops, video motion sensors, or other suitable technologies capable of sensing vehicle presence.

1.7 One Master Control Panel and one Guard Booth Control panel for each Guard Booth along with all control switches and indicating lights as shown on the Drawings. The Master Control Panel will normally be located in the Gatehouse for use by the lead ACP guard.

1.8 **[NOTE TO DESIGNER. If actuated traffic arm(s) is not required, delete this paragraph. See Standard Definitive Design drawings for Barrier Normally Closed schemes with and without actuated traffic arms.]** An Actuated Traffic Arm for each inbound lane in the ID Check Area. ATAs shall be installed near the Guard Booths as shown on the Drawings. An ATA Control Panel with Open and Close control switches for the ATA shall be provided and mounted on the back wall of the Guard Booth below the back window.

2 BARRIER CONTROL SWITCHES.

2.1.1 Per the Drawings, the active vehicle barrier control system shall have one Control Power On/Off switch, one key operated 3 position Manual - Auto - Local mode selector switch for the Inbound Barriers, one key operated 3

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Normally Deployed Active Barrier Safety System

position Manual - Auto - Local mode selector switch for the Outbound Barriers, one Inbound Fill switch, one Inbound Release switch, one Outbound Fill switch, one Outbound Release switch, and one set of Open and Close switches for each barrier. Keys for the inbound and outbound mode switches shall be unique and shall be removable in the Local positions only. Also per the Drawings, the Guard Booth Control Panels shall have one Inbound Fill switch, one Inbound Release switch, one Outbound Fill switch, and one Outbound Release switch. In the Barrier Normally Closed Safety Scheme, at least one barrier is closed in both the inbound and outbound lanes, therefore, the EFO function (and associated controls) is not required.

2.1.2 In the Manual mode of the Inbound Barriers' mode selector switch, the Close and Open switches on the Master Control Panel shall be activated for the inbound barriers, but the Fill and Release switches on the Master and Guard Booth Control Panels shall be deactivated for inbound barriers. In the Auto mode of the Inbound Barriers' mode selector switch, the Close and Open switches on the Master Control Panel shall be deactivated for the inbound barriers and the Fill and Release switches on the Master and Guard Booth Panels shall be activated for the inbound barriers. In the Local position of the inbound barriers' Manual - Auto - Local selector switch, the Close and Open switches on the Master Control Panel shall be deactivated and the Fill and Release switches on the Master and Guard Booth Control Panels shall also be deactivated for the inbound barriers. Inbound barriers can only be operated by controls located locally at the barriers. The above requirements also apply to the control switches and control logic for the outbound barriers.

2.1.3 Under normal operations, the Inbound Barriers and Outbound Barriers Manual - Auto - Local mode selector switches on the Master Control Panel will be in the Auto positions. Barriers in the inbound or outbound lane(s) can be individually operated by placing the appropriate Inbound or Outbound Mode switch to the Manual mode. Once in the Manual mode, individual barriers can be opened and closed from the Open and Close switches on the Master Control Panel. The Local position of each barrier's Manual - Auto-Local selector switch can be used when maintenance needs to be performed on a barrier. Maintenance personnel would place the Inbound or Outbound Manual - Auto - Local mode switch in the Local position and then remove and retain the key, thus locking out all control of those barriers from the Master and Guard Booth Control Panels. Maintenance personnel would also have to block and mark the lane ahead of the barriers and also lock and tag out certain equipment at the barriers per the barrier manufacturer's recommendations for the type of maintenance to be performed.

3 TRAFFIC SIGNAL AND BARRIER CONTROLS.

3.1 BARRIER LAYOUT AND DESIGNATIONS. Each inbound and outbound lane shall have 2 barriers per lane arranged in a sally port to entrap a vehicle or vehicles between them. The space between barriers shall be long enough for the longest vehicle anticipated for the ACP. The space may be made longer to accommodate multiple vehicles in a platooning type arrangement. Per the Drawings, the initial barrier from the perspective of innocent motorists is designated A, and the final barrier is designated B for inbound lanes. The initial barrier, again from the perspective of the innocent motorists, is designated C, and the final barrier is designated D for outbound lanes.

