SECTION 34 71 13.19

CRASH RATED ACTIVE VEHICLE BARRIERS AND CONTROLS
02/20

PART 1 GENERAL

1.1 REFERENCES

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	(2011, Errata 2012) A Policy on Geometric Design of Highways and Streets
AASHTO LTS	(2013; Errata 2013) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals
AASHTO RSDG-4	(2011; Errata 1 2012; Errata 2 2015) Roadside Design Guide

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2015; Errata 1 2015; Errata 2 2016) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A106/A106M	(2019a) Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
ASTM D4956	(2013) Standard Specification for Retroreflective Sheeting for Traffic Control
ASTM F2656/F2656M	(2018) Standard Test Method for Crash Testing of Vehicle Security Barriers

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 142	(2007; Errata 2014) Recommended Practice for Grounding of Industrial and Commercial Power Systems - IEEE Green Book
IEEE C37.90	(2005; R 2011) Standard for Relays and Relay Systems Associated With Electric Power Apparatus

IEEE C37.90.1	(2013) Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
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

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

IEC 60068-2-27	(2008; ED 4.0) Environmental Testing - Part 2-27: Tests - Test Ea and Guidance: Shock
IEC 60068-2-30	(2005; ED 3.0) Environmental Testing - Part 2-30: Tests - Test Db: Damp Heat, Cyclic (12 H + 12 H Cycle)
IEC 61000-4-5	(2017) Electromagnetic Compatibility (EMC) - Part 4-5: Testing and Measurement Techniques - Surge Immunity Test
IEC 61131-3	(2013) Programmable Controllers - Part 3: Programming Languages

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO ISO/IEC 17025	(2017) General Requirements for the Competence of Testing and Calibration Laboratories

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2018) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 1	(2000; R 2015) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 2	(2000; R 2005; Errata 2008) Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 4	(2015) Application Guideline for Terminal Blocks
NEMA MG 1	(2018) Motors and Generators
NEMA TC 2	(2013) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
NEMA TS-1	(1989; R 2005) Traffic Control Systems

	(not recommended for new designs)
NEMA TS-2	(2016) Traffic Controller Assemblies with NTCIP Requirements - Version 03.07

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17) National Electrical Code

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE J517	(2017) Hydraulic Hose

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 8500.01	(2014; Change 1-2019) Cybersecurity
DOD 8510.01	(2014; Change 1-2016; Change 2-2017) Risk Management Framework (RMF) for DoD Information Technology (IT)

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2015) Manual on 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
29 CFR 1910	Occupational Safety and Health Standards
47 CFR 15	Radio Frequency Devices

UNDERWRITERS LABORATORIES (UL)

UL 486A-486B	(2018) UL Standard for Safety Wire Connectors
UL 508	(2018) UL Standard for Safety Industrial Control Equipment

UL 651	(2011; Reprint Nov 2018) UL Standard for Safety Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL 796	(2016) UL Standard for Safety Printed-Wiring Boards
UL 1059	(2001; Reprint Dec 2017) UL Standard for Safety Terminal Blocks
UL 1076	(2018) UL Standard for Safety Proprietary Burglar Alarm Units and Systems

1.2 ABBREVIATIONS & DEFINITIONS

1.2.1 Abbreviations

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

1.2.2 Definitions

Command & Control. Command & Control function refers to location the main guard will be located to oversee the activity at the ECF/ACP. This is typically the Gatehouse, but not in all cases.

Crash-rated active vehicle barrier. Crash-rated active vehicle barrier and active vehicle barrier in this specification refer to a vehicle barrier that has been tested to impede or stop a vehicle of a specific weight and speed. The barrier is operable either manually or through electrical controls.

1.3 SUBMITTALS

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.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Overall System Drawings; G[, [_____]]

Point to Point Wiring Information; G[, [_____]]

TRAFFIC CONTROL PLANS; G[, [_____]]

crash rated active vehicle barrier system; G[, [_____]]

Installation; G[, [_____]]

Electrical Work; G[, [_____]]

SD-03 Product Data

Major Components; G[, [_____]]

Data Package; G[, [_____]]

CRASH RESISTANCE: DEMONSTRATION OF COMPLIANCE; G[, [_____]]

Hydraulic Fluid manufacturer's data; G[, [_____]]

SD-05 Design Data

traffic signal support design calculations; G[, [_____]]

UPS Calculations; G[, [_____]]

Generic Design and Contract Revisions; G[, [_____]]

SD-06 Test Reports

Crash Test Reports; G[, [_____]]

Current Site Conditions; G[, [_____]]

KEY CONTROL PLAN; G[, [_____]]

Factory Acceptance Test; G[, [_____]]

Factory Acceptance Test Report; G[, [_____]]

Contractor Verification Test; G[, [_____]]

Contractor Verification Test Report; G[, [_____]]

Performance Verification Test (PVT); G[, [_____]]

Performance Verification Test Report; G[, [_____]]

Endurance Test; G[, [_____]]

Final Report; G[, [_____]]

SD-07 Certificates

COMPONENT CERTIFICATION; G[, [_____]]

Cybersecurity Equipment Certification; G[, [_____]]

Cybersecurity Installation Certification; G[, [_____]]

Installation Superintendent Qualifications; G[, [_____]]

Project Manager Qualifications; G[, [_____]]

TECHNICAL SPECIALISTS QUALIFICATIONS; G[, [_____]]

SD-08 Manufacturer's Instructions

Manufacturer Repair of Coatings Instructions; G[, [_____]]

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G[, [_____]]

OPERATING AND MAINTENANCE INSTRUCTIONS; G[, [_____]]

Submit operation and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA, Controls O&M Data Package and the requirements herein.

1.4 INSTALLATION PACKAGE

Submit Installation package [30 - 60] days after receipt of the Notice to Proceed. The installation package consists of the overall system drawings, major components and data package.

1.4.1 Overall System Drawings

Include the following in overall system drawing package:

a. Functional System Block Diagram, identifying all major equipment including interconnection between components specified herein and those furnished under other sections and communications protocols.

(1) Indicate control/signal and data communication paths and identify PLCs, control interface devices, and media to be used

(2) Describe characteristics of network and other data communication lines.

(3) Describe methods used to protect against power outages and transient

voltages including types and ratings of isolation and surge suppression devices used in data, communication, signal, control, and ac and dc power circuits.

b. Block and Wiring Diagrams of each subsystem.

c. Drawing showing equipment layout in the Command & Control including the Master control panel, UPS, and other hardware intended to be located in the Command & Control.

d. Drawing showing equipment layout around the crash rated active vehicle barriers including the crash rated active vehicle barriers, active vehicle barrier control box(es), vehicle presence detectors, stop lines, traffic signals, warning beacons (wig-wag warning signals) (if applicable), and actuated traffic arms (if applicable).

e. A signing and pavement marking plan.

f. Drawing showing layout and dimensions of the each individual active vehicle barrier operating panels.

g. Touchscreen Audible Tones and Visual Indications if used. Include the following material for use at touchscreen video control panels:

(1) Audible indication, notification, and alarm tones.

(2) Visual materials for touchscreen video control panel display screens, complete with proposed shapes, colors, scale, and textual content. Provide the following: graphics, including maps; icons; dialog boxes; and help messages, prompts and instructions. Provide material in color.

h. Tamper switch locations for AVBCS related cabinets and operating panels.

i. Vehicle presence[, overspeed,] [and wrong-way] detector locations, set-points, and sensor detection patterns. Include descriptions of the security strategy for detecting potential threat vehicles, the coverage and operation of the sensors, and the human machine interfaces for overspeed and wrong way alarms.

j. Details of connections to power sources, including power supplies and grounding.

k. Preliminary point-to-point wiring database. Preliminary submittals is to provide sufficient detail to ensure the final database has all the appropriate information. Provide details such as the legend to be used for the different wiring types, alphanumeric numbering scheme, abbreviations to be used, and the layout of the database. Provide an example of a small section of the system showing the point-to-point wiring.

1.4.2 Point to Point Wiring Information

Final point-to-point wiring diagram of complete interconnected system including database listing of wire numbers, to and from designations, and wire characteristics.

1.4.3 Major Components

Submit the following for approval:

a. Active Vehicle Barrier Controls to include pushbuttons, indicating lights, switches and panels.

b. Programmable Logic Controller.

c. Traffic Signs: powered and unpowered.

d. Traffic signals and traffic signal supports.

e. Warning Beacons (wig-wags).

f. In-pavement lights.

g. Alarm display panels.

h. Sequence of Events Recorder.

i. Cable and wiring used for the data transmission.

j. Surge protection device.

k. Cabinets and other main components needed to make a complete system.

l. Tamper switches.

[m. Actuated traffic arms.
]
[n. Touch screens, if allowed.
]
[o. Equipment used for presence detection.
]
[p. Wrong-way detection.
]
[q. Overspeed detection.
]

1.4.4 Data Package

1.4.4.1 Delivery

Deliver all items of computer software and technical data (including technical data which relates to computer software), which is specifically identified in this specification 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. Identify all data delivered by reference to the particular specification paragraph against which it is furnished.

1.4.4.2 Technical Data and Software

Include the following in the data package:

a. Communications speeds and protocol descriptions.

b. Operator commands.

c. Alarm and system messages and printing formats.

d. Start-up and shut-down operations including system and database backup operations.

e. Expansion capability and method of implementation.

f. Sample copy of sequence of events report.

g. Color print of the graphical user interface (GUI) screens (when used) on 216 x 292 mm 8-1/2 by 11 inch paper.

h. System data entry requirements.

i. User enrollment.

j. System and application software descriptions.

k. Recovery and restart procedures.

l. Use of report generator and generation of reports.

1.4.4.3 Active Vehicle Barrier Controls

Describe operation of the different barrier control operating modes to include normal and emergency operation, barrier control switches, [actuated traffic arms,] [overspeed,] [wrong-way,] traffic signals, warning beacons, and vehicle presence detectors. Include description of security strategy for defeating a threat vehicle and the SDDC approved barrier safety scheme for protecting innocent vehicles from barrier operations.

1.5 TRAFFIC CONTROL PLANS

1.5.1 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].

1.5.2 Traffic Control Plan During Crash Rated 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/ECF remain in service. As a minimum, include requirements for traffic signal indications, for bagging signal heads, 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 COMPONENT CERTIFICATION

Provide certifications from the manufacturers of the following equipment as part of the data package: crash rated active vehicle Barrier, [programmable logic controller (PLC),] [traffic arm,] warning signal, annunciator, sequence of events recorder, and all sensors including [overspeed,]

[wrong-way,] [and]vehicle presence.

1.7 CYBERSECURITY EQUIPMENT CERTIFICATION

Furnish a certification that control systems are designed and tested in accordance with DOD 8500.01, DOD 8510.01, Section 25 05 11 CYBERSECURITY OF FACILITY RELATED CONTROL SYSTEMS, and as required by individual Service Implementation Policy.

1.8 OPERATION AND MAINTENANCE MANUALS

Submit finalized manuals bound in hardback, loose-leaf binders within 30 days after completing the Endurance test. Update the draft copy used during site testing with any changes required prior to final delivery of the manuals. Identify each manual's contents on the cover. Include in each manual the names, addresses, and telephone numbers of each subcontractor installing equipment and systems, and the nearest service representative for each item of equipment. Provide each manual with a table of contents and tab sheets. Place tab sheets at the beginning of each chapter or section and at the beginning of each appendix. Include modifications made during installation, checkout, and acceptance in the final copies delivered after completion of the endurance test. Provide the number of copies of each manual to be delivered per DD FORM 1423.

1.8.1 Software Manual

In the software manual describe the functions of all software and include all other information necessary to enable proper loading, testing, and operation. As a minimum, include in the manual the following:

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 date 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.

1.8.2 Hardware Manual

As a minimum, describe all equipment furnished in the hardware manual and include the following:

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.

1.8.3 Functional Design Manual

Identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions within the functional design manual. Include a description of hardware and software functions, interfaces, and requirements for all system operating modes.

1.8.4 Maintenance Manual

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 in the maintenance manual.

1.8.5 Application Software

Provide a copy of the software installation package on optical disk that runs the control program. Provide on optical disk, separate from the operating system software, the complete program or image of the installed software, with all custom changes and configuration data specific for the installed system. At the end of project, after the endurance test is complete, provide complete sets of optical discs. [Provide one set of discs to the USACE Protective Design Center.Provide one to be turned over to the User.]

1.8.6 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, and control diagrams of the system to be used for final system drawings. This set is to be accurately kept up-to-date with all changes and additions to the AVBCS and to be delivered to the Government with the final endurance test report. In addition to being complete and accurate, this set of drawings is to be kept neat and not be used for installation purposes. Furnish final drawings with the endurance test report on optical disk in [Microstation latest Version] [or] [AutoCAD latest version][_____] format.

1.9 CRASH RESISTANCE: DEMONSTRATION OF COMPLIANCE

Submit the following as demonstration of compliance with the specified crash resistance requirements for each crash rated active vehicle barrier proposed for this project.

1.9.1 Crash Test Report

Submit a crash test report for crash-rated active vehicle barrier with a configuration identical to the as tested crash rated active vehicle barrier being provided, from a DOS approved testing laboratory or a testing laboratory accredited by a nationally recognized testing agency in accordance with ISO ISO/IEC 17025. This report is only required for

crash-rated active vehicle barriers that are not on the DOD list. The information is to be submitted with the barrier submittal and is to show an approved crash test per ASTM F2656/F2656M.

1.9.2 Different Length

The only exception to the requirement that the tested crash rated active vehicle barrier be identical to the as tested crash rated active vehicle barrier being provided is the barrier's length. If a length other than that tested is required, the length of the required crash rated active vehicle barrier must represent an interperloation between the successfully tested lengths of crash rated active vehicle barriers that are identical in all other ways. The tested shorter crash rated active vehicle barrier and the tested longer crash rated active vehicle barrier must be identical in construction and testing conditions before the alternate length can be considered. If the length of the required barrier for this project is different than the length tested, provide Crash Test Reports for identical barriers at the maximum/minimum width conditions as required by ASTM F2656/F2656M section 8.2.5. In addition to the test report, provide a letter written by the manufacturer clearly stating that the alternate length crash rated active vehicle barrier is to be constructed in the same manner as the tested barriers.

1.10 QUALITY CONTROL

1.10.1 Project Manager Qualifications

Designate a Project Manager for all work under this specification. The Project Manager is to provide technical and managerial leadership to all contractor personnel and subcontractors during the design, manufacturer, and installation phases of this specification. This person serves as the single point of contact for the General Contractor for all work required in this specification. The Project Manager must have a minimum of 5 years of experience in the design, manufacture, and installation of similar systems.

1.10.2 Installation Superintendent Qualifications

Designate an Installation Superintendent responsible for onsite installation team direction and leadership. First line supervision of tradesmen and subcontractors is provided by the Superintendent. The Superintendent is responsible for job planning and coordination between the work with trades, subcontractors, vendors, and site personnel. The Superintendent is responsible for scheduling materials, equipment, and labor to maintain the flow of work commensurate with the task schedule. The Superintendent administers and executes the provisions of the Accident Prevention Plan. The Superintendent must have a minimum of 5 years of experience in the installation, operation, and testing of similar systems. The Project Manager and the Installation Superintendent can be the same individual.

1.11 TECHNICAL SPECIALISTS QUALIFICATIONS

Provide the services of technical specialists for the crash rated active vehicle Barriers and the related control system. Submit names and qualifications for each of the technical specialists involved. The technical specialists are to have a minimum of 3 years of experience in the installation, operation, and testing of all components, software, and interconnecting wiring of their particular equipment/subsystem. The

presence of each technical specialist is required during Factory Tests of the system, during installation in the field, and serves as the Contractor's Commissioning Specialist for their designated equipment/subsystem for the commissioning tests as specified.

1.12 KEY CONTROL PLAN

Key control plan for all Contractor provided enclosures requiring locks and all keyed control switches. Provide a key control plan that includes 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.

1.13 DELIVERY, STORAGE, AND HANDLING

Protect components delivered to site and/or placed in storage from the weather, humidity (and humidity variation), temperature (and temperature variation), dirt and dust, or other contaminants. Store structural materials on sleepers or pallets and protect them from rust and objectionable materials such as dirt, grease, or oil. Handle all components to protect finish and coatings from scuffs, abrasions or other damage. Excessive damage to factory applied finishes and coatings is cause for rejection. Provide all other delivery, storage and handling protections as recommended by the manufacturer.

1.14 PROJECT/SITE CONDITIONS

1.14.1 Environmental Conditions

All materials, equipment and installation techniques must be appropriate for the prevalent environmental conditions at the installation location. Installation is to be in conformance with manufacturer's written environmental requirements. Submit Manufacturer's Environmental Requirements.