3.2 AUTO MODE OF OPERATION.

APPENDIX A

Normally Deployed Active Barrier Safety System

3.2.1 Initially with no vehicles present in the inbound lanes and the Inbound Barriers' Manual - Auto - Local mode selector switch in the Auto mode, Barrier A is open and Barrier B is closed. Incoming vehicles are checked at the ID Check point and if cleared are allowed to pass over Barrier A and proceed to the Stop Line for Barrier B. The guard at either the Gatehouse or the Guard Booth will then activate the Inbound Release switch. Upon activation of the Inbound Release switch, the Traffic Signal for Barrier A shall go from Green to Yellow for three seconds and then to Red. After an additional second of Red, Barrier A's close circuit shall be energized to close the barrier. After Barrier A is fully closed, Barrier B's open circuit shall be energized to open Barrier B. When Barrier B is fully open, its Traffic Signal shall change from Red to Green to allow the vehicle or vehicles to proceed onto the Installation.

3.2.2 When the vehicle or vehicles between Barriers A and B have passed over Barrier B, the guard will activate the Inbound Fill switch. Upon activation of the Inbound Fill switch, the Traffic Signal for Barrier B shall change from Green to Yellow for 3 seconds and then to Red. After an additional 1 second at Red, Barrier B's close circuit will be energized to close Barrier B. After Barrier B is fully closed, the open circuit for Barrier A shall be energized to open Barrier A. After Barrier A is fully open, its Traffic Signal shall change from Red to Green.

3.2.3 The same controls apply to Barriers C and D in the outbound lanes and control switches Outbound Release and Outbound Fill.

3.2.4 The close circuit for all barriers shall be supervised by the Vehicle Presence Detectors (VPD's) in front of and behind the barrier, such that if either VPD detects a vehicle, the barrier close circuit shall be suppressed.

3.2.5 A red indicating light adjacent to each Fill switch shall light when the lane barriers are in the Fill position, i.e., the initial barrier is open and the final barrier is closed. Similarly, a red indicating light adjacent to each Release switch shall light when the lane barriers are in the Release position, i.e., the initial barrier is closed and the final barrier is open. The Fill and Release indicator lights shall only light when the barriers' mode switch is in the Auto position.

3.3 MANUAL MODE OF OPERATION. When the Inbound Barriers Manual - Auto - Local mode switch is placed in the Manual mode, the inbound barriers shall be controlled from the individual barrier Open and Close switches on the Master Control Panel. Initiation of a Close command to an open barrier shall cause that barrier's Traffic Signal to change from Green to Yellow for 3 seconds and then to Red. After an additional one second of Red, the barrier's close circuit shall be energized through the VPD's immediately in front of and behind the barrier. If the VPD's are clear, the barrier shall close. Initiation of an Open command to a closed barrier shall energize the open circuit for the barrier and open the barrier. After the barrier is fully open, the Traffic Signal shall change from Red to Green. In the Manual mode, both initial and final barriers in a given entrapment area can be opened. Situations requiring this configuration include passing a vehicle that is longer than the entrapment area. In such situations, guards must provide compensatory security measures to defeat a threat while both barriers are open.

3.4 LOCAL MODE OF OPERATION. When the barrier's Manual - Auto - Local mode switch is placed in the Local position and the barrier is open, the Traffic

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Normally Deployed Active Barrier Safety System

Signal for that barrier shall change from Green to Yellow for 3 seconds and then to Red. If the barrier is closed when its Manual - Auto - Local mode switch is placed in the Local position, the Traffic Signal will already be Red and shall stay Red as long as the selector switch is in the Maintenance position. When the barrier's Manual - Auto - Local mode switch is returned to the Manual or Auto positions, the Traffic signal shall stay Red if the barrier is closed or shall change to Green if the Barrier is open.

3.5 OUTBOUND ENTRAPMENT AREA: A VPD located immediately in front of the final barrier's STOP line shall detect a vehicle's presence in the entrapment area. If the final barrier is closed, a signal shall be sent to the guard in the Gatehouse notifying him/her of the vehicle's presence. The signal shall cause a short audible noise to alert the guard and shall turn on a Red indicating light until the final barrier is open.

APPENDIX A
Presence Detection Active Barrier Safety System

[NOTE TO DESIGNER. Include a drawing showing the control switches and control logic for this scheme. Use Drawings E1.03 and either E1.05 (no queue preemption) or E1.06 (queue preemption) in the Standard Design or provide new drawings if the control switches and controls on Drawing E1.03, E1.05, or E1.06 are modified. If the controls are modified from Drawings E1.03, E1.05, or E1.06, the following control sequences must also be modified.]

1 PRESENCE DETECTION SAFETY SCHEME FEATURES. Provide the following features for the Presence Detection Safety Scheme:

1.1 One Active Vehicle Barrier at the end of the Response Zone in each inbound and each outbound lane.

1.2 Dual phenomenology vehicle presence detectors (VPDs) located in front of the Stop Line (detectors 1a and 1b), between the Stop Line and the barrier (detectors 2a and 2b), and immediately after the barrier (detectors 3a and 3b). Presence detectors can be induction loops, IR Break Beams, video motion sensors, or other suitable technologies capable of sensing vehicle presence.

1.3 Passive barriers on raised islands between each inbound and each outbound lane. Passive barriers and islands shall extend from just ahead of the range of VPDs 1a and 1b to just beyond the trailing edge of the range of VPDs 3a and 3b. See Drawings.

1.4 Passive barrier on a raised median island between the inner most inbound and outbound lanes. Passive barrier and median island shall extend from the end of the last Turn-around to either the trailing edge of range of the inbound VPDs 3a and 3b or the leading edge of the outbound VPDs 1a and 1b, whichever is further. See Drawings.

1.5 A three light Traffic Signal at each inbound and outbound lane. The three lights in each Traffic Signal shall be Red-Yellow-Green top to bottom. The Traffic Signal shall be located 3.5 feet behind the front edge of the Stop Line as a driver normally approaches the barriers.

1.6 A 2 foot wide Stop Line placed 24 feet in front of the active vehicle barrier as a driver normally approaches the barrier.

1.7 Actuated Traffic Arm 11.5 feet beyond the front edge of the Stop Line. Provide an Auto-Test selector switch and Open and Close switches for the ATA in the Barrier Control Cabinet. In the Auto mode of the selector switch, the ATA control shall mimic the adjacent active vehicle barrier. In the Test mode of the selector switch, the ATA shall be controlled by the Open and Close switches.

1.8 Vehicle presence detection systems to detect queues on any inbound or outbound lanes in front of the barrier(s). VPDs shall be a minimum of 117 feet in front of the front edge of the Stop Line and shall cover an area the width of the lane(s) by 50 feet long. Multiple loops may be used to achieve the 50 foot required length.

1.9 One Master Control Panel, one Guard Booth Control panel for each Guard Booth, one Overwatch Position Control Panel, and a Local Control Panel for each barrier along with all control switches and indicating lights as shown

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Presence Detection Active Barrier Safety System

on the Drawings. The Master Control Panel will normally be located in the Gatehouse for use by the ACP guards. Each Local Control Panel for an individual barrier shall be located locally at or near its respective barrier.

1.10 Actuated Traffic Arm for each inbound lane in the ID Check Area. ATAs shall be installed near the Guard Booths as shown on the Drawings. An ATA Control Panel with Open and Close control switches for the ATA shall be provided and mounted on the back wall of the Guard Booth below the back window.

2 BARRIER CONTROL SWITCHES.

2.1 Per the Drawings, the Master Control Panel shall have a Control Power On/Off switch and each barrier shall have a 3 position mode selector switch and Open and Close switches. Also per the Drawings, the Master Control Panel and the Guard Booth and Overwatch Position Control Panels shall have EFO switches. Each barrier shall also have a 2 position mode selector switch and Open and Close switches on a Local Control Panel located at or near the barrier.