1.14.2 Exterior Conditions

House all components mounted in locations exposed to weather in corrosion-resistant enclosures with appropriate environmental protection. Improper housing design is not to cause a degradation in component performance.

Provide components (those installed outside or in an enclosure exposed outside) that meet the following ambient conditions:

a. Temperature: [-25 to 140]degrees F;

1.14.3 Interior Conditions

Provide equipment, which is installed in environmentally protected interior areas, that meet the performance requirements specified for the following ambient conditions:

a. Temperature: 32 to 120 degrees F. Components installed in unheated security protected areas must meet performance requirements for temperatures as low aszero degrees F;

1.14.4 Site Power Supply

Power supply at the site will be 208 v 1 phase, 208 V 3 phase, 480 v as shown on the drawings.

1.14.5 Current Site Conditions

Prepare and submit a report on "Current Site Conditions", within 75 days of Notice to Proceed, to the Government documenting site conditions that significantly differ from the design drawings and include any conditions on the design documents that would negatively 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 Contracting Officer. Review of this package is to be by the designer of record and the local government construction manager.

1.15 MAINTENANCE AND SERVICE

1.15.1 Description of Work

The adjustment and repair of the system includes all vehicle barriers and systems installed under this specification. Provide and perform all repair, calibration, and other work in accordance with the manufacturer's documentation and instruction. Responsibility is limited to Contractor installed equipment.

1.15.2 Service Personnel

Certify service personnel in the maintenance and repair of the specific type of equipment installed and qualified to accomplish work promptly and satisfactorily. Advice the Government in writing of the name of the designated service representative, and of any change in personnel.

1.15.3 Schedule of Work

Perform routine inspections at minimum once per quarter (4 per year) as detailed below. Barrier system should be tested weekly at a minimum or as recommended by the barrier system manufacturer.

1.15.3.1 Routine Inspections

Include visual checks and operational tests of crash rated active vehicle barriers (cleaning pit if necessary), traffic signals, console equipment, peripheral equipment, local processors, sensors, and electrical and mechanical controls as part of the minor inspections.

1.15.3.2 Scheduled Work

Perform scheduled work during regular working hours, Monday through Friday, excluding federal holidays.

1.15.4 Operation

The applicable portion or portions from the performance verification test procedures are to be used after all scheduled maintenance and repair activities to verify proper component and system operation.

1.15.5 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. Provide a log that contains all initial settings. Ensure logs are kept and available for inspection onsite, demonstrating that planned and systematic adjustments and repairs have been accomplished for the system.

1.15.6 System Modifications

Make any recommendations for system modification in writing to the Government. Prior approval of the Government is required before any system modifications are made. Updating of the operation and maintenance manuals as well as any other documentation affected is required after any modification is made to the system.

1.15.7 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. Accomplish updates in a timely manner, fully coordinated with system operators, and ensure all data is 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.

1.16 WARRANTY

Provide all labor, equipment, and materials required to maintain the entire system in an operational state as specified, for a period of [one year] after formal written acceptance of the performance verification test to include scheduled and nonscheduled adjustments.

1.16.1 Warranty Service

The Government initiates service calls to the Contractor when the system is not functioning properly. Qualified personnel must be available to provide service to the complete system. Furnish the Government with a telephone number where the service supervisor can be reached at all times. Warranty service is to comply with 01 78 00 CLOSEOUT SUBMITTALS and the with the following codes:

a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within [24] hours, initiate work within [48] hours and work continuously to completion or relief.

b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within [4] days, initiate work within [48] hours and work continuously to completion or relief.

c. Third Priority Code 3. All other work to be initiated within [7] work days and work continuously to completion or relief.

d. The "Construction Warranty Service Priority List" is as follows:

Code 1-crash rated active vehicle barrier system (controls and barrier)
(1) Mechanical or electrical equipment failure that prevents the crash rated active vehicle barrier from opening or closing through the controls.
(2) Active vehicle barrier control system is unable to reset.
(3) Active vehicle barrier control system is unable to operate the crash rated active vehicle barriers properly.

Code 2-Active vehicle barrier system (controls and barrier)
(1) A single traffic signal is not operational.
(2) Problem associated with the vehicle presence detection system (typically safety loops).
(3) Problem associated with sequence event recorder.
(4) Crash rated active vehicle barrier opens and closes, but does not perform the operation in a smooth manner.
(5) Problem associated with wrong-way detection system.
(6) Problem associated with overspeed detection system.

Code 3-Active vehicle barrier system (controls and barrier)
(1) Warning beacon(s) is not operational.
(2) Active vehicle barrier warning light(s) or in-pavement light(s) are not operational.
(3) Any item associated with a control system malfunction (example indicating light or warning buzzer) that does not have a direct impact on operating the crash rated active vehicle barriers.

1.16.2 Service Call Requests

Record separately each service call request, as received. Provide a form that includes 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.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Furnish and install a complete and functional crash rated active vehicle barrier system for the ACP/ECF including crash rated active vehicle barriers, active vehicle barrier controls, traffic signals, traffic signal controls, traffic warning signals, traffic signs and pavement markings, [actuated traffic arms if applicable,][vehicle overspeed detectors if applicable,][wrong-way detectors if applicable,]vehicle presence detectors, tamper switches, alarm displays, sequence of events recorder, data transmission, and all interconnecting conduit and wiring. Crash rated active vehicle barrier types covered by this specification include [active net barriers].

2.2 CRASH RATED ACTIVE VEHICLE BARRIER SAFETY SCHEME

Install and program the [Hybrid Beacon Conventional (Signs and Signals)][Full Containment][High Efficiency Presence Detection] [Stop Control] safety scheme, as approved by the Surface Development and Distribution Command (SDDC) to ensure the safety of innocent motorists. See Appendix A [and the contract drawings]for the required features and operational sequences of this safety scheme.

2.3 CRASH RATED ACTIVE VEHICLE BARRIER FEATURES

2.3.1 Impact Conditions

The crash rated active vehicle barriers are to withstand an impact corresponding to [ASTM F2656/F2656M, Impact Condition OF [M50][M40]where the letter(s) correspond to the test vehicle and the last two digits correspond to the test velocity in mph][or][DOS [K12][K8]].

2.3.2 Penetration Rating

[When subjected to the specified Impact Condition, vehicle barriers are to respond with Penetration Rating equal to or better than [P2]as defined in ASTM F2656/F2656M.]

2.3.3 Operators

[Provide [electric (electromechanical)] crash rated active vehicle barriers.]

2.3.4 Vehicle Loads

All roadway components are to be capable of supporting a 32,000 pound axle load or a 16,000 pound wheel load.

2.3.5 Roadway Obstruction

When a barrier is in the "Access Allowed" position, no element in the drive path is to extend above the surrounding grade. Taper all changes in grade.

2.3.6 Dimension Requirements

Provide crash rated active vehicle barrier dimensions with the same dimensions of the barrier tested in the Proof of Performance test(s) and as documented [in the Crash Test Report].

2.3.6.1 Structural Footprint Dimensions

Structural footprint dimensions are not to exceed Test crash rated active vehicle barrier buttress at the same rating specified.

2.3.7 Failure Modes of Operation

Design the system to remain in the last commanded position in the event of failure.

a. Design the system so that unauthorized personnel cannot manually manipulate the barrier into the "access allowed" position in the event of a power outage. Locks and tamperproof screws and bolts are examples of acceptable means to prevent unauthorized access.

b. Design the system to allow authorized personnel to manually manipulate the barrier into the "access allowed" and "access denied" position in the event of a power outage or operator failure. Barriers are to be capable of being raised and lowered using a recessed handle on the top surface of the barrier or a manual hydraulic pump or other means when the hydraulics or electric motors are not operational. The operation is to require no more than 267 N 60 pounds of force to operate.

c. Design the system to maintain the barriers in the raised position, without inspection, for periods of time of up to 1 week.

2.3.8 Crash Rated Active Vehicle Barrier Foundations

[Foundation systems are to be shallow with required depths no more than [18 inches].]

2.4 CRASH RATED ACTIVE VEHICLE BARRIER(S)

2.4.2 ACTIVE NET BARRIERS

Provide active net barrier systems that meet the design and performance requirements of this SECTION. Provide active net barriers that consist of a [cable/net system]. Energy absorbing barrier systems are to have a minimum testing frequency of one week and not require any specialized equipment or trained personal to return to the "access allowed" position.

2.5 POWER UNIT

2.5.1 ELECTRIC POWER UNIT ENCLOSURE

Provide a NEMA Type 3R enclosure as specified in NEMA 250 to enclose the electric power unit. Provide an access door with hinges and an inside and outside operable/lockable (exterior) door latch. Place and configure equipment within the enclosure so that all periodic maintenance can be performed through the access door without removal of the equipment. Equip the enclosure with weatherproof louver vents appropriately sized and located to dissipate internal heat generation.

2.6 HEATER

If required by contract documents,Provide a waterproof barrier heater with a thermostat control and NEMA 4 junction box connection point for de-icing and snow melting. Provide a heater that ensures proper barrier operation is maintained down to an ambient temperature of minus 40 degrees F.

2.7 FINISH AND MARKINGS

Provide signs and markings that meet retroreflectivity requirements as contained in the MUTCD under Part 2 Signs sections on 'Retroreflectivity', 'Maintaining Minimum Retroreflectivity', and 'Shapes' plus ensure all state and local retroreflectivity requirements are satisfied. Paint surfaces in accordance with requirements of Section 09 90 00 PAINTS AND COATINGS.

Provide signing as shown in the drawings. A minimum sign sheeting of MUTCD Part 6F Temporary Traffic Control Device Zone Devices, Section on Channelizing Devices, Type III sign sheeting is to be used for regulatory

and warning signs. Provide all sign posts with a breakaway design as set forth in AASHTO RSDG-4 or as required by the local/State Department of Transportation.

2.8 ACTIVE VEHICLE BARRIER CONTROL SYSTEM (AVBCS)

2.8.1 General Requirements

The AVBCS provides alarm, status, and control information to the [Master Control Panel], [Remote Control Panel(s),] [Guard Booth Control(s) (panels and buttons),] [Search Area Control Panel(s),] [Search Building Control Panel,][Overwatch Position Control Panel,] [Pedestrian Control Panel,]and the Local Control Panel(s). A full layout showing the location of the controllers is required. A controller that is installed in a facility requires a complete layout of all equipment to be placed in the room/area to ensure all clearances are maintained. This layout is part of the shop drawings submittal. The control system contains all relays, timers, and other devices and an industrial programmable controller programmed as necessary for the barrier operation. The control panel allows direct interface with auxiliary equipment such as card readers, remote switches, loop detectors, infrared sensors, and [sliding][swinging] gate limit switches. Provide logic to coordinate the barricade and the traffic lights.

2.8.2 System Integration

Provide the AVBCS as an integrated system, including all sub systems specified hereafter. AVBCS hardware and software integration is required 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 must be extensively documented and demonstrated in the Technical Data and Software Package. ***The system is configured with industrial programmable logic controllers.***

2.8.3 AVBCS Processor

The AVBCS processor consists of a combination of controllers located within the ACP/ECF that work with the various hand machine interface operating panels that are either hard control panels (discrete switches, buttons and indicating lights) or touchscreen control panel(s) or a combination of both touchscreen and hard control items.

a. A programmable logic controller (PLC) meeting the requirements listed herein. Provide the PLC or PLCs with the latest software version. This is the main overall controller for the AVBCS.

b. Overspeed controllers are to work in unison with the system to provide the appropriate alarms.

c. Wrong-way controllers are to work in unison with the system to provide the appropriate alarms.

d. Human Machine Interface: [Hard-control] [Hard-control panel and touchscreen video-control] [Contractor allowed the option to provide either hard control or touchscreen control or a combination of the two systems; however, EFO is to be hard control] panel operator interface.

e. Vehicle Presence Detection: Controller that operate the vehicle presence detection system(s) are to work in unison with the overall system to provide the appropriate response.

f. Computer control. Controller(s) that are computers (not a PLC or traffic control unit) are not allowed at this time.

2.8.4 PROGRAMMABLE LOGIC CONTROLLER (PLC)

2.8.4.1 PLC General Requirements

PLCs area digitally operating electronic apparatus that use a programmable memory for internal storage of instructions for implementing specific functions such as logic, sequencing, timing, counting, and arithmetic though digital or analog input/output modules. PLCs are capable of receiving discrete and analog inputs and, through programming, and are able to control discrete and analog output functions, perform data handling operations and communicate with external devices. Provide PLCs that function properly at temperatures between 32 and 122 degrees F. Provide an intelligent process controller that has the ability to function independently; that is, perform its function without the need for commands from a separate computer.

2.8.4.2 Input/Output Characteristics

Each controller allows for analog input, analog output, discrete input and discrete output. The number and type of inputs and outputs for the system is as shown on the drawings or described herein and is to comply with the sequence of control. During normal operation, a malfunction in any input/output channel is to affect the operation of that channel only and must not affect the operation of the CPU or any other channel. Provide a PLC that is able to communicate with a computer or other PLC's via fiber optic cable or copper cable. Provide a PLC processor that is able to process data from Remote Input/Output modules via fiber optic cable or copper cable. Ensure remote Input/Output modules do not require individual programming to function.

2.8.4.3 Wiring Connections

Provide wiring connections that are heavy duty, self lifting, pressure type screw terminals to provide easy wire insertion and secure connections. Provide a hinged protective cover over the wiring connections. Provide write-on areas for identification of the external circuits on the cover.

2.8.4.4 Diagnostics

Provide each PLC with diagnostic routines implemented in firmware. The CPU is to continuously perform self-diagnostic routines that will provide information on the configuration and status of the CPU, memory, communications and input/output. The diagnostic routines are to be regularly performed during normal system operation.

2.8.5 PLC SOFTWARE

Furnish all PLC software described in this specification as part of the complete control system.

2.8.5.1 Operating System

Maintain a point database in its memory that includes all parameters, constraints and the latest value or status of all points connected to the PLC. Each PLC is be capable of operating in stand alone mode.

2.8.5.1.1 Startup

Provide the PLC with startup software that causes automatic commencement of operation without human intervention, including startup of all connected I/O functions.

2.8.5.1.2 Failure Mode

Upon failure for any reason, each PLC is to perform an orderly shutdown and force all PLC outputs to a predetermined (failure mode) state, consistent with the failure modes shown and the associated control device.

2.8.5.2 Functions

Provide a controller operating system that is able to scan inputs, control outputs, and read and write to its internal memory in order to perform the required control as indicated in the sequence of control on the drawings.

2.8.6 AVB Control System Processing and Control Software

2.8.6.1 General

Specific functions to be implemented are defined in individual system control sequences and database tables shown on the drawings and herein. Provide software that provides the communication, programming and control capabilities necessary to support all specified points. Provide a controller that is online at all times and performs all required functions as specified. Provide software that consists of custom-developed code and/or one or more standard software modules. Where multiple modules are used, the modules need to be capable of sharing data and operating together seamlessly. Provide a system that supports multiple user operations with multiple tasks for each user and supports operation and management of all peripheral devices. Provide a system that allows on-line configuration modifications, while the system is operating. Provide a system that allows the possibility of upgrading the software to newer versions using an automatic mechanism provided by the software manufacturer.

2.8.6.2 Display Information

Provide information necessary to support all requirements specified at the AVBCS display, including: guard control commands; alarm notification; status point changes; and report generation

2.8.6.3 Convenience Outlet

Provide a 120 volt ac, 15 amp, ground fault interruption (GFI) type duplex convenience outlet inside each cabinet that houses a PLC.

2.8.7 CONTROL PANEL(S)

[Provide a master control panel to interface between all barrier control

circuits, remote EFO control panels,[remote EFO control buttons,][wrong-way][, overspeed], auxiliary equipment, and the crash rated active vehicle barrier power units. Provide remote control panel(s)/buttons [for each [guard booth,][search area,][Overwatch,][_____].] Provide remote local panel(s) at the barrier location to be used for maintenance purposes. Control circuits contain all relays, timers, and other devices or an industrial programmable controller programmed as necessary for the barrier operation. Provide a control panel that allows direct interface with auxiliary equipment such as card readers, remote switches, loop detectors, infrared sensors, and sliding or swinging gate limit switches. Ensure loop controllers do not allow an automatic barrier raise following power loss or restoration. Run all device interconnect lines to terminal strips. Descriptions are primarily for discrete controls making up a given control panel. If allowing or using touchscreen control instead, see paragraph "Touchscreen" for revised requirements. [Provide control panels as shown on the drawings and as described in Appendix A.][Provide control panels as shown on the drawings.][Provide control panels as described in Appendix A.][EFO function is not allowed to be accomplished with a touch screen.]]