2.2 The modes on each barrier's mode selector on the Master Control Panel shall be Local - EFO - Test. Each switch shall be operable by a key unique for that switch only, which shall be removable in all modes. The modes of each barrier's mode selector switch on the Local Control Panel shall be Off-Local. Each switch shall be operable by the same key that operates the mode selector switch for that barrier on the Master Control Panel. The key will be removable in the "Off" position only of the Off-Local mode selector switch.

2.3 Operating Modes.

2.3.1 EFO Operation. Under normal operations, all barriers' mode selector switches on the Master Control Panel will be in the EFO position with the key removed and accessible only by the lead ACP guard. With the barrier's mode selector switch in the EFO position, EFO shall be enabled for that barrier, but the Open and Close switches for that barrier on the Master Control Panel and the Open and Close switches on that barrier's Local Control Panel shall be disabled.

2.3.2 Test Operation. An individual barrier can be test operated by installing the proper lane markings and passive barriers ahead of the active barrier and then placing its mode selector switch in the Test position. With the barrier's mode selector switch in the Test position, that barrier's Open and Close switches on the Master Control Panel shall be enabled, but the Open and Close switches on that barrier's Local Control Panel shall be disabled and all EFO switches shall be disabled for that barrier only.

2.3.3 Local Operation. The Local mode can be used when maintenance personnel need to perform maintenance on the barrier. Maintenance personnel would obtain the mode selector switch key from the lead ACP guard, place the barrier's mode selector switch on the Master Control Panel in the Local position, and then remove the key. With the barrier's mode selector switch on the Master Control Panel in the Local position, that barrier's Open and Close switches on the Master Control Panel shall be disabled and all EFO switches shall be disabled for that barrier only. The maintenance person would then insert the key into the Off-Local mode selector switch on the barrier's Local Control Panel and turn the key to the "Local" position, which shall enable

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the Open and Close switches on the barrier's Local Control Panel. Maintenance personnel would also have to block and mark the lane ahead of the barrier and also lock and tag out certain equipment at the barrier per the barrier manufacturer's recommendations for the type of maintenance to be performed.

3 TRAFFIC SIGNAL AND BARRIER CONTROLS.

3.1 EFO MODE OF OPERATION. In the EFO mode of operation with the barrier open and no vehicles on VPD 1a or 1b, the Traffic Signal shall be Red. If a vehicle is detected by either VPD 1a or 1b, there shall be a one second delay and then the Traffic Signal shall change from Red to Green to allow the vehicle to pass over the barrier. Once the vehicle is detected by either VPD 2a or 2b, the Traffic Signal shall change from Green back to Red. This operation is similar to Lane Metering on freeway entrances. If a vehicle is detected by VPD 2a, 2b, 3a, or 3b at the instant a guard activates the barrier Emergency Fast Operate (EFO) command, the barrier "Close" circuit shall be suppressed until VPD's 2a, 2b, 3a, and 3b are all clear. Also, if a guard activates the Emergency Fast Operate (EFO) command and the Traffic Signal is Green, the Traffic Signal shall change from Green to Red and the barrier "Close" circuit shall be suppressed until the vehicle is detected by either VPD 2a or 2b. If the vehicle is detected by VPD 2a or 2b, the suppression will continue until VPD's 2a, 2b, 3a, and 3b are all clear as described above. If neither of these conditions exist at the time that a barrier Emergency Fast Operate (EFO) command is activated, the barrier "Close" Circuit shall not be suppressed and the barrier shall immediately close in its emergency fast mode (2 seconds or less). See typical control schematics on the Drawings.