[Provide a master control panel to interface between all barrier control circuits, remote EFO control panels,[remote EFO control buttons,] wrong-way[, overspeed], auxiliary equipment, and the crash rated active vehicle barrier power units. Provide remote control panel(s)/buttons [as shown.][for each[guard booth,][search area,][Overwatch,][_____].] Provide remote local panel(s) at the barrier location to be used for maintenance purposes. Control circuits contain all relays, timers, and other devices or an industrial programmable controller programmed as necessary for the barrier operation. Provide a control panel that allows direct interface with auxiliary equipment such as card readers, remote switches, loop detectors, infrared sensors, and sliding or swinging gate limit switches. Ensure loop controllers do not allow an automatic barrier raise following power loss or restoration. Run all device interconnect lines to terminal strips. Descriptions are primarily for discrete controls making up a given control panel. If allowing or using touchscreen control instead, see paragraph "Touchscreen" for revised requirements. [EFO function is not allowed to be accomplished with a touch screen.]]

2.8.7.1 Master Control Panel

Provide a master control panel with all necessary displays and controls to allow the operator to view real-time alarms, discrete point status changes, to control crash rated active vehicle barriers and related equipment. Locate the master control panel[as shown on the drawings] in a manner to allow the operator to easily use the controls and monitor the displays while, at the same time, oversee entry and exit operations. Permanently label all control panel indicator lights, push buttons, and switches on the console. [Provide master control panel as shown on the drawings.][The master control panel includes the following:]

[a. Keyed Power On/Off switch with a red indicating light illuminating when power is on.

][b. Mode Selector Switch. Provide a selector switch for each barrier. The switch is to have ["EFO", "Test", "Local"] ["EFO", "Test"] [_____] modes. [Provide a keyed switch.]

][c. A pushbutton for "access allowed" and a pushbutton for "access denied" positions for each barrier and corresponding indicating light for each

action. Illuminate a red indicating light for "access denied" and a green indicating light for "access allowed".

][d. A pictograph of the barrier in the "access allowed" position and "access denied" position next to the pushbutton.

][e. An EFO [pushbutton][switch][pushbutton or switch] with a cover that operates the barrier(s) in EFO mode.

][f. EFO Activated. Red indicating light.

][g. EFO Reset. [Lockable][Switch or pushbutton][Keyed switch].

][h. Lamp test button.

][i. An operating mode switch between EFO and manual modes for [each barrier][the inbound lanes and for the outbound lanes][as indicated].

][j. A toggle switch that arms or disarms each [remote panel with an EFO] [guard booth] control panel. Provide indicating light - red for arm and green for disarm.
]
[k. An audible alarm (buzzer) that has adjustable volume control. Volume control can be by another switch or built into the buzzer.
]
[l. Provide a pushbutton that is used to silence the audible alarm. Silence button when pushed just silences the present alarm. If a new alarm comes into the panel, the audible alarm will activate.
]

2.8.7.2 Remote EFO Control Panel - Primary

[This panel is intended to be installed at each overwatch position. [Provide as shown on the drawings.]
]
[[Provide Remote Control Panel(s) - Primary as shown on the drawings.][The Remote Control Panel(s) - Primary includes the following:]
]
[a. Provide a red indicating light for "access denied" and a green indicating light for "access allowed".

][b. Next to the pushbutton or position indicating lights, provide a pictograph of the barrier in the access allowed position and access denied position.

][c. An EFO [pushbutton][switch][pushbutton or switch] with a cover that operates the barrier(s) in EFO mode.

][d. EFO Activated. Red indicating light. Locate near the EFO.

][e. A lamp test button.]

[f. An audible alarm (buzzer) that has adjustable volume control. Volume control can be by another switch or built into the buzzer.
]
[g. Provide a pushbutton that is used to silence the audible alarm. Silence button when pushed just silences the present alarm. If a new alarm comes into the panel, the audible alarm will activate.

]
[h. Provide a red indicating light that shows when the remote panel is Armed from the master control panel.
]
2.8.7.3 Remote EFO Control Panel - Secondary

[This panel is intended to be installed in each Guard Booth[, at the Pedestrian Booth,] and at each Search Area. [Provide as shown on the drawings.]
]
[[Provide Remote Control Panel(s) - secondary as shown on the drawings.][The Remote Control Panel(s) - secondary includes the following:]
]
[a. An EFO [pushbutton][switch][pushbutton or switch] with a cover that operates the barrier(s) in EFO mode.

][b. Provide a red indicating light that shows when the remote panel is Armed from the master control panel.
]
[c. EFO Activated. Red indicating light. Locate near the EFO.

][d. An audible alarm (buzzer) that has adjustable volume control. Volume control can be by another switch or built into the buzzer.
]
[e. An red visual indicating light for wrong-way.
]
[f. An red visual indicating light for overspeed.
]
2.8.7.4 Remote EFO Control Button

[This EFO control button is intended to be installed at each Guard Booth. [Provide as shown on the drawings.]
]
[[Provide EFO control button as shown on the drawings.][The EFO control button includes the following:]
]
a. An EFO [pushbutton][switch][pushbutton or switch] with a cover that operates the barrier(s) in EFO mode.

b. Provide a red indicating light that shows when the remote EFO button is Armed from the master control panel.

c. EFO Activated. Red indicating light. Locate near the EFO.

2.8.7.5 Remote - Local Control Panel

This Remote Control Panel does not haven an EFO. The panel is to be located within a cabinet located near the crash-rated active vehicle barrier that is lockable. [Provide Local Remote Control Panel(s) as shown on the drawings.][The Local Remote Control Panel(s) includes the following:]

[a. A pushbutton for "access allowed" and a pushbutton for "access denied" positions for each barrier and corresponding indicating light for each action. Illuminate a red indicating light for "access denied" and a green indicating light for "access allowed").

][b. Next to the pushbutton, provide a pictograph of the barrier in the

"access denied" position and "access allowed" position.]

[d. Mode Selector Switch. Provide a selector switch on the panel for each [barrier][direction of travel]. The switch is to have ["EFO or Off", "Local"] modes. [Provide a keyed switch.] Provide with a red indicating light illuminating when in the [Local][On} position.
]
[e. Out of service switch. Provide a two-position switch that can be operated in any operating mode.
]]

2.8.7.6 Keys for Switches

[Provide keyed switches and keys as shown on the drawings and required in Appendix A.][Provide keyed switches and keys as shown on the drawings.][Provide keyed switches and keys as described in Appendix A.][The Control Panel(s) include keyed switches with keys per the following:]

[a. Each master control panel switch operable by a unique key.

][b. Master control panel mode switch key removable in [all modes]["EFO", "Test", "Local"]["EFO", "Test"][_____]mode(s) only.

][c. Local panel mode selector switch with key removable in ([all modes]["Off", "Local"]["Off"][_____].

][d. Master control panel mode selector switch for a [specific barrier][direction of travel] is to match the corresponding Local Control Panel mode selector switch for the same barrier. The master control panel mode selector switch and the local control panel switch are keyed the same.

][e. Key removable only in [off][on][_____] position.]

2.8.8 VOLTAGE

The control circuit operates from a [120] VAC or 24 VDC (when barrier interface panel is incorporated) supply.

2.8.9 SEQUENCE OF EVENTS RECORDER

All alarms and events listed in Appendix B must be collected by the AVBCS 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, EFO Guard booth 1 activated. 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 a spreadsheet. Receive and store all alarms and status changes in the AVBCS database with the appropriate time tags in no more than 100 milliseconds after the condition occurs (e.g., alarm/status point contact closure).

2.8.10 ALARM DISPLAY PANELS AT THE ID CHECK AREA AND SEARCH AREA(S)

Mount one or more Alarm Display Panels consisting of back-lit or LED

[OVERSPEED and][WRONG WAY] messages outside of but near the guard booths at the ID Check Area. Mount so that the guards can see the message boards while looking toward the on-coming traffic. Include an adjustable audible alarm with the each alarm panel. Provide and locate a sufficient number of alarm panels to ensure any ACP/ECF guard either sitting in a guard booth or standing outside the guard booth can see and hear at least one panel. Provide an adjustable audible alarm that is loud enough to be heard over ambient traffic noise. Overspeed and wrong-way alarms clear automatically 3 seconds (adjustable) after the alarm condition ends with no action required by guard. Record overspeed and wrong-way alarms on the Alarm and Events Recorder.

2.8.11 Control Panel Components and Construction

2.8.11.1 Enclosures

Each control panel enclosure is to conform to the requirements of NEMA 250 for the types specified. Provide the manufacturer's standard finish color, unless otherwise indicated. Repair and refinish damaged using original type finish. Provide Type [1][4][12] enclosures for installation in equipment rooms; those for installation in clean, dry indoor occupied space may be Type 1; other locations are as otherwise specified or shown. [Provide Type 4 or as shown, enclosures for equipment installed outdoors.] [Provide Type 4X enclosures for installation in corrosive environment and construct of [stainless steel]. Painted steel is not be allowed for use in a corrosive environment.] Provide enclosure with a single, continuously hinged exterior door with print pocket, 3-point latching mechanism and key lock and a single, continuously hinged interior door. Provide panels that are mounted on flat horizontal surface with a top that is tilted at 45 degrees or 60 degrees (unless a panel is wall mounted) to ensure easy viewing of the controls. Secure the control panel to the surface it is mounted.

2.8.11.2 Controllers

Provide controllers per paragraph programmable logic controller (PLC).

2.8.11.3 Standard Indicator Light

Provide indicator lights that comply with UL 508. Provide lights that are heavy-duty, round and mount in a 22.5 mm 0.875 inch mounting hole for alarm indicator, crash rated active vehicle barrier position indicator and EFO activation. Provide lights of the same size and type indicated for alarm indicator or provide round and mount in a 12.7 mm 0.5 inch mounting hole for all other indicators. Provide long-life LED type indicator lights that operate at 120 VAC or 24 VDC. Provide indicator light with a legend plate labeled as shown on the drawings. Provide the indicated lens color as shown on the drawings or specified herein. Provide panels with an overall "Push to Test" pushbutton or provide lights that are push to test (lamp) type. It is allowed to provide illuminated pushbuttons instead of a separate visual indicator.

2.8.11.4 Selector Switches

Selector switches must comply with UL 508. Provide selector switches that are heavy duty, round and mount in a 22.5 mm 0.875 inch mounting hole. Provide the number of positions as indicated on the drawings or specified herein. Provide switches as indicated on the drawings or specified herein.

Provide selector switches with a legend plate labeled as shown on the drawings or specified herein. Where indicated or required, Provide dual auxiliary contacts for the automatic position where indicated or required, to provide position sensing at the workstation. Auxiliary contacts that are rated for 120 VAC, 1A as a minimum. Provide key operated switches where indicated on the drawings or specified herein. All keys are to be identical unless indicated on the drawings or specified herein to have different keying.

2.8.11.5 Push Buttons

Push buttons must comply with UL 508. Provide push buttons that are heavy duty, round and mount in a 22.5 mm 0.875 inch mounting hole. Provide the number and type of contacts as indicated on the drawings or required by the Sequence of Control. Provide push buttons that are rated for 600 volts, 10 amperes continuous. Provide push buttons with a legend plate labeled as shown on the drawings.

2.8.11.6 Relays

Provide relays that are as required by the Sequence of Control. Provide relay coils that are rated[120 VAC] [or] [24 VDC][that coordinates with the controls] and provide with matching mounting socket.

2.8.11.7 Terminal Blocks

Provide terminal blocks for conductors exiting control panels that are two-way type with double terminals, one for internal wiring connections and the other for external wiring connections. Provide terminal blocks made of Bakelite or other suitable insulating material with full deep barriers between each pair of terminals. Provide a terminal identification strip that forms part of the terminal block and each terminal must be identified by a number in accordance with the numbering scheme on the approved wiring diagrams.

2.8.11.8 Alarm Horns

Provide alarm horns where indicated on the drawings[or where required in Appendix A]. Provide horns that are vibrating type and comply with UL 508. Provide horns with a means to adjust the volume level. Exterior horns are to be weather proof by design or be mounted in a weather proof enclosure that does not reduce the effectiveness of the horn. Horn is to be set to go off for [10][4][6][_____] seconds after an EFO is activated.

2.8.11.9 Alarm Buzzer

Provide warning alarm piezoelectric buzzer at the master control panel and other panels where indicated on the drawings and specified herein. Provide round buzzer that mounts mount in a 0.875 inch mounting hole.
Provide buzzers with a Maximum 100 dB at 39 inch. Provide buzzer with a means to adjust the volume level and with selectable alarm tones.

2.8.11.10 Touchscreen

EFO function is to be done by a discrete pushbutton/switch and is not allowed to be done on the touchscreen. The Contractor[has the option][is] to provide a touchscreen to perform the functions of the master control panel. [The master control panel graphical user interface is to show the layout of the ACP/ECF and have different screens that allow the user to go

to specific areas to perform the operation.][The master control panel graphical user interface is to show pushbuttons and lights in graphical format.] The minimum size for the touchscreen is 15 inches380mm for the master control panel. Screen shots are to be submitted for review and approval as part of the panel layouts. Provide symbology as indicated:

a. Show the crash rated active vehicle barrier graphically.

b. Red circular symbol to "push" for closing. Green circular symbol to "push" to open.

c. Green rectangle with black lettering for changing between operating modes. When going between different operating modes, a different screen is to show. Items that do not function are not shown or can be grayed out on the screen if approved. If going between modes and the system is in the incorrect configuration, an alarm box stating "Incorrect Configuration" is to pop-up.

d. EFO Activation triggers a red square with the wording "Warning Emergency Fast Operate Activated".

e. EFO Reset will be a green square with the wording "Press to Reset EFO". This opens a screen with a keypad to enter the pin to reset the EFO.

f. Control systems that have different operating modes will have the modes on different screens or some means to clearly shown on the screen which mode the panel is currently operating.

g. Local mode, when using discrete components, uses a key to do a lock-out/tag-out type application to ensure the maintenance worker has full control. When using a touch screen, a keyed approach can still be used as well as a password approach. No matter the solution, it is imperative that it require an action done by the guard or maintenance worker at the master control panel and then at the Local control panel to achieve full control. A solution that has only a unique password at the Local control panel is not allowed.

2.9 SEQUENCE OF OPERATION

[Refer to Appendix A and the drawings for Sequence of Operation requirements.][Refer to Appendix A for Sequence of Operation requirements.][Sequence of Operation is as shown on the drawings.][_____ .]
[The system operates in the following manner:]
[

a. [The master control panel arms or disarms the control functions at the [local][and][remote]control panels and controls the operational mode of all the barriers in the system. The master control panel also controls and monitors the position of each barrier.]

b. [When enabled by the Master Control Panel, the Local Control Panel[s] control[s] and monitor[s] the position of each barrier under the Local Panels control.]

c. [When enabled by the master control panel, the remote control panel[s] control[s] and monitor[s] the position of each barrier under the remote panel's control.]

d. Power On/Off switch. Provide a green light to indicate the "on" position. With the switch in the "off" position, all indicating lights and switches are off/disabled.

e. Selector Switch. Provide a selector switch for each barrier.[Provide a selector switch for each lane.][Provide a selector switch for each direction of travel.]Provide a switch that has ["EFO", "Test", "Local"] ["EFO", "Test"] [_____] modes. "EFO" mode locks out "Test" (manual) and "Local" operation for the barrier via "access allowed" /" and access denied" push buttons. "Test" mode locks out "EFO" and "Local" operation for the barrier. "Local" mode locks out the "Test" manual "access allowed"/ and "access denied" push buttons at the master control panel and the "EFO" mode for that barrier. [_____]

f. EFO. When the EFO button is pushed, barriers that have their selector switch in EFO position deployed after a [4] [_____] second delay. Induction loops must also be clear for the barriers to deploy. [The delay timer allows the yellow light in the traffic signal to illuminate for 3 seconds and then illuminate the red light for [1] [_____] second[s] prior to allowing barrier(s) to deploy. When the EFO button is pushed, a red indicating light on the panel(s) illuminated to indicate EFO activation.][A horn located at the barriers is to sound for [4][6][_____] seconds as soon as the EFO button is pushed.]

g. EFO Reset. Use of a [pushbutton][or][keyed switch] is required to reset the logic after an EFO has occurred.

h. Active Vehicle Barriers with "Access Allowed" and "Access Denied" Pushbuttons. When the barrier is in the "access denied" position a red indicating light on a control panel will illuminate. When the barrier is in the "access allowed" position a green indicating light on the same panel illuminated. The green indicating light must not illuminate until the barrier is in the "access allowed" position.

i. Lamp Test Button. When pushed this button activated all indicating lamps to verify that all bulbs are functional.

j. Induction Loops at the barrier. Provide [one prior to and one after the barrier][as shown on the drawings][_____]. [In "EFO" mode, barrier activation is suppressed until the loops don't sense the presence of vehicles.][In other modes, if the loop is activated (i.e. a vehicle is on the loop) barrier operation is prevented. Once cleared, the barrier does not deploy.]]