3.2 **[NOTE TO DESIGNER: Delete paragraphs 3.2 and 3.3 if Queue Operation is not required.]** QUEUE OPERATION. If vehicles back up behind the Stop Line during periods of heavy traffic such that the queue VPD detects a vehicle continuously for 30 seconds, the Traffic Signal shall go from Lane Metering operation to Queue operation. In the Queue operation, the Traffic Signal shall change to Flashing Yellow and vehicles will be allowed to pass over the barrier without stopping at the Stop Line. The Queue operation shall end immediately when the Queue VPD does not detect a vehicle. When the Queue operation ends, the Traffic signal shall change from Flashing Yellow to Solid Yellow and then to Red and resume Lane Metering operation. The distance between the Queue VPD and the Stop Line is such that the last vehicle leaving the Queue VPD will see the Traffic Signal change to Solid Yellow and Red in time to have to stop at the Stop Line. Since this operation relies on the vehicles in the queue to stop a threat vehicle, the last vehicle in the queue must stop at the Stop Line.

3.3 EFO DURING QUEUE OPERATION. If an EFO command is activated from any of the Control Panels during Queue operation, the Traffic Signal shall go from Flashing Yellow to Solid Yellow for 4 seconds and then to Solid Red. After an additional 1 second of Solid Red, the barrier close circuit shall be energized, provided that there are no vehicles detected on VPD's 2a, 2b, 3a, or 3b. If a vehicle is detected on any of these VPD's, the barrier close circuit will be suppressed until all VPD's are clear.

3.4 EFO RESET. After an EFO activation, guards will close all inbound and outbound lanes. Guards will then activate the EFO Reset switch on the Master Control Panel to reset EFO, place each barrier's mode switch to the Test position, open each barrier using the Open switches on the Master

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Control Panel, and then place each barrier's mode switch to the EFO position. Guards could then reopen the ACP.

3.5 TEST AND LOCAL MODES OF OPERATION. When a barrier's mode switch is placed in either the Local or Test modes, the traffic signal for that barrier, if not already red, shall go from Green to Yellow for 3 seconds and then to Red. As noted above, before a barrier's mode switch is placed in either the Local or Test positions, the operator must ensure that the lane that the barrier is in is properly blocked and marked.

3.6 RETURN TO EFO MODE. When the barrier's mode switch is placed in the EFO mode and the barrier is open, the barrier's Traffic Signal shall revert back to the RED/GREEN lane metering operation. If a barrier's mode switch is placed in the EFO mode and the barrier is closed, the barrier's Traffic Signal shall stay Red and an alarm shall be generated on the ACP TROUBLE window on the Gatehouse Control Panel.

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[NOTE TO DESIGNER. Include a drawing showing the control switches and control logic for this safety scheme. Use Drawings E1.03 and E1.04 in the Standard Design or provide a new drawing if the control switches and controls on Drawings E1.03 and E1.04 are modified. If the controls are modified from Drawings E1.03 and E1.04, care must be taken to ensure compliance with the security and safety criteria in the Army Standard Design. The control sequences described below will also need to be modified.]

1 SIGNS AND SIGNALS SAFETY SCHEME FEATURES. Provide the following features for the Signs and Signals Safety System:

1.1 Active Vehicle Barriers in all inbound and outbound lanes.

1.2 A three light Traffic Signal over each inbound and outbound active barrier. The three lights in each Traffic Signal shall be Red-Yellow-Green top to bottom. The Traffic Signal shall be located up to 10 feet behind the active barriers as a driver normally approaches the barriers.

1.3 A 2 foot wide stop line placed 40 feet in front of the traffic signal as a driver normally approaches the barriers.

1.4 Double solid white lines between inbound lanes approaching the barriers to prohibit lane changes in front of the barriers.

1.5 Double solid yellow lines between adjacent inbound and outbound lanes.

1.6 Vehicle Presence Detectors (VPDs) located immediately before and immediately after each barrier. VPDs can be induction loops, video motion sensors, or other suitable technologies capable of sensing vehicle presence.

1.7 Warning Sign and Beacon with alternating yellow flashing lights located 150 feet in front of the barriers.

1.8 One Master Control Panel, one Guard Booth Control panel for each Guard Booth, one Overwatch Position Control Panel, and a Local Control Panel at each barrier along with all control switches and indicating lights as shown on the Drawings. The Master Control Panel will normally be located in the Gatehouse for use by the ACP guards. Each Local Control Panel for an individual barrier shall be located locally at its respective barrier power unit.