2.10 AVB LIGHTING

e. Active Net type barriers are not required to have lighting mounted on the barrier. For Energy Absorbing Barriers, markings will be provided by the installation of retroreflective wrap on the netting/cables/posts which provide the same color scheme, retroreflective performance and durability as required in this SECTION. Provide retroreflective tape wrapped on the cables in alternating red and white pattern that is visible in both directions.

2.11 WARNING BEACONS

The warning beacon or wig-wag must be [mounted within [_____] m[_____] ft of each barrier] [on each barrier] [as shown on the drawings] and is to

include two alternately flashing signal sections. Provide each signal section with a standard traffic signal face with a flashing CIRCULAR YELLOW signal indication. Mount signal sections horizontally on the warning beacon. The visible diameter of each signal section is not to be less than 200 mm 8 inch. When illuminated, the beacon must 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. Provide the yellow lens color to meet the requirements of MUTCD. Provide all flashing contacts with filters for suppression of radio interference. Provide beacons that flash at a rate of not less than 50 nor more than 60 times per minute. The illuminated period of each flash is 1/2 of the total cycle for each signal section. Provide a beacon this is programmable and in order to permit continuous non-flashing operation through a supervisory signal from the Traffic Controller Unit (CU). Provide day-light sensor and an automatic dimming system to reduce the brilliance of the beacon.

2.12 BLANK-OUT SIGNS

Provide the blank-out sign with LEDs that have a lifetime of 80,000 hours or better. Automatic dimming is to adjust to ambient light levels. Flashing circuits are to be adjustable. Sign is to be NEMA 4 or 4X. Sign housing is to be constructed of extruded aluminum or stainless steel with gasket seals around the doors and lens. At full intensity, the sign is to be highly visible anywhere within a 15 degree cone centered about the optic axis. LED assemblies are removable and replaceable with simple hand tools. Provide a sign that is rated to operate in a temperature range of -37C to 74C -35F to 165F.

2.13 TRAFFIC SIGNALS/HYBRID BEACON TRAFFIC SIGNALS

Provide traffic signals with light emitting diode (LED) signal modules. The term "LED signal module" in this text refers 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 are to 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 are as shown on the drawings and are to conform with MUTCD. Provide visors on each signal. Provide [yellow] [or] [black] housing color.

[Supply red/yellow/green 305 mm 12 inch traffic lights for each[entrance and exit lanes][as shown on the drawings or required by Appendix A] to alert motorists of the barrier position. Supply all necessary brackets to allow the lights to be properly mounted. Use the green light to indicate that the barrier is fully open.
]
[Hybrid Beacon. A three light hybrid beacon signal head over each inbound and outbound active barrier and on each post or only, only in special cases, post mounted only. Post mounted only requires two posts with each having a traffic signal. Supply red/yellow 305 mm 12 inch traffic lights for each entrance and exit lanes to alert motorists of the barrier position. Signals are placed such that there are two red signals mounted side by side with a yellow signal centered below. Supply all necessary brackets to allow the lights to be properly mounted.
]
[Supply red 305 mm 12 inch traffic lights for each[entrance and exit lanes][as shown on the drawings or required by Appendix A] to alert motorists of the barrier position. Supply all necessary brackets to allow

the lights to be properly mounted.
]

2.14 TRAFFIC SIGNAL SUPPORTS

Submit all traffic signal support design calculations as well as shop drawings to the government for review and acceptance prior to installation.Ensure compliance with AASHTO LTS and applicable local and state standard specifications for the design and installation of all traffic control supports. Traffic signal supports consist of tubular members, mast arms, pole shaft, base plates, anchor bolts assemblies, foundations as well as associated connections and appurtenances. Evaluate loading to be consistent with local and state guidelines. Determine ice and wind loads based on the geographic location of the installation in accordance with AASHTO guidelines. Evaluate group loading analysis to be consistent with local and state guidelines and section 1.2.6 of AASHTO LTS. Allowable stress must be consistent with local and state guideline and section 1.4 of AASHTO LTS. Provide fatigue calculations that are consistent with local and state guideline and section 1.9.6 of AASHTO LTS. It is the Contractor's responsibility to conduct soil borings for foundation design; otherwise, conservative soils assumptions are to 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, inspect and evaluate each foundation excavation 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.

2.15 VEHICLE PRESENCE, WRONG-WAY, AND OVERSPEED DETECTORS

Provide sensors that are compatible with the barrier controller and that function as part of a complete barrier control system.

Sensors used to detect overspeed are to have an an alarm setpoint of ([____] m/sec [____] mph that covers a distance of ([____] m/sec [____] mph from the ID Check Area or as shows on the drawings.

2.15.1 Photoelectric Type

Provide photoelectric sensors that meet the requirements listed below. Photoelectric sensors are used for vehicle presence detection [and over-height detection] as shown on the drawings.

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. Provide a photoelectric detector set, including the mounting post that is of robust design to withstand mechanical abuse such as plowed snow from roadway snow removal operations.

e. Provide surge protective devices (SPD) for the power and sensor wire terminations.

f. Provide matching cable connector as required

g. Provide a detector with a minimum range of 1.8 m 6 feet to no less than 19.5 m 65 feet.

i. Provide a detector with user selectable sensitivity settings.

m. Provide a detector that is capable of operating in a temperature range of -40 to +149 degrees F.

2.15.2 Induction Loops

Induction loops may be used for vehicle presence detection, wrong-way detection, and point overspeed detection. Induction loops must be capable of detecting passenger vehicles, motorcycles, and high bed trucks. Tests for all three types of vehicles are to be conducted on each installed loop during the Performance Verification Test.[Provide a pair of inductive loops per barrier/lane whose outputs are used to prevent barriers raising[and lowering] when a vehicle has activated the loop. These safety loops are to be in a quadrapole configuration.][Provide loops as required by Appendix A and as shown on the drawings.][Active vehicle barriers that cross multiple lanes are to have loops that are still sized for each lane.] Induction loops used for vehicle detection and not wrong-way or overspeed detection are to be quadrapole. Provide induction loops that meet the following:

a. Tuning: automatic

c. Loop Sensing frequency: minimum four user selectable frequencies to minimize cross talk with adjacent loops.

d. Sensitivity: user selectable, minimum 4 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: -30 to 180 degrees F.

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.

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 14AW stranded cable with cross-linked-polyethylene insulation installed in a PVC sleeve. Loop wire extending from the loop to the loop amplifier is to 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.

(7) Provide loops that are capable of detecting motorcycles, passenger vehicles, and high bed trucks with the same sensitivity setting.

(8) Provide two complete loops for wrong-way detection. Using a single loops to detect wrong-way is not acceptable.

2.15.3 Radar

Radar detection sensors may be used for vehicle overspeed and wrong-way detection.[Point overspeed Detection. Provide a detector unit that is capable of detecting the speed of one or more vehicles at a point in the ACP/ECF Approach Zone and closing an alarm contact if the vehicle speed is over a preset value.][Continuous overspeed Detection. The detector unit must be capable of continuously detecting the speed of vehicles within preset zones as they approach the ID Check Area of the ACP/ECF. The Sensor is to 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 is to be 5 m 15 feet or less.] Provide radar detection units that meet the following requirements:

a. Provide a detector unit with an operating temperature range of -40 to +170 degrees F.

e. Each detector unit is to transmit on a frequency band of 10.525 GHz +/-25 MHz or another approved spectral band. Provide a detector that

complies with the FCC rules. Provide a detector unit that does not interfere with any known equipment.

g. Provide a detector unit with a field of view that covers an area defined by an oval shaped beam with a beam height and width of 15 degrees minimum and a range of3 to 70 m 10 to 200 feet minimum.

h. Provide a NEMA 3R enclosure or better for the detector unit. Do not exceed overall nominal envelop dimensions of 200 by 254 by 150 mm 8 by 10 by 6-inch.

k. Provide a detector unit that has 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/ECF 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.

n. Set all detector unit parameters and adjust detectors to provide required zone coverage.

2.16 WRONG-WAY AND OVERSPEED WARNING ANNUNCIATOR

Provide a warning annunciator (audible and visual) as indicated in the following:

(1) Provide a visual and audible annunciator that produces a sound whenever a [wrong way] [or overspeed] is detected by a vehicle entering from the exit. Provide the barrier control panels with an audible and visible indicating device as [indicated in Appendix A][indicated in Appendix A and on the drawings][indicated on the drawings.]

[(2) Provide a visual and audible annunciator that produces a sound whenever a [wrong way] [or overspeed] is detected by a vehicle entering from the exit. Provide a marquee style LED sign that shows "WRONG WAY" or "OVERSPEED" with an audible annunciator. Mount marquee on a column in the ID Check area that is visible to the guards when looking toward approacing traffic. Provide a means to adjust the volume on all the audible alarms. [Provide am audible annunciator that sounds until a silence reset button is pressed.][Provide an audible annunciator that sounds for [3][____] seconds and then clears itself.]

2.17 NON-CRASH RATED ACTUATED TRAFFIC ARM ASSEMBLY

Provide actuated traffic arm capable of 300 duty cycles per hour as a

minimum and capable of operating the arm through 90 degrees. Provide gate operators with single phase [[120][208][240][277][_____] volt]motors. Provide slab size and anchorage for gate operator in accordance with manufacturer requirements.

(1) Cover each traffic arm with 406 mm 16 inch wide reflectorized red and white sheeting. Provide the traffic arm with retroreflective markings, in accordance with MARKINGS, [LIGHTING] AND SIGNS paragraph of this SECTION.

(2) Furnish a spare traffic arm for each traffic arm.

(3) Construct gate operator cabinets of galvanized steel, or aluminum and paint per manufacturers approved standard color.

(4) Provide gates with a hand-crank, or other means, which will allow manual operation during power failures.

(5) Construct actuated traffic arms out of wood, steel, fiberglass, or aluminum, as specified by the manufacturer for the given lengths as shown on the drawings.

(6) Provide each gate operator with an obstruction detector that automatically reverses the gate motor when an obstruction is detected. Provide an obstruction detector that is one of the following: An induction loop buried in the road, a photocell electric eye mounted on the gate operator, or a safety strip mounted on the lower edge of the arm. The detector system automatically deactivates when the arm reaches the fully lowered position.

[(7) Provide a break sensor as part of the traffic arm assembly that detects when a vehicle makes contact with the traffic arm and breaks the arm. When the break sensor is activated provide an audible warning through the vehicle barrier control panel. Provide an audible warning that sounds until an audible warning silence reset button is pressed or for [3][_____] seconds.]

2.17.1 Traffic Arm at Other Areas

Provide non-crash rated actuated traffic arm (barrier gate arm) assembly with an opening and closing time of less than or equal to [2][3][5] seconds. Provide each entry lane with a vertical traffic arm gate. Each traffic arm is to be capable of being operated from a remote open-close push button station. The guard booth for that lane is to have the means to open and close. [Provide a means to control each traffic arm from the Command and Control].[Provide actuated traffic arms with three LED flashing lights mounted on the arm.]

2.17.2 Traffic Arm at Active Vehicle Barrier

Provide non-crash rated actuated traffic arm (barrier gate arm) assembly with an opening and closing time of less than or equal to [2][3][5] seconds. Provide a traffic arm, as a separate piece of equipment, with each non-portable crash rated active vehicle barrier as part of the barrier safety operating system. [This traffic arm automatically deploys (close) when the emergency up button is activated and open when the vehicle barrier

is reset.][Provide actuated traffic arms with three (minimum)LED flashing lights mounted on the arm.][Do not equip this traffic arm with a separate automatic obstruction detector. The safety loop for the barrier or the stop line is to function as the obstruction detector.]

2.18 UNINTERRUPTIBLE POWER SUPPLIES (UPS)

[A panelboard located at the barrier location is powered from main UPS located near or at the Command and Control. This panelboard can be used to power some of the equipment listed below instead of a stand alone units.][When the facility UPS provides power to equipment/systems listed, then separate stand alone UPS are not required.]Provide separate UPS units capable of carrying required loads for a minimum of [10][2][5][15][_____] minutes for those items not powered from a central UPS based on this list below. Submit UPS Calculations for all proposed UPS systems identifying all connected loads plus 25% spare capacity.

[a. Primary communications system.

][b. All sensors and controllers for [over speed,] [wrong-way,] [tamper,] etc.

][c. Active Vehicle Barrier Control system including all controls for crash rated active vehicle barriers, [traffic warning signals], [actuated traffic arms], and [warning signals]. This includes the crash rated active vehicle barrier, traffic signal lights, in-pavement lights, and wig-wags.
][d. Active Vehicle Barrier activation systems for [1.5][2] complete operation cycle ("access allowed" position to "access denied" position or "access denied" position to "access allowed" position).
]
[e. Lighting. One luminaire for each ID Check Lane located near the ID guard position and one luminaire for each CCTV camera required at the Active Vehicle Barrier.
]
2.19 SURGE PROTECTION

2.19.1 Power Line Surge Protection

Protect equipment connected to alternating current circuits protected from power line surges. Fuses are not to be used for surge protection.

2.19.2 Sensor Device Wiring and Communication Circuit Surge Protection

Protect inputs against surges induced on device wiring. Protect outputs against surges induced on control and device wiring installed outdoors and as shown. Protect communications equipment against surges induced on any communications circuit. Install surge protection circuits at each end on cables and conductors, except fiber optics, which serve as communications circuits between systems. Fuses are not to be used for surge protection.

2.20 INTRUSION DETECTION SYSTEM

Install and furnish the IDS and duress alarm system per the requirements of 28 10 05 ELECTRONIC SECURITY SYSTEMS (ESS).

[The IDS and duress alarm system for the contract consists of providing

power and pathways for the signal wiring. A future contract will install the wiring and IDS equipment.][The IDS equipment is part of this contract as shown on the drawings.]

2.21 CCTV SYSTEM

Install and furnish the CCTV system per the requirements of 28 10 05 ELECTRONIC SECURITY SYSTEMS (ESS).

2.21.1 CCTV System

[The CCTV system for the contract consists of providing power and pathways for signal wiring. A future contract will install the wiring and CCTV.][The CCTV system equipment is part of this contract.]

2.21.2 AVBCS and ESS Interface

Provide the AVBCS with output contacts for use by the ESS (IDS and CCTV systems) as follows:

a. Pull up all camera views of the crash rated active vehicle barriers during any EFO activation. Provide a dry contact from the AVBCS to be used by the CCTV system.

b. Provide a dry contact from the AVBCS that indicates a tamper switch alarm. This contact is to be used by the IDS system.

c. Provide a spare dry contact from the AVBCS that indicates an EFO activation.

2.22 MATERIALS AND COMPONENTS

2.22.1 Materials and Equipment

Units of equipment that perform identical, specified functions are to be products of a single manufacturer. Provide all material and equipment that is new and currently in production.

2.22.2 Single Manufacturer Active Vehicle Barriers

Provide all parts, components, accessories fittings and fasteners by a single manufacturer as required by manufacturer's written requirements, installation instructions and written warranty, unless otherwise noted in this specification.

2.22.3 Field Enclosures

2.22.3.1 Interior Sensors

Provide sensors used in an interior environment with a housing that provides protection against dust, falling dirt, and dripping non-corrosive liquids.

2.22.3.2 Exterior Sensors

Provide sensors used in an exterior environment with a housing that provides protection against windblown dust, rain and splashing water, and

hose directed water. Provide sensors that remain undamaged by the formation of ice on the enclosure.

2.22.3.3 Interior Electronics

Provide systems electronics used in an interior environment with enclosures which meet the requirements of NEMA 250, Type 12.

2.22.3.4 Exterior Electronics

Provide systems electronics used in an exterior environment with enclosures which meet the requirements of NEMA 250, Type 3R, 4, or 4X.

2.22.3.5 Corrosion Resistant

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

2.22.4 Above Ground Components

All above ground metal components are to be [shop primed and site painted] [or] [hot dipped galvanized] [or] [powder coated] unless otherwise specified.

2.22.5 Below Ground Components

All below ground metal components are to be [shop primed and site painted] [or] [hot dipped galvanized] [or] [powder coated] unless otherwise specified.

2.22.6 Nameplates

2.22.6.1 Components

Provide a nameplate on the barrier control panels for the AVB systemfor major components of the system. Nameplates will not be required for devices smaller than 25 by 75 mm1 by 3 inch. Provide plates that have at least the following data legibly marked:

a. Manufacturer's name.

b. Manufacturer's address.

c. Type, Style or Model number.

d. Serial number.

2.22.7 Locks and Key-Lock Switches

2.22.7.1 Locks

Provide locks on system enclosures for maintenance purposes. Arrange locks so that the key can only be withdrawn when in the locked position. Key locks alike and furnish only 2 keys for all of these locks. Control these keys in accordance with the key control plan as specified in paragraph Key Control Plan.

2.22.7.2 Key-Lock-Operated Switches

Provide UL listed Key-lock-operated switches as required to be installed on system components. Provide 2 or 3 position key -lock-operated switches , with the key removable in specified positions. Key all key-lock-operated switches differently and furnish only 2 keys for each key-lock-operated-switch. Keys must be removable in the positions described in these specifications or as shown on the drawings. Control keys in accordance with the key control plan as specified in paragraph Key Control Plan.

2.22.7.3 Construction Locks

Use a set of temporary locks during installation and construction. The final set of locks installed and delivered to the Government must not include any of the temporary locks.

2.22.8 System Components

Design system components for continuous operation. Provide control relays and similar switching devices that are solid state type or sealed electro-mechanical.

2.22.8.1 Modularity

Design equipment for increase of system capability by installation of modular components. Design system components to facilitate maintenance through replacement of modular subassemblies and parts.

2.22.8.2 Maintainability

Design components to be maintained using commercially available tools and equipment. Arrange and assemble components they are accessible to maintenance personnel. Insure there is 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.

2.22.8.3 Interchangeability

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

2.22.8.4 Product Safety

Conform system components to applicable rules and requirements of NFPA 70. Install system components 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.

2.23 ELECTRICAL WORK

Submit detail drawings containing complete wiring and schematic diagrams, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Provide motors, manual or automatic motor control equipment [,except where installed in motor control centers] and protective or signal devices required for the operation specified herein. Provide all field wiring for induction loop detectors, communication lines, and power circuits with surge protection. Provide any wiring required for the operation specified herein, but not shown on the electrical plans, or specified herein, under this section.

2.24 WIRE AND CABLE

Provide all wire, cable, and conduit connecting all Contractor furnished and, where indicated on the drawings, Government furnished equipment. Provide wiring in accordance with NFPA 70. Provide wiring that is fiber optic or copper cable in accordance with the manufacturers' requirements. Copper signaling line circuits and initiating device circuit field wiring must be No. [20][18] AWG size conductors at a minimum. Ensure wire size is sufficient to prevent voltage drop problems. Circuits operating at any other voltage are to ensure the voltage drop does not exceed 5 percent of nominal voltage.

2.24.1 Above Ground Sensor Wiring

Provide sensor wiring that is 20 AWG minimum, twisted and shielded, 2, 3, 4, or 6 pairs to match hardware. Provide multi-conductor wire with an outer jacket of PVC.

2.24.2 Cable Construction

Provide all cable components to withstand the environment in which the cable is installed for a minimum of 20 years.

2.25 CONCRETE

Provide concrete that conforms to Section 03 30 00 CAST-IN-PLACE CONCRETE.

2.26 WELDING

Welding is to be in accordance with AWS D1.1/D1.1M.

2.27 ACCESSORIES

Supply all accessories as required for a complete and finished system. Provide, at a minimum, all accessories as required by manufacturer's instructions.

2.28 FABRICATION

Shop assembly the vehicle barrier systems to the greatest extent possible.

2.29 TEST, INSPECTIONS AND VERIFICATIONS

Provide manufacturer written verification that vehicle barrier systems provided under this contract are manufactured in the "as-tested" and/or

"as-certified" configurations, based on the crash testing.

Submit a Verification of Performance certificate stating that the construction, materials, and methods used will meet performance standards described in this section for this project

2.30 FACTORY ACCEPTANCE TEST

2.30.1 General

Provide personnel, equipment, instrumentation, and supplies necessary to perform a factory acceptance test of the complete crash rated active vehicle barrier control system. A factory acceptance test is to demonstrate that the proposed system and related equipment meet the control parameters within the contract documents. The system must show that barriers cannot be deployed with anything but a red signal. The test is to demonstrate the required alarm annunciation, CCTV controls, and sequence of events recording. The test set-up must include the PLC(s), the master control panel, alarm panel, control switches, and at least one of each type of remote panel, and limit switches. The duress, overspeed, and wrong-way sensors; the crash rated active vehicle barrier open and close position switches; the VPDs; the traffic signals; and the warning beacons may all be simulated.

2.30.2 Factory Acceptance Test Report

Submit the factory acceptance test report, which documents the results of the test. The test report is to include the results of all test procedures showing all commands, stimuli, and responses to demonstrate compliance with the contract requirements in the test report. Include the certification from technical specialists from the crash rated active vehicle barrier, PLC that their subsystem meets the contract requirements in the test report.

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 paragraph "Current Site Conditions".

3.2 INSTALLATION

Perform installation in accordance with manufacturers instructions and in the presence of a representative of the manufacturer. Manufacturer's representative must be experienced in the installation, adjustment, and operation of the equipment provided. The representative is to be present during adjustment and testing of the equipment. Show on the drawings proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including foundation and clearances for maintenance and operation.

3.2.1 Oversight

The Contractor designated technical specialist for the crash rated active vehicle barrier control system (AVBCS) must oversee installation where installation is not completed by manufacturer installation team.

3.2.1.1 Observation and Inspection

Manufacturer's representative is to [observe and inspect] crash rated active vehicle barrier systems installation. Manufacturer's representative must be experienced in the installation, adjustment, and operation of the equipment provided. Manufacturer's representative is to be present during adjustment and testing of the equipment.

3.2.1.2 Installer Training/Certification

Install crash rated active vehicle barriers by the manufacturer's trained or certified installers in accordance with manufacturer's written installation instructions.

3.2.2 Installation Schedule

Before beginning any site work, provide a schedule of all installation and testing activities. Arrange project activities in the proposed schedule in chronological order. Coordinate all installation and testing activities, specifically those requiring ACP/ECF outages, with the Contracting Officer. There must be a Contracting Officer approved schedule before any site work is performed.

3.2.3 Crash Rated Active Vehicle Barrier Installation

Include with the detail installation drawings a copy of the as tested installation drawing. Install crash rated and/or certified crash rated active vehicle barrier in an 'as-tested' condition. Additional site investigation and construction is required in order to accomplish this; except when a site specific crash test was performed where the exact site requirements were utilized in the crash test. Modifications to any components from the 'as-tested' configuration must be reviewed and sealed as acceptable by the manufacturer's registered engineer.

3.2.3.1 Vertical Alignment

Install all vertical elements plumb and in alignment with a tolerance of [1/2 inch] or in accordance with manufacturer's installation instructions, whichever is more restrictive.

3.2.3.2 Horizontal Alignment

Install all horizontal elements in the alignment indicated on the approved shop drawings with a tolerance of [1/2 inch] in [6 feet - 6 inches] or in accordance with manufacturer's installation instructions, whichever is more restrictive.

3.2.3.3 Field Welding

Field welding is only allowed with written direction from the manufacturer detailing the components to be welded and procedures for welding and repair to finished surfaces after welding operations. Welding to be performed by manufacturer qualified welders.

3.2.3.4 Field Cutting and Drilling

Avoid unnecessary cutting and drilling of pre-finished components. If

necessary to cut or drill or otherwise modify product due to field conditions, repair factory finish in accordance with the manufacturer's written instructions.

3.2.4 Incidental Infrastructure

Provide all incidental construction as indicated. Design construct, and install incidental construction in accordance with local/state DOT requirements, AASHTO GDHS-5, AASHTO RSDG-4, NCHRP 350, and the MUTCD.

3.2.5 Concrete Placement

Provide concrete test reports per Section 03 30 00 CAST-IN-PLACE CONCRETE. After placement of the crash rated active vehicle barrier(s), replace the pavement sections to match the section and depth of the surrounding pavement unless a thicker pavement section is required for the tested condition of the crash rated active vehicle barrier. Warp pavement to match the elevations of existing pavement.

3.2.6 Reinforcing Steel Inspection

Inspect all by contractor's project quality control representative and/or project superintendent and the Contracting Officer representative prior to concrete placement as required by contract documents and contracting officer. Contractor is required to provide no less than [2] days notice of concrete placement schedule to required inspection personnel. Coordinate with the requirements found in Section 03 30 00 CAST-IN-PLACE CONCRETE.

3.3 DRAINAGE

3.3.1 Pit Drainage

Provide a drain connection in each barrier that requires pit/vault type construction.[Provide hookups between the storm drains if gravity surface drainage can not be achieved.] Provide a minimum drainage line of3 inches.If there are multiple drain connections that can be made to the crash rated active vehicle barrier ensure the lines drain the low points as a minimum.

3.3.2 Surface Drainage

Install crash rated active vehicle barrier per the test conditions for the crash rated active vehicle barrier. Ensure placement of the barrier provides positive drainage away from the barrier.

3.4 ELECTRICAL

Furnish and install all cables and conduits for all wiring interconnecting contractor furnished, and where indicated, Government furnished equipment. Install all wiring per Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM and Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION.

3.4.1 Wiring

Use ring-style terminals for all control power wiring requiring compression terminals. Conform terminals and compression tools to UL 486A-486B. Use roundhead screws and lockwashers to provide vibration-resistant connections. Use screw connections or other locking means to prevent shock

or vibration separation of the card from its chassis for connections between any printed circuit cards and the chassis.

3.4.2 Grounding

Provide adequate grounding system for the following: Traffic signal supports, warning signal supports, AVBCS enclosure, crash rated active Vehicle Barrier frames, crash rated active vehicle barrier control enclosure, and supports for overspeed and wrong-way detectors. Provide a #6 AWG ground wire from crash rated active vehicle barrier frame to the crash rated active vehicle barrier control enclosure.

3.4.3 Enclosure Penetrations

Penetrate enclosures through the bottom unless the system design requires penetrations from other directions. Seal penetrations of interior enclosures involving transitions of conduit from interior to exterior, and penetrations on exterior enclosures with rubber silicone sealant to preclude water entry. Terminate the conduit riser in a hot-dipped galvanized metal cable terminator. Fill the terminator with an approved sealant as recommended by the cable manufacturer and in a manner that does not damage the cable

3.4.4 Exterior Components

Those components installed outside are to be able to function within the environmental conditions indicated previously for the paragraph on Exterior Conditions.

Provide motors, actuators, wiring, luminaires, and other components that are installed below grade that are rated to function in a wet environment. Components within the barrier below grade fall in this category. Manufacturers of the crash rated active vehicle barrier and other below grade components are to assume a water saturated environment for the components. The devices and components must be watertight per NFPA 70. Provide motors and actuators with a minimum rating of[IP66] per NEMA MG 1.

3.4.5 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. Configure components within the system with appropriate service points to pinpoint system trouble in less than 30 minutes where possible.

3.5 OPERATING AND MAINTENANCE INSTRUCTIONS

Submit written Operations and Maintenance Instructions.
As part of the Operations and Maintenance Instructions, provide:

a. Periodic inspection and testing recommendations for daily, weekly, monthly and yearly intervals.

3.6 REPAIR

Repair damage to galvanized, coated, painted finishes in accordance with manufacturers written instructions. Submit Manufacturer Repair of Coatings

Instructions. In the case where the manufacturer does not have written instructions, Submit recommended repair instructions (referencing published standards) for approval.

3.7 TEST PLANS

Testing of the AVBCS to include components as directed by contract documents and contracting officer. Below is a list of potential items for testing. Final approval from contracting officer required prior to implementing contractor field test and performance verification test.

a. Information on the AVB to include size and rating. Refer to approved for construction drawings.

b. Listing of the controllers and description of each controller and the locations of the controllers. Refer to approved for construction drawings.

c. PLC restart test (test each one individually) by turning off the PLC for at least 1 minute then back on to verify proper reboot of the system.

d. Battery power test. 10 minutes on battery then do an EFO and lower barrier.

e. Power on/off test.

f. Test (manual) test for each barrier.

g. Local test for each barrier.

h. Test and Local mode loop (VPD) operation. Test each loop at least once with a vehicle defined by contract documents and contracting officer. Multiple tests may be requested to be completed using motorcycle/small cart, SUV, and passenger vehicle.

i. System alarms

j. Panel layout and labeling. Refer to approved for construction drawings.

k. Matrix testing of the various combinations of modes that the AVBs can be found in.

l. Tests to verify loss of a PLC ensures safe operation of the system

m. Test traffic signal operation as well as wig-wag and in-ground light operation.

n. Verify loss of signal between controllers triggers a trouble alarm.

o. Other tests deemed necessary to ensure system operates safely.

p. Information on the layout of the barrier to include distance from ID Check. time measurement on EFO deployment to verify reaction time does not exceed that defined by threat scenario calculations if available.

q. Information on signage to include wording and location

r. Verification of grounding as discussed herein.

s. Information on the cabinet ratings and NEC disconnect locations.

t. Test or verification on any heating system associated with the AVBs

u. Verification that the AVB drains properly (may be a sump pump etc. that needs testing).

v. General appearance of the system to include paint stripe configuration on the barriers, use of reflective tape, etc.

w. Verification of safety equipment necessary for performing maintenance.

x. EFO test for each EFO switch.

y. EFO loop (VPD) operation). Test each loop at least once with a vehicle defined by contract documents and contracting officer. Multiple tests may be requested to be completed using motorcycle/small cart, SUV, and passenger vehicle.

z. EFO loop activation when signal turns yellow

aa. EFO loop deactivation when signal turns yellow

bb. EFO Reset function works properly.

cc. Matrix testing of the various combination of loops for each safety mode: EFO, Test, Local. Note for Test and Local this does include both up (close) and down) open functions.

dd. Arm/Disarm (yes/no) selector switch operation for each remote EFO panel/station.

x. Auto mode test for normally closed

y. Auto loop (VPD) operation). Test each loop at least once with a vehicle defined by contract documents and contracting officer. Multiple tests may be requested to be completed using motorcycle/small cart, SUV, and passenger vehicle.

z. Loop activation when signal turns yellow

aa. Loop deactivation when signal turns yellow

bb. Matrix testing of the various combination of loops for each safety mode: Auto, Test, Local. Note for Test and Local this does include both up (close) and down) open functions.

cc. Arm/Disarm (yes/no) selector switch operation for each remote panel/station.

3.8 CONTRACTOR VERIFICATION TEST

Submit test plan for the Contractor Verification Test. Test plans are to include a a test schedule before the scheduled start of the Contractor Field Tests. See paragraph "TEST PLANS" for information required in a test

plan. 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 contractor verification test. Submit the contractor verification test report no more than 1 week after the completion of each test. Deliver a report certifying that the installed complete system has been calibrated, tested, and is ready to begin performance verification testing.

3.9 FINAL SYSTEM ACCEPTANCE

3.9.1 General

Final system acceptance consists of successfully completing the Performance Verification Test and completion of the commissioning, the training of Installation security and maintenance personnel as described below.

3.9.2 Training

3.9.2.1 General Requirements

Conduct training courses for designated personnel in the operation and maintenance of the AVBCS. Orient the training to the specific system being installed. Deliver training manuals as directed by the contract documents. Obtain approval of the planned training schedule from the Government at least 30 days prior to the training. Do no provide training until the performance verification test has been successfully completed.

3.9.2.2 Guard's Training

Teach the guard training course at the project site to include all operation methods of barrier system including but not limited to emergency operation, test operation, local operation, reset of barrier system after EFO, Deployment procedures from every control station including remote EFO. Additional training as dictated by contract documents to be provided. Upon completion of this course, each student is to demonstrate the ability to perform the following when operating the AVBCS:

a. Operate the crash rated active vehicle barriers in[Test, Local and EFO/Auto] modes.

b. Understand the differences between the normal and EFO/AUTO operation of the barriers.

c. Understand when to use Test, Local and EFO/AUTO 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 crash rated 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/Auto activation/operation.

h. Monitor, acknowledge, and reset alarms.

i. Understand the operation and coverage of all overspeed and wrong-way sensors.

3.9.2.3 Maintenance Personnel Training

The Maintenance Personnel Training Course is to be taught at the project site for a period of up to eight hours after the Performance Verification testing. Include the following in the course:

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 crash rated active vehicle barriers and other critical equipment.

e. Calibration procedures.

f. Review of system drawings to identify device locations, communications, topology, and flow.