1.9 Actuated Traffic Arm for each inbound lane in the ID Check Area. ATAs shall be installed near the Guard Booths as shown on the Drawings. An ATA Control Panel with Open and Close control switches for the ATA shall be provided and mounted on the back wall of the Guard Booth below the back window.

2 BARRIER CONTROL SWITCHES.

2.1 Per the Drawings, the Master Control Panel shall have one Control Power On/Off switch and each barrier shall have a 3 position mode selector switch and Open and Close switches. Also per the Drawings, the Master Control Panel and the Guard Booth and Overwatch Position Control Panels shall have EFO switches. Each barrier shall also have a 2 position mode selector switch and Open and Close switches on a Local Control Panel located at or near the

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barrier.

2.2 The modes on each barrier's mode selector on the Master Control Panel shall be Local - EFO - Test. Each switch shall be operable by a key unique for that switch only, which shall be removable in all modes. The modes of each barrier's mode selector switch on the Local Control Panel shall be Off-Local. Each switch shall be operable by the same key that operates the mode selector switch for that barrier on the Master Control Panel. The key will be removable in the "Off" position only of the Off-Local mode selector switch.

2.3 Operating Modes.

2.3.1 EFO Operation. Under normal operations, all barriers' mode selector switches on the Master Control Panel will be in the EFO position with the key removed and accessible only by the lead ACP guard. With the barrier's mode selector switch in the EFO position, EFO shall be enabled for that barrier, but the Open and Close switches for that barrier on the Master Control Panel and the Open and Close switches on that barrier's Local Control Panel shall be disabled.

2.3.2 Test Operation. An individual barrier can be test operated by installing the proper lane markings and passive barriers ahead of the active barrier and then placing its mode selector switch in the Test position. With the barrier's mode selector switch in the Test position, that barrier's Open and Close switches on the Master Control Panel shall be enabled, but the Open and Close switches on that barrier's Local Control Panel shall be disabled and all EFO switches shall be disabled for that barrier only.

2.3.3 Local Operation. The Local mode can be used when maintenance personnel need to perform maintenance on the barrier. Maintenance personnel would obtain the mode selector switch key from the lead ACP guard, place the barrier's mode selector switch on the Master Control Panel in the Local position, and then remove the key. With the barrier's mode selector switch on the Master Control Panel in the Local position, that barrier's Open and Close switches on the Master Control Panel shall be disabled and all EFO switches shall be disabled for that barrier only. The maintenance person would then insert the key into the Off-Local mode selector switch on the barrier's Local Control Panel and turn the key to the "Local" position, which shall enable the Open and Close switches on the barrier's Local Control Panel. Maintenance personnel would also have to block and mark the lane ahead of the barrier and also lock and tag out certain equipment at the barrier per the barrier manufacturer's recommendations for the type of maintenance to be performed.

3 TRAFFIC SIGNAL AND BARRIER CONTROLS.

3.1 EFO MODE OF OPERATION. In the EFO mode of operation with the barrier open, the Traffic Signal shall be Green. Upon activation of an EFO command at any of the Control Panels, barrier emergency closure shall be delayed 4 seconds. During this 4 seconds, the Traffic Signal shall change from Green to Yellow for 3 seconds and then to Red. After an additional one second at Red, the barrier's emergency close circuit shall be energized to close the barrier in its emergency fast mode (2 seconds or less) provided that the VPDs immediately in front of and behind the barrier are clear. If either VPD detects a vehicle, the barrier shall not close.

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3.2 EFO RESET. After an EFO activation, guards will close all inbound and outbound lanes. Guards will then activate the EFO Reset switch on the Master Control Panel to reset EFO, place each barrier's mode switch to the Test position, open each barrier using the Open switches on the Master Control Panel, and then place each barrier's mode switch to the EFO position. Guards could then reopen the ACP.

3.3 TEST AND LOCAL MODES OF OPERATION. When a barrier's mode switch is placed in either the Local or Test modes, the traffic signal for that barrier shall go from Green to Yellow for 3 seconds and then to Red. As noted above, before a barrier's mode switch is placed in either the Local or Test positions, the operator must ensure that the lane that the barrier is in is properly blocked and marked.