3.9.2.4 System Manager Training

Train System managers in addition to the Guard and Maintenance Personnel described above. Provide system manager training for trainers, such that, system managers will be able to train new guards and maintenance personnel in the future. System manager training is to include same training as Guards and Maintenance Personnel. Training can be combined into session with Guards and Maintenance personnel as directed by contracting officer.

3.9.3 Performance Verification Test (PVT)

3.9.3.1 Test Plan

Submit a performance verification test plan. The test plan is to match the test plan used for the Contractor Verification Test plus any changes that came up during the testing. The test plan is to include the test procedures/plan and approved drawings for control panels and barrier system layout. Submit to the contracting officer prior to the proposed start date of the performance verification test.

3.9.3.2 Test Equipment and Personnel

Provide the following for all PVT tests as required per contracting officer:

a. A minimum of 6 hand held radios/walkie-talkies with additional batteries.

b. Safety vests for all participants.

c. Two Stop watches.

d. Flash lights.

e. Multi-meter.

f. Metal of sufficient size and shape to activate vehicle presence detection (VPD) loops or vehicle(s) meeting criteria described by contracting officer to accurately test loop sensors.

g. Three copies of the PVT test plan.

3.9.3.3 Commissioning

Perform a performance verification test of the installed AVB Control System per approved test procedures and under the direction of the Contractor's Team Leader. The PVT is to demonstrate that the system complies with the requirements specified herein. Conduct the PVT, where possible, during regular daytime working hours on weekdays. At the completion of the PVT, appropriate Commissioning Team Members are to sign identifying what passed and any deficiencies left unresolved.

3.9.3.4 Test Report

Within ten (10) days of successful completion of the PVT, the Contractor's Team Leader submits a performance verification test report to the Contracting Officer documenting the results of the test. Include in the test report the results of all test procedures showing all commands, stimuli, and responses to demonstrate compliance with the contract requirements. The Contracting Officer will notify the Contractor, within ten (10) 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; retest those procedures.

3.9.4 APPENDICES

APPENDIX A - SDDCTEA Approved Safety Schemes

[Appendix A1 - HYBRID BEACON (Conventional Signs and Signals) Active Barrier Safety Scheme

Hybrid Beacon (Signs and Signals) Safety Scheme Features. Provide the following features for the Conventional (Signs and Signals) Safety Scheme:

[1. General Layout Information

1.1 Active Vehicle Barriers in all inbound and outbound lanes. .

1.2 Hybrid Beacon. A three light hybrid beacon signal head over each inbound and outbound active barrier. Special location may require only posts i.e. no masts. Post mounted requires two posts with each having a traffic signal. Provide three head traffic signals with two Red signals adjacent horizontally and a Yellow centered below the two red beacons. Install the hybrid beacon signal at the centerline of the AVB. The beacons are to be Light Emitting Diode (LED) type. Mast arm will have a 'Barrier Signal' sign.

1.3 A 610 mm2 foot wide stop line placed 26.2M86 feet in front of the the active vehicle barrier and the traffic signal is 12.8 meters42 feet from the near edge of the stop line. Provide a 'Stop Here On Red' sign.

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

1.5 Diagonal pavement striping. Provide white crosshatching pavement marking that covers the front and back VPDs.

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. Induction loops must be diagonal quadrapole loop. A loop crossing multiple lanes is not allowed. The VPD before the AVB starts 610 mm2 feet from the AVB and is 23.16M76 ft long.

1.7 Warning Sign and Warning Beacons (wig-wags) (2 Beacons with alternating flashing yellow lights) located 44.2 meters145 feet in front of the barriers. Beacon lamps will be LED.

1.8 One Master Control Panel, [one Guard Booth Control panel plus one Guard Booth EFO button each Guard Booth][one Guard Booth EFO panel], one Overwatch Position Control Panel, one Search Area Control panel per separate search area, [Pedestrian panel,]and a Local Control Panel or panels at each barrier along with all control switches and indicating lights as shown on the Drawings. Locate the Master Control Panel in the Command and Control location for use by the ACP/ECF guards. Locate each Local Control Panel at or near its respective barrier power unit.

1.9 Red steady in-pavement lights. When required are to be located between the stop line and approach VPD.

1.10 Horn located at the crash-rated active vehicle barriers. Provide the horn with a means to adjust the volume.

[1.11 LED blankout sign that indicates 'Do Not Enter' installed at the

barrier. Two per direction of travel by placing one on each side of the roadway.]]

2 BARRIER OPERATING CONTROL PANELS.

[Operating panel layouts are found in Army Standard Design drawing package.][Operating panel layouts are found in the contract drawings.]

3 TRAFFIC SIGNAL AND BARRIER CONTROLS.

3.1. Hybrid Beacon. EFO MODE OF OPERATION.

3.1.1 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 with that key being accessible only by the lead ACP/ECF guard. With the barrier's mode selector switch in the EFO position, EFO is enabled for that direction of travel, 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 are disabled.

3.1.2 In the EFO mode of operation with the barrier open, the Traffic Signal is Dark. Upon activation of an EFO command from any armed EFO, delay barrier emergency closure by 2 seconds. Activate the wig-wag (warning beacons) as soon as EFO is pushed. During the 2 seconds, the hybrid beacons signals change from dark (off) to Solid Yellow for 2 seconds and then to Alternating flashing Red (alternate on/off in a wig-wag fashion). Activate the in-pavement lights (steady on) when the traffic signal turns red and stay red as long as the traffic signal light is red. After 2 seconds from EFO activation, energize the barrier's emergency close circuit to close the barrier(s) in emergency fast mode (2 seconds or less) provided that the VPDs immediately in front of and behind the barrier are clear (entry and exit loops). If either or both VPDs detect a vehicle, then the barrier does not close; however, the the emergency close signal is latched only for those barriers that were in EFO mode at the time of activation. Once both VPDs are clear, the barriers (those in EFO mode) deploy (unless EFO Reset had been activated). The warning horn sounds for 10 seconds with the setting adjustable in the program.

3.2 Hybrid Beacon. EFO RESET. After an EFO activation, guards will close all inbound and outbound lanes. Guards will obtain the EFO Reset key and then activate the EFO Reset switch on the Master Control Panel to reset EFO. This turns off the warning beacons (wig-wags) and removes the latch command for the EFO circuit. The person in charge can then place the Master Control Panel mode switches into Test (or go through the sequence to use the Local panel) and use the Open buttons to lower each barrier. Once all the barriers are Open for a given direction of travel and the corresponding mode switches are back in EFO mode, then the traffic signal for that direction of travel turns Dark and the in-pavement lights deactivate. This needs to be done for both directions of travel in order to have Dark traffic signals in all directions.

3.3 Hybrid Beacon. TEST MODE OF OPERATION.

3.3.1 Test Operation. An individual barrier can be test operated by installing the proper lane closure markings and barricades ahead of the active barrier and then placing the mode selector switch for that direction of travel into the Test position. With the mode selector switch in the Test position, the barrier's Open and Close switches on the Master Control Panel

for that direction of travel are enabled, but the Open and Close switches on the Local Control Panel for that direction of travel are disabled. In addition all active EFO switches are disabled from operating any barrier for that direction of travel. Where a single barrier spans both inbound and outbound lanes, the test operation switch deactivates all EFO capability.

3.3.2 When a mode switch is placed in Test mode, the traffic signals for that direction of travel cycle to Alternating Flashing RED (the hybrid beacons signals change from dark (off) to Steady Yellow for 2 seconds and then to Alternate flashing Red (alternate on/off in a wig-wag fashion). The barriers for that direction of travel are allowed to operate without any time delay ONCE the signal is alternating flashing Red. The traffic signals for that direction of travel stay Red until all the conditions are met for RETURN TO EFO MODE. The in-pavement lights for that barrier activate when the traffic signal is red and stay red as long as the traffic signals are red. Note the warning beacons do not operate under Test or Local mode, but can be allowed to operate if requested and approved. WARNING: Installation is responsible for proper lane closure procedures (closing off the lane, bagging the traffic signal over the barrier if a long term operation, having guards present, etc) during a Test or Local mode operation.

3.4 Hybrid Beacon. LOCAL MODE OF OPERATION

3.4.1 Local Operation. Local mode is used when maintenance personnel need to perform maintenance on the barrier.

3.4.1.1 Maintenance personnel would obtain the mode selector switch key from the lead ACP/ECF guard and place the key into the Master Control Panel 3-position mode selector switch for the appropriate direction of travel.

3.4.1.2 The person then turns the selector switch to the Local position to enable Local mode and then removes the key.

3.4.1.3 With the mode selector switch on the Master Control Panel in the Local position, Open and Close switches on the Master Control Panel for the barriers for that direction of travel are disabled and all EFO switches are disabled for that direction of travel. If a single barrier spans multiple directions of travel all EFO capability will be deactivated.

3.4.1.4 The maintenance person would then insert the key into the appropriate Off-Local mode selector switch on the barrier's Local Control Panel and turn the key to the "Local" position. This action activates the Open and Close switches at the Local Control Panel for the barriers in that direction of travel.

3.4.1.5 Maintenance personnel would also have to block and mark the lane ahead of the barrier in accordance with standard lane closure procedures/standards 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.

3.4.2 Hybrid Beacon. LOCAL MODE OF OPERATION (one barrier per direction of travel). When a mode switch is placed in Local mode, the traffic signals for that direction of travel cycle to Alternating Flashing RED (the hybrid beacons signals change from dark (off) to Steady Yellow for 2 seconds and then to Alternate flashing Red (alternate on/off in a wig-wag fashion). The barriers for that direction of travel are allowed to operate without any time delay ONCE the signal is alternating flashing Red and there is full Local

control. The traffic signals for that direction of travel stay Red until all the conditions are met for RETURN TO EFO MODE. The in-pavement lights for that barrier activate when the traffic signal is red and stay red as long as the traffic signals are red. Note the warning beacons do not operate under Local, but can be allowed to operate if requested and approved. WARNING: Installation is responsible for proper lane closure procedures (closing off the lane, bagging the traffic signal over the barrier if a long term operation, having guards present, etc) during a Test or Local mode operation.

3.5 If the Master Control panel is in EFO mode and the Local Panel is in Local mode, that is a conflict. Hybrid beacon is dark and EFO DOES NOT function. Local panel does not have any control. The mode indicating lights for Local and EFO are to alternate flashing and an audible alarm is to sound.

3.6 If the Master Control panel is in Test mode and the Local Panel is in Local mode, that is a conflict. Hybrid beacon signal is Red after cycling and all corresponding Test mode functions are INACTIVE. Local panel does not have any control. The mode indicating lights for Test and Local are to alternate flashing and an audible alarm is to sound.

3.7 Out-of-Service switch. This function is provided for times when a barrier is damaged in a lane and needs to be taken out of service for an extended period of time. The out of service switch is to be located at the AVB location and is allowed to operate in EFO, Test and Local modes. This allows an AVB to be locked out in a lane, but the other lane can operate under EFO. The switch locks out all functions for the AVB when activated. The up and down lights for that AVB will alternate going on and off. WARNING: Installation is responsible for proper lane closure procedures (closing off the lane, bagging the traffic signal over the barrier, having guards present, etc). The Out-Of-Service switch has two positions: Yes and No [contractor is allowed to use Enable and Disable, but it must be clear].

3.7.1 No Position. All controls operate normally.

3.7.2 Yes Position. The Close/ Open position indicating lights for those barriers will alternate from one to the other approximately every 1 sec. This will happen at the Master Control Panel, Local Control Panel (if on) and at any other panel that has barrier position indicator lights.

3.7.2.1 If Local Panel is in Local Mode, then traffic signal is red and in-pavement lights are on. All controls to operate the barrier(s) are locked out.

3.7.2.2 If system is in Test Mode, then traffic signal is red and in-pavement lights are on. All controls to operate the barrier(s) are locked out.

3.7.2.2 If system is in EFO Mode, then traffic signal is dark. All controls to operate the barrier(s) are locked out.

3.8 Hybrid Beacon. RETURN TO EFO MODE. When the mode switch is placed in the EFO mode and all the barriers for that direction of travel are Open (not deployed), then the barrier's Traffic Signal change from Red to Dark if it was Red. If a mode switch is placed in the EFO mode and any of the barriers for that direction of travel are Closed, then the barrier's Traffic Signal stays Red (if it was red) and an alarm is generated on the ACP/ECF TROUBLE window on the Gatehouse Control Panel. The in-pavement lights turn off when the traffic signal changes to Dark.

3.9 Vehicle Presence Detector consisting of safety loops on either side of a crash rated active vehicle barrier may require additional programming and hardware. If the loops are more than 3 meters10 feet (apart, then add 0.5-1 sec additional time delay on the "back" loop. The alternative is to provide a latching logic between loops. In the latching logic, the master panel needs a release pushbutton for each barrier.

3.10 AUDIBLE ALARMS. Provide an audible alarm at the Master Control Panel, Overwatch Control Panel, [Pedestrian control panel, main Guard Booth Control Panel and Search Area Control panel(s). The volume must be adjustable either through a rheostat or other means. Provide a button that silences the audible alarm at each panel. This silence button does not affect the corresponding visual indicator. Silence button does not prevent an audible alarm if a new condition develops.

3.10.1 When an EFO is pushed an alarm will go off.

3.10.2 Overspeed and Wrong-way will each cause an alarm to go off for 3 seconds and then clear itself.

3.10.3 Duress activation.

3.10.4 AVB Trouble condition.

3.10.5 VPD Trouble condition.

3.10.6 VPD Activation for over the set amount of time period (typically 15 seconds) Light goes on immediately for VPD activation, but audible alarm activates after 15 seconds.

3.10.7 Out of Service activation. AVB indicator lights alternate being on.

3.10.8 Master Panel in EFO mode and Local Panel is in Local Mode. EFO mode and Local mode indicator lights alternate being on.

3.10.9 Master Panel in Test mode and Local Panel is in Local Mode. Test mode and Local mode indicator lights alternate being on.

3.10.10 Return to EFO mode with an AVB or AVBs in the incorrect position (not fully open). EFO mode indicator light and open/down AVB position light(s) flash.

3.10.11 Communication Loss alarm.

3.10.12 Tramper Switch. Any tamper switch activation triggers an alarm.

3.11 LED Blank-Out Sign (when used). The sign is to meet the following:

3.11.1 Symbol conforms to MUTCD or local Host Nation requirements.

3.12 AUDIBLE ALARMS. Provide an audible alarm at the Local Control Panel. The volume must be adjustable either through a rheostat or other means. Provide a button that silences the audible alarm at each panel. This silence button does not affect the corresponding visual indicator. Silence button does not prevent an audible alarm if a new condition develops.

3.12.1. AVB Trouble condition.

3.13 AUXILIARY CONTACTS

Provide auxiliary contacts (dry) to be used by the Intrusion Detection System and the CCTV system as specified herein and indicated on the drawings.
]]

Appendix A2 - High Efficiency Presence Detection (HEPD) Active Barrier Safety Scheme

HIGH EFFICIENCY PRESENCE DETECTION (HEPD) SAFETY SCHEME FEATURES. Provide the following features for the HEPD Safety Scheme:

[1 General equipment layout information.

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

1.2 Vehicle presence detectors can be induction loops, video motion sensors, or other suitable technologies capable of sensing vehicle presence. Induction loops must be diagonal quadrapole loop and sized per lane i.e. a loop crossing multiple lanes is not allowed. Provide a vehicle presence detector (VPD) that starts 1220 mm4 ft ahead of the stop line and goes across the stop line that is 1830 mm6 ft wide by 2.43 meters8 ft long. Provide entry VPD that is between the stop line and AVB and starts 610 mm2 ft from the AVB that is 10.36 meters34 ft long and 1830 mm6 ft wide. This second VPD starts 2 ft from the AVB. There is a third VPD is after the AVB and it is 1830 mm6 ft by 1830 mm6 ft and starts 610 mm2 ft the AVB. All VPDs, if loops, are to be quadrapole.

1.3 A 610 mm2 foot wide stop line placed 13.72 meters45 feet in front of the the active vehicle barrier. Provide a 'Stop Here On Red' sign.

1.4 Traffic Signals and associated signage.

1.4.1 Locations with a single inbound lane and a single outbound lane are to be configured as follows. Provide a post on the driver side and passenger side of the lane. As a minimum the post is to have a three-head Traffic Signal and a LED blank-out sign and a sign that indicates which lane the signal is belongs. Provide a traffic signal that is Red-Yellow-Green top to bottom. The Traffic Signal is to be located at the centerline of the crash rated active vehicle barrier. Bottom of the signal must be 2.49 M8 ft above finished surface. The LED blank-out sign that states "DO NOT ENTER" and is to be mounted below the traffic signal.

1.5 Warning Sign and Warning Beacons (wig-wags) (2 Beacons with alternating flashing yellow lights) located typically between 39.6 meters130 ft and 45.7 meters150 ft in front of the AVB. Beacon lamps will be LED.

1.6 One Master Control Panel, [one Guard Booth Control panel plus one Guard Booth EFO button each Guard Booth][one Guard Booth EFO panel], one Overwatch Position Control Panel, one Search Area Control panel per separate search area, [Pedestrian panel,]and a Local Control Panel or panels at each barrier along with all control switches and indicating lights as shown on the Drawings. Locate the Master Control Panel in the Command and Control location for use by the ACP/ECF guards. Locate each Local Control Panel at or near its respective barrier power unit.

1.7 Red steady in-pavement lights. Where required are to be located between the stop line VPD and the approach VPD.

1.8 Horn located at the crash-rated active vehicle barriers. Provide the horn

with a means to adjust the volume.

1.9 Diagonal pavement striping. Provide white crosshatching pavement marking that covers the front and back VPDs. Do not stripe the stop line VPD.

1.10 LED blankout sign that indicates 'Do Not Enter' installed at the barrier. Two per direction of travel by placing one on each side of the roadway on the traffic signal post.

1.11 Passive barriers on raised islands between each lane. Passive barriers and islands extend at least the same distance as the stop line VPD on the secure side of the AVB. Passive barriers must be placed to ensure that a vehicle cannot do a reverse slip. A reverse slip is where a vehicle passes over the barrier after a vehicle passes (slips in behind going opposite direction). See Drawings.

1.12 Passive barrier on a raised median island between the inner most inbound and outbound lanes. the median is to extend at least 25 ft ahead of the stop line. Passive barriers as a minimum start at 3.66 meters12 ft from the the stop line and extend to 3.66 meters12 ft past the active vehicle barrier. Island has a passive barrier that is 1830 mm6 ft from the leading edge and 4 ft from the other edge.

1.11 Actuated Traffic Arm 609 mm2 feet beyond the back edge of the Stop Line

1.12 Actuated Traffic Arm for each inbound lane in the ID Check Area. ATAs are installed near the Guard Booths as shown on the Drawings. An ATA Control Panel with Open and Close control switches for the ATA are provided and mounted on the back wall of the Guard Booth below the back window. If the installation plans on getting Automatic Installation Entry, then just provide infrastructure for the future installation of the ATAs.]

2 BARRIER OPERATING CONTROL PANELS.

[Operating panel layouts are found in Army Standard Design drawing package.][Operating panel layouts are found in the contract drawings.]

3 TRAFFIC SIGNAL AND BARRIER CONTROLS.

3.1 EFO MODE ACTIVATION. The following descriptions assume that the safety VPDs (those located adjacent to the AVB) are clear. A vehicle on the stop line VPD does not impact AVB movement under EFO. . If the VPDs are not clear then the AVB deployment is delayed until all safety VPDs are clear. EFO Operation. Under normal operations, all lane 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/ECF guard. With the barrier's mode selector switch in the EFO position, EFO is enabled for that lane, but the Open and Close switches for that lane on the Master Control Panel and the Open and Close switches on that barrier's Local Control Panel is disabled.

3.1.1 EFO Mode of Operation with Active Vehicle Barrier (AVB) Up (Closed).

3.1.1.1 Initial State
a. AVB is UP (Closed)
b. VPDs do not have to be clear since the AVB is already in the closed position.
c. Traffic Arm is Down (Closed).

d. Traffic Signals for that lane are Red.
e. Warning beacons (wig-wags) and LED 'Do Not Enter' Blank-out signs area off.

3.1.1.2 EFO is Pushed.
a. Warning beacons (wig-wags) and LED Blank-out signs activate immediately.
b. Horn activates for 10 seconds.
c. AVB remains in the deployed position until EFO Reset is accomplished.

3.1.2 EFO Mode of Operation with Active Vehicle Barrier (AVB) Down (Open).

3.1.2.1 Initial State
a. AVB is Down (Open).
b. Traffic Arm is Down (Closed).
c. Traffic Signals for that lane are Red.
d. Warning beacons (wig-wags) and LED Blank-out signs area off.

3.1.2.2 EFO is Pushed.
a. Warning beacons (wig-wags) and LED Blank-out signs activate immediately.
b. Lane horn(s) is activated for 10 seconds.
c. AVB is deployed. AVB is fully Up (Closed) within 2 seconds (t=2). EFO is not to be interrupted by any position limit switch for the Actuated Traffic Arm.
d. AVB remains in the deployed position until EFO reset is accomplished.

3.1.3 EFO Mode of Operation while Active Vehicle Barrier (AVB) is Down (Open) While Processing Traffic.

3.1.3.1 Initial State
a. AVB is Down (Open).
b. Traffic Arm is Up (Open).
c. Traffic Signals for that lane are green i.e. in Normal Operation.
d. Warning beacons (wig-wags) and LED Blank-out signs area off.

3.1.3.2 EFO is Pushed.
a. Warning beacons (wig-wags) and LED Blank-out signs activate immediately.
b. Lane horn(s) is activated for 10 seconds.
c. Traffic Signal if Green will go to Yellow for 2 seconds (t=2).
d. Traffic Signal will go to Red (t=2).
e. Traffic Arm begins to go Down (Close) as soon as VPD 1a and 1b are clear. Traffic Arm is fully Down (Closed) after 2 seconds. EFO is not to be interrupted by any position limit switch for the Actuated Traffic Arm.
f. Once Traffic Arm is fully Down (Closed), then AVB is deployed. AVB is to be fully Up (Closed) within 2 seconds.
g. AVB remains in the deployed position until EFO reset is accomplished.

3.2 Normal Operations - EFO Mode

3.2.1.1 Initial State
a. AVB is Up (Closed).
b. Traffic Arm is Down (Closed).
c. Traffic Signals for that lane are Red.
d. Warning beacons (wig-wags) and LED Blank-out signs area Off.

3.2.1.2 Vehicle Stops is detected by stop line VPD.
a. Once vehicle detected, AVB is to start Down (Open) after a 1 second delay (t=1).
b. AVB is fully Down (Open) after 2 more seconds (t=3).
c. Once AVB is Down (Open), Traffic Arm is to start Up (Open).

b. Traffic Arm is fully Up (Open) after 2 more seconds (t=5).
c. Traffic signal changes to Green (t=5).
d. A timer is started once stop line VPD is cleared. The timer is set for 3 seconds.
(1). If stop line VPD is clear for the 3 seconds then the Traffic Signal is to change to Yellow (t=8).
(a). Traffic Signal is Yellow for 3 seconds (t=11). Once signal changes to Yellow, the system is to complete the following steps prior to processing other vehicles, even if a vehicle is detected by the stop line VPD.
(b). Traffic Signal changes to Red.
(c) Traffic Arm begins Down (Close).
(d) Traffic Arm is fully Down (Closed) after 2 seconds (t=13).
(e) Once Traffic Arm is fully Down (Closed), AVB is to start Up (Close).
(f) AVB is to be fully Up (Closed) within 2 seconds (t-15).
(2). If the stop line VPD detects a vehicle before 3 seconds elapse, then the Traffic Signal is to stay Green and the Traffic Arm stay Up (Open). The three second timer resets to each time the loop is cleared.

3.3 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 lane's mode switch to the Test or Local position. When in Test position, it will allow the guard to operate the traffic arm and crash rated active vehicle barrier for that lane. Local mode would be used by maintenance personnel.

3.4 TEST MODE OF OPERATION.

3.4.1 When a barrier's mode switch is placed in Test mode the following is to happen. An individual barrier and traffic arm can be test operated by installing the proper lane closure markings and barricades ahead of the active barrier and then placing the mode selector switch for that direction AVB into the Test position. With the mode selector switch in the Test position, the barrier's and traffic arm's Open and Close switches on the Master Control Panel for that AVB is enabled, but the Open and Close switches on the Local Control Panel for that AVB are disabled. In addition all active EFO activations disabled from operating that barrier.

3.4.2 Test Mode Sequence of Operation

3.5.2.1 Initial State
a. Traffic Arm is Down (Closed).
b. Traffic Signals for that lane are Red. Note signals do not cycle through yellow before changing to red.
c. warning beacons (wig-wags) and LED Blank-out signs area off.
d. AVB can either be Up (Closed) or Down (Open).

3.4.2.2 Switch is placed in Test
a. The operator must ensure that the lane that the barrier is in is properly blocked and marked prior to placing the switch into Test or Local mode. This is to comply with MUTCD or Host Nation Criteria.
b. Switch must be in either Test or Local mode for 1 second.
c. Blocks EFO operation for that lane.
d. Horn sounds for 4 seconds or not at all .
e. LED blankout signs activate.
f. Warning beacons do not activate.

3.4.2.3 Initial State

a. AVB is Down (Open).
b. Traffic Arm is Up (Open).
c. Traffic Signals for that lane is Green.
d. warning beacons (wig-wags) and LED Blank-out signs area off.

3.4.2.4 Switch is placed in Test or Local Mode.
a. The operator must ensure that the lane that the barrier is in is properly blocked and marked prior to placing the switch into Test or Local Mode. This is to comply with MUTCD or Host Nation Criteria.
b. Blocks EFO operation for that lane.
c. Traffic Signal changes from green to yellow for 2 seconds then red.
d. Horn sounds for 4 seconds or not at all.
e. LED blankout signs activate.
f. Warning beacons do not activate.

3.5 LOCAL MODE OF OPERATION.

3.5.1 Local Operation. Local mode is used when maintenance personnel need to perform maintenance on the barrier.

3.5.1.1 Maintenance personnel would obtain the mode selector switch key from the lead ACP/ECF guard and place the key into the Master Control Panel 3-position mode selector switch for the appropriate AVB.

3.5.1.2 The person then turns the selector switch to the Local position and remove the key.

3.5.1.3 With the mode selector switch on the Master Control Panel in the Local position, Open and Close switches on the Master Control Panel for that barrier and actuated traffic arm is disabled and all EFO activations disabled for that AVB. Local mode operation is enabled.

3.5.1.4 The maintenance person would then insert the key into the appropriate Off-Local mode selector switch on the barrier's Local Control Panel and turn the key to the "Local" position. This action activates the Open and Close switches at the Local Control Panel for that barrier and actuated traffic arm.

3.5.1.5 Maintenance personnel would also have to block and mark the lane ahead of the barrier in accordance with standard lane closure procedures/standards 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.

3.5.2 Local Mode Sequence of Operation.

3.5.2.1 Initial State
a. Traffic Arm is Down (Closed).
b. Traffic Signals for that lane are Red. Note signals do not cycle through yellow before changing to red.
c. warning beacons (wig-wags) and LED Blank-out signs area off.
d. AVB can either be Up (Closed) or Down (Open).

3.5.2.2 Switch is placed in Local Mode
a. The operator must ensure that the lane that the barrier is in is properly blocked and marked prior to placing the switch into Test or Local mode. This is to comply with MUTCD or Host Nation Criteria.

b. Switch must be in either Test or Local mode for 1 second.
c. Blocks EFO operation for that lane.
d. Horn does not sound.
e. LED blankout signs activate.
f. Warning beacons do not activate.

3.5.2.3 Initial State
a. AVB is Down (Open).
b. Traffic Arm is Up (Open).
c. Traffic Signals for that lane is Green.
d. warning beacons (wig-wags) and LED Blank-out signs area off.

3.5.2.4 Switch is placed in Local Mode.
a. The operator must ensure that the lane that the barrier is in is properly blocked and marked prior to placing the switch into Test or Local Mode. This is to comply with MUTCD or Host Nation Criteria.
b. Blocks EFO operation for that lane.
c. Traffic Signal changes from green to yellow for 2 seconds then red.
d. Horn does not sound.
e. LED blankout signs activate.
f. Warning beacons do not activate.
[
3.6 Out-of-Service switch. Provide one per direction of travel. This function is provided for times when a barrier is damaged in a lane and needs to be taken out of service for an extended period of time. WARNING: Installation is responsible for proper lane closure procedures (closing off the lane, bagging the traffic signal over the barrier, having guards present, etc). The switch is located at the Local panel but can function at anytime. The Out-Of-Service switch has two positions: Yes and No or the wording Enable and Disable is allowed..

3.6.1 No Position. All controls operate normally.

3.6.2 Yes Position. The Close/ Open position indicating lights for those barriers will alternate from one to the other approximately every 1 sec. This will happen at the Master Control Panel, Local Control Panel (if on) and at any other panel that has barrier position indicator lights.

3.6.2.1 If Local Panel is in Local Mode, then traffic signal is red and in-pavement lights are on. All controls to operate the barrier(s) are locked out.
3.6.2.2 If system is in Test Mode, then traffic signal is red and in-pavement lights are on. All controls to operate the barrier(s) are locked out.
3.4.2.2 If system is in EFO Mode, then traffic signal is green. All controls to operate the barrier(s) are locked out.]

3.7 RETURN TO AN EFO MODE. The traffic arm is to be down, AVB is up, and the traffic signal is to be red. When the operator places the mode switch into EFO mode, the system is to wait 1 second and then check the position of the traffic arm and the AVB. If either the traffic arm or the AVB are not in the correct position or both are not in the correct position, then the EFO Mode indicating light is to flash and an audible alarm activates. The audible alarm is on for 1 second and then off for 2 seconds. The audible alarm continues in this manner until the equipment is either put in the correct position or the alarm silence is pushed.

3.8 VPDs.

3.8.1 Stop Line VPD. This vehicle presence detection device is used to notify the system when a vehicle is in position to be processed through the lane.

3.8.2. Safety VPDs. These vehicle presence detection devices are used to notify the system when a vehicle is traversing the AVB and it will suppress the AVB from going Up (Close) or Down (Open).
These VPDs must be clear before the AVB is allowed to deploy.

3.8.3. When a VPD is activated for 15 seconds or more, an audible/visual alarm indicating light activates for that lane.

3.8.4. Vehicle Presence Detector consisting of safety loops on either side of a crash rated active vehicle barrier may require additional programming and hardware. If the loops are more than 10 ft (3 meters) apart, then add 0.5-1 sec additional time delay on the "back" loop. The alternative is to provide a latching logic between loops. In the latching logic, the master panel needs a release pushbutton for each barrier.

3.9 Lane Horn. The horn activates under EFO. An adjustable timer is to be set at 10 seconds.

3.10 Actuated Traffic Arm. The Traffic Arm is to have an edge sensor or a torque motor sensor to stop it from continuing to close on a vehicle. When the sensor impacts an object it stops motion and reverses to the Up (Open) position. Loops or break beams are not allowed for this operation. The stop line VPD is to prevent the traffic arm from closing until the VPD is cleared.

3.11 AUDIBLE ALARMS. Provide an audible alarm at the Master Control Panel, Overwatch Control Panel, main Guard Booth Control Panel, Pedestrian Booth, and Search Area Control panel(s). The volume must be adjustable either through a rheostat or other means. Provide a button that silences the audible alarm at each panel. This silence button does not affect the corresponding visual indicator. Silence button does not prevent an audible alarm if a new condition develops.

3.11.1. When an EFO is pushed an alarm will go off for 10 seconds unless silenced earlier.

3.11.2. Overspeed and Wrong-way will cause an alarm to go off for 3 seconds and then clear itself.

3.11.3. Duress activation.

3.11.4. AVB Trouble condition.

3.11.5. Loop Trouble condition.

3.11.6. VPD Activation for over the set amount of time period (typically 15 seconds) Light goes on immediately for VPD activation, but audible alarm activates after 15 seconds.

3.11.7. Out of Service activation. AVB indicator lights alternate being on.

3.11.8. Master Panel in EFO mode and Local Panel is in Local Mode. EFO mode and Local mode indicator lights alternate being on.

3.11.9. Master Panel in Test mode and Local Panel is in Local Mode. Test mode and Local mode indicator lights alternate being on.

3.11.10. Return to EFO mode with an AVB or AVBs in the incorrect position (not fully open). EFO mode indicator light and open/down AVB position light(s) flash.

3.11.11 Traffic arm is neither in fully up or fully down for more than 10 seconds. Position indicator lights for that traffic arm alternate flashing.

3.11.12 Communication Loss alarm.

3.11.13 Tramper Switch. Any tamper switch activation triggers an alarm.

3.12 LED Blank-Out Sign. The sign is to meet the following:

3.12.1 Symbol conforms to MUTCD or local Host Nation requirements.

3.13 AUDIBLE ALARMS. Provide an audible alarm at the Local Control Panel. The volume must be adjustable either through a rheostat or other means. Provide a button that silences the audible alarm at each panel. This silence button does not affect the corresponding visual indicator. Silence button does not prevent an audible alarm if a new condition develops.

3.13.1. AVB Trouble condition.

3.14 AUXILIARY CONTACTS
Provide auxiliary contacts (dry) to be used by the Intrusion Detection System and the CCTV system as specified herein and indicated on the drawings.

Appendix A4 - FULL CONTAINMENT ((Sally Port or Platooning) Active Barrier Safety Scheme

FULL CONTAINMENT (Sally Port or Platooning)SAFETY SCHEME FEATURES. Provide the following features for the full containment Safety Scheme:

[1 General equipment layout information.

1.1 One or more sets of Active Vehicle Barriers in the inbound and outbound lane or lanes. Each set of barriers consists 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/ECF corridor to contain vehicles within the corridor.

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

1.5 A 610 mm2 foot wide stop line placed 4.9 meters16 feet in front of each barrier(s) as a driver normally approaches the barrier(s). Provide a 'Stop Here On Red' sign at the stop line on each side of the roadway.

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. Induction loops must be diagonal quadrapole loop and sized per lane i.e. a loop crossing multiple lanes is not allowed.

1.7 Vehicle presence detector located at the stop line starts 1200 mm4 ft before the stop line then crosses the stop line and extends another 610 mm2 ft past the stop line. Presence detectors can be induction loops, video motion sensors, or other suitable technologies capable of sensing vehicle presence.

1.7 One Master Control Panel, one Guard Booth Control panel for each Guard Booth, and one Overwatch Panel along with all control switches and indicating lights as shown on the Drawings. The Master Control Panel is normally located in the Command and Control for use by the lead ACP/ECF guard.

1.8 One Master Control Panel, [one Guard Booth Control panel plus one Guard Booth EFO button each Guard Booth][one Guard Booth EFO panel], one Overwatch Position Control Panel, one Search Area Control panel per separate search area, [Pedestrian panel,]and a Local Control Panel or panels at each barrier along with all control switches and indicating lights as shown on the Drawings. Locate the Master Control Panel in the Command and Control location for use by the ACP/ECF guards. Locate each Local Control Panel at or near its respective barrier power unit.

1.9 Diagonal pavement striping. Provide white cross hatching pavement

marking that covers the front and back VPDs. Do not stripe the stop line VPD.

[1.10 Provide an Actuated Traffic Arm for each lane. Install ATAs 610 mm2 ft from the backside of the stop line.
]
1.11 Provide an Actuated Traffic Arm (ATA) for each inbound lane in the ID Check Area. ATAs are to be installed near the Guard Booths as shown on the Drawings. Provide an ATA Control Panel with Open and Close control switches for the ATA and mount in the Guard Booth.
]
2 BARRIER OPERATING CONTROL PANELS.

[Operating panel layouts are found in Army Standard Design drawing package.][Operating panel layouts are found in the contract drawings.]

3 TRAFFIC SIGNAL AND BARRIER CONTROLS.

3.1 BARRIER LAYOUT AND DESIGNATIONS. Arrange each inbound and outbound lane to have two barriers per lane arranged in to entrap a vehicle or vehicles between them. Design the space between barriers to be long enough for the longest vehicle anticipated for the ACP/ECF. The space may be made longer to accommodate multiple vehicles in a platooning type arrangement. The initial barrier from the perspective of innocent motorists is designated 1, and the final barrier is designated 2 for inbound lanes. The initial barrier, again from the perspective of the innocent motorists leaving the installation, is designated 1, and the final barrier is designated 2 for outbound lanes.

3.2 AUTO MODE OF OPERATION.

3.2.1 Auto Operation. In the Auto mode of the Inbound Barriers' mode selector switch, the Close and Open switches on the Control Panel are deactivated for the inbound barriers and the Fill and Release switches on the Master Control panel are activated for the inbound barriers. Guard Booth Panels and Overwatch Panel are activated for the inbound barriers, but only if the arm/disarm switch for the given panel is in the armed position. The above requirements also apply to the control switches and control logic for the outbound barriers.

3.2.2 Initially with no vehicles present in the inbound lanes and the Inbound Barriers' Manual - Auto - Local mode selector switch in the Auto mode, Barrier 1 is open and Barrier 2 is closed. Incoming vehicles are checked at the ID Check point and if cleared are allowed to pass over Barrier 1 and proceed to the Stop Line for Barrier 2. The guard at either the Gatehouse or the Guard Booth then activates the Inbound Release switch. Upon activation of the Inbound Release switch, the Traffic Signal for Barrier 1 goes from Green to Yellow for three seconds and then to Red. After an additional second of Red, Barrier 1's close circuit is energized to close the barrier and traffic arm if present. After Barrier 1 is fully closed, Barrier 2's open circuit is energized to open Barrier 2. When Barrier 2 is fully open, its Traffic Signal changes from Red to Green to allow the vehicle or vehicles to proceed onto the Installation. If traffic arms are provided at the Stop Line, then the traffic arm associated with Barrier 1 will close first followed by closing Barrier 1. The traffic arm associated with Barrier 2 will have the barrier open first and then the traffic arm will open. In both cases, the traffic signal does not change to Green unless both the traffic arm and crash rated active vehicle barrier are fully open.

3.2.3 When the vehicle or vehicles between Barriers 1 and 2 have passed over Barrier 2, the guard activates the Inbound Fill switch. Upon activation of the Inbound Fill switch, the Traffic Signal for Barrier 2 changes from Green to Yellow for 3 seconds and then to Red. After an additional 1 second at Red, Barrier 2's close circuit is energized to close Barrier 2. After Barrier 2 is fully closed, the open circuit for Barrier 1 is energized to open Barrier 1. After Barrier 1 is fully open, its Traffic Signal changes from Red to Green. If there is a traffic arm associated with Barrier 2, the traffic arm closes once the signal is Red, then once fully closed, then Barrier 2 closes. If there is a traffic arm associated with Barrier 1, then Barrier 1 will open first, followed by the traffic arm. Once both are open then the signal changes to Green.

3.2.4 The same controls apply to Barriers 1 and 2 in the outbound lanes and control switches Outbound Release and Outbound Fill.

3.2.5 Supervise the close circuit for all barriers 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 is suppressed. The open circuit is not impacted by a VPD being activated.

3.2.6 A green indicating light adjacent to each Fill switch illuminates when the lane barriers are moving to the Fill position from the barriers being in the Release position. The indicating light is only on while the barriers (and actuated traffic arms) are moving to the proper position. Once in the Fill position the indicating light goes off. Similarly, there is a green indicating light adjacent to each Release switch that lights when the lane barriers are moving to the Release position from the barriers being in the Fill position. The indicating light is only on while the barriers (and actuated traffic arms) are moving to the proper position. Once in the Release position the indicating light goes off.

3.2.7 Red indicating lights are provided to indicate when the barriers (and actuated traffic arms) are in the Fill or Release positions.

3.3 MANUAL MODE OF OPERATION.

3.3.1 In the Manual mode of the Inbound Barriers' mode selector switch, the Close and Open switches on the Master Control Panel are activated for the inbound barriers, but the Fill and Release switches on the Master, Guard Booth Control Panels, and Overwatch Panel are deactivated for inbound barriers. The above requirements also apply to the control switches and control logic for the outbound barriers. The AVB and traffic arm in manual mode can be operated independently. Warning: In this mode it is possible to have the traffic arms and AVBs all in the option position.

3.3.1 When the Inbound Barriers Manual - Auto - Local mode switch is placed in the Manual mode, the inbound barriers can now be controlled by the individual barrier Open and Close switches on the Master Control Panel. Initiation of a Close command to an open barrier causes 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 is energized through the VPD's immediately in front of and behind the barrier. If the VPD's are clear, the barrier closes. Initiation of an Open command to a closed barrier energizes the open circuit for the barrier and open the barrier. After the barrier is fully open and the mode switch is placed in Auto mode, then the Traffic Signal changes 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. If there is a traffic arm associated with a barrier, the traffic arm is to close first and open last when compared to the barrier movement. Manual mode does not allow manual operation of the barrier and the traffic arm separately from each other.

3.3.2 The close circuit for all barriers is 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 is suppressed. The open circuit is not impacted by a VPD being activated.

3.4 LOCAL MODE OF OPERATION.

3.4.1 Local Operation. Local mode is used when maintenance personnel need to perform maintenance on the barrier.

3.4.1.1 Maintenance personnel would obtain the mode selector switch key from the lead ACP/ECF guard and place the key into the Master Control Panel 3-position mode selector switch for the appropriate direction of travel.

3.4.1.2 The person then turns the selector switch to the Local position and remove the key.

3.4.1.3 With the mode selector switch on the Master Control Panel in the Local position, Open and Close switches on the Master Control Panel for the barriers for that direction of travel are disabled and Auto mode is disabled disabled for that barrier set.

3.4.1.4 The maintenance person would then insert the key into the appropriate Off-Local mode selector switch on the barrier's Local Control Panel and turn the key to the "Local" position. This action enables the Open and Close switches at the Local Control Panel for the barriers in that direction of travel.

3.4.1.5 Maintenance personnel would also have to block and mark the lane ahead of the barrier in accordance with standard lane closure procedures/standards 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.

3.5.2 When the Inbound Barriers Manual - Auto - Local mode switch is placed in the Local mode no change takes place with the traffic signals. This action just locks out the Auto and Manual mode functions. The key is then taken to the Local panel where the Local panel is placed into Local mode. The inbound barriers can now be controlled by the individual barrier Open and Close switches on the Local Control Panel. Initiation of a Close command to an open barrier causes 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 is energized through the VPD's immediately in front of and behind the barrier. If the VPD's are clear, the barrier closes. Initiation of an Open command to a closed barrier energizes the open circuit for the barrier and open the barrier. After the barrier is fully open and the mode switch is placed in Auto mode, then the Traffic Signal changes from Red to Green. In the Local mode, both initial and final barriers in a given entrapment area can be opened. In such situations, guards must provide compensatory security measures to defeat a threat while both barriers are

open. The traffic arm associated with a barrier is operated independent from the crash rated active vehicle barrier. Upon completion of maintenance, the traffic arm and corresponding barrier need to be in the same position e.g. either both open or both closed.

3.5.3 The close circuit for all barriers is 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 is suppressed. The open circuit is not impacted by a VPD being activated.

3.6 FINAL BARRIER: A VPD located at the barrier's STOP line detects a vehicle's presence in the entrapment area. If the final barrier is closed, then a signal is sent to the guard in the Gatehouse notifying him/her of the vehicle's presence. The signal causes a short audible noise to alert the guard and turns on a Red indicating light until the final barrier is open. If the barrier is open, then just the indicating light for the loop illuminates.

3.7 FILL OR RELEASE COMMAND WITH VPD.

3.7.1 Vehicle Presence Detector consisting of safety loops on either side of a crash rated active vehicle barrier may require additional programming and hardware. If the loops are more than 3 meters10 ft apart, then add 0.5-1 sec additional time delay on the "back" loop. The alternative is to provide a latching logic between loops. In the latching logic, the master panel needs a release pushbutton for each barrier.

3.7.2 When in Auto mode and a Fill or Release command is requested, then the system is to function as indicated.

3.7.2.1 When a VPD is activated on a barrier that is to close, then the action (Fill or Release) is suppressed. An audible alarm is to sound and the Fill or Release indicating light is to Flash. The original command is unlatched. Once the VPD(s) is cleared, then the guard must hit the reset button to clear the system and alarm. The Fill or Release command is to be reinitiated then. Once the traffic arm or barrier starts to close, a VPD activation is not to stop the cycle. The VPD must be activated prior to the command to stop the command.

3.7.2.2 A VPD activation on a barrier that is to open does not stop the action of opening (Fill or Release).

3.8 MANUAL OPEN OR CLOSE COMMAND WITH VPD.

3.8.1 Manual operation to Open a barrier or traffic arm is not impacted by a VPD activation associated with that barrier/traffic arm.

3.8.2 Manual operation to Close a barrier or traffic arm is suppressed by a VPD activation associated with that barrier/traffic arm. The VPD activation must take place prior to the Close command to suppress the action. The command is unlatched and must be reinitiated once the VPD(s) is cleared.

3.9 RETURN TO AUTO MODE.

3.9.1 When the mode switch is placed in the Auto mode and all the barriers for that direction of travel are in the appropriate configuration - one is Open (not deployed) and one is Closed (deployed), then the Auto mode

indicating light illuminates and the corresponding Fill or Release light is to be illuminated.

3.9.2 If a mode switch is placed in the Auto mode and if both barriers for that direction of travel are either Open or Closed or if the traffic arm and barrier are in an incorrect position, then an alarm is to sound. The visual indicator is to be an alternating flashing of the Fill and Release indicator lights and the Auto indicating light is to turn off. The guard needs to go to manual mode and place the equipment in the correct configuration. Moving the mode switch from Auto to Manual (or local) mode turns off the alarm.

3.10 RESET. Reset button is only located at the Master Control Panel.

3.10.1 The reset button is used to reset after an Auto mode Fill or Release action is stopped by a VPD during a closing action. See RETURN to Auto Mode.

3.10.2 The reset button is also used to correct the unlikely situation that a barrier and traffic arm are prevented from completing a coordinated action. One possible is traffic arm closing on an object and then reversing back to the open position.

3.11 Out-of-Service switch. This function is provided for times when a barrier is damaged in a lane and needs to be taken out of service for an extended period of time. The out of service switch is to be located at the AVB location and is allowed to operate in EFO, Test and Local modes. This allows an AVB to be locked out in a lane, but the other lane can operate under EFO. The switch locks out all functions for the AVB when activated. The up and down lights for that AVB will alternate going on and off. WARNING: Installation is responsible for proper lane closure procedures (closing off the lane, bagging the traffic signal over the barrier, having guards present, etc). The Out-Of-Service switch has two positions: Yes and No or Enable and Disable is allowed for the wording..

3.12 AUDIBLE ALARMS. Provide an audible alarm at the Master Control Panel, Overwatch Control Panel, [Pedestrian control panel,] main Guard Booth Control Panel and Search Area Control panel(s). The volume must be adjustable either through a rheostat or other means. Provide a button that silences the audible alarm at each panel. This silence button does not affect the corresponding visual indicator. Silence button does not prevent an audible alarm if a new condition develops.

3.12.1 Stop line VPD. When the stop line VPD is activated it activates a visual indicator and audible indicator when the barrier is in the Closed position. If the AVB is in the open position, only a visual indicator.

3.12.2. Overspeed and Wrong-way will cause an alarm to go off for 3 seconds and then clear itself.

3.12.3. Duress activation.

3.12.4. AVB Trouble condition.

3.12.5. Loop Trouble condition.

3.6.6. Each Loop Activated.

3.12.7 If an actuated traffic arm is provided at the crash rated active

vehicle barriers are equipped with a break arm alarm. Upon breakage of the traffic arm, an audible/visual alarm is to happen at the master control panel. The visual indicator consists of a the traffic arm position indicator light flashing.

3.12.8. Master Panel in Auto mode and Local Panel is in Local Mode. Auto mode and Local mode indicator lights alternate being on.

3.12.9. Master Panel in Manual/Test mode and Local Panel is in Local Mode. Manual/Test mode and Local mode indicator lights alternate being on.

3.12.10. Return to Auto mode with an AVB or AVBs are in the incorrect position (not fully open). Auto mode indicator light and open/down AVB position light(s) flash.

3.12.11 Communication Loss alarm.

3.12.11 Tramper Switch. Any tamper switch activation triggers an alarm.

3.13 AUDIBLE ALARMS. Provide an audible alarm at the Local Control Panel. The volume must be adjustable either through a rheostat or other means. Provide a button that silences the audible alarm at each panel. This silence button does not affect the corresponding visual indicator. Silence button does not prevent an audible alarm if a new condition develops.

3.13.1. AVB Trouble condition.

3.14 AUXILIARY CONTACTS. Provide auxiliary contacts (dry) to be used by the Intrusion Detection System and the CCTV system as specified herein and indicated on the drawings.

Appendix A4 - Stop Control Safety Scheme

STOP CONTROL Provide the following features for the full containment Safety Scheme:

[1 General equipment layout information.

1.1 Active Vehicle Barriers in all inbound and outbound lanes.

1.2. Do Not Enter LED blankout signs are located at the midpoint of the AVB on each side of the lane.

1.3 A 610 mm2 foot wide stop line placed 4.3 meters14 feet in front of the the active vehicle barrier. A Stop sign is located at the front of the stop line.

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. Induction