3.4 RETURN TO EFO MODE. When the barrier's mode switch is placed in the EFO mode and the barrier is open, the barrier's Traffic Signal shall change from Red to Green. If a barrier's mode switch is placed in the EFO mode and the barrier is closed, the barrier's Traffic Signal shall stay Red and an alarm shall be generated on the ACP TROUBLE window on the Gatehouse Control Panel.

APPENDIX B				
Events and Alarms at ACP				
Event/Alarm Point	Alarm at Gatehouse	Alarm at CSMS	Record on SER	
Overspeed	Yes	No	Yes	
Wong-Way	Yes	No	Yes	
Guard Booth #n - EFO Enable	No	No	Yes	
Guard Booth #n - EFO Disable	No	No	Yes	
Guard Booth #n - EFO	Yes	Yes	Yes	
Guard Booth #n - Duress	Yes	Yes	Yes	
Guard Booth #n - IDS	Yes	Yes	No	
Overwatch Position - EFO Enable	No	No	Yes	
Overwatch Position - EFO Disable	No	No	Yes	
Overwatch Position - EFO	Yes	Yes	Yes	
Overwatch Position - Duress	Yes	Yes	Yes	
Overwatch Position - IDS	Yes	Yes	No	
Gatehouse - EFO	Yes	Yes	Yes	
Gatehouse - IDS	Yes	Yes	No	
EFO Reset	No	No	Yes	
EFO Safety Preemption Start	No	No	Yes	Note 2
EFO Safety Preemption End	No	No	Yes	Note 2
Barrier Controls Tamper	Yes	Yes	No	
Search Area Duress	Yes	Yes	Yes	
Search Area IDS	Yes	Yes	No	
Visitors Control Center Duress	Yes	Yes	Yes	
Visitors Control Center IDS	Yes	Yes	No	
Emergency Gen Malfunction	Yes	No	No	
Emergency Gen Switch Over	Yes	No	No	

APPENDIX B				
Events and Alarms at ACP				
Event/Alarm Point	Alarm at Gatehouse	Alarm at CSMS	Record on SER	
Emergency Gen Switch Back	Yes	No	No	
Emergency Gen Low Fuel	Yes	No	No	
Barrier #n - EFO Mode	No	No	Yes	
Barrier #n - Test Mode	No	No	Yes	
Barrier #n - Local Mode	No	No	Yes	
Barrier #n - Close Ckt Energized	No	No	Yes	
Barrier #n - Close Command	No	No	Yes	
Barrier #n - Open Command	No	No	Yes	
Barrier #n - Closed	No	No	Yes	
Barrier #n - Open	No	No	Yes	
Barrier #n - Trouble	Yes	No	Yes	
Que Start	No	No	Yes	
Que End	No	No	Yes	
Loop #1 Barrier n Malfunction	Yes	No	Yes	
Loop #2 Barrier n Malfunction	Yes	No	Yes	
Loop #3 Barrier n Malfunction	Yes	No	Yes	
IR #6 Barrier n Malfunction	Yes	No	Yes	
IR #7 Barrier n Malfunction	Yes	No	Yes	
IR #8 Barrier n Malfunction	Yes	No	Yes	

Notes:

- 1 Central Security Monitoring Station - CSMS
- 2 Sequence of Events Recorder - SER
- 3 Presence Detection Safety System only

Number of Events = $23 + 5 \times \text{No of Gd Booths} + 14 \times \text{No of Barriers}$
Number of Alarms @ GH = $11 + 3 \times \text{No of Gd Booths} + 6 \times \text{No of Barriers}$

Number of Alarms @ CSMS= $12+3*\text{No of Gd Booths}+6*\text{No of Barriers}$

No of GB =	2	8
No of Barriers =	4	5
No of Alarms @ GH =	41	65
No of Alarms @ CSMS =	42	66
No of Events =	89	133

-- End of Section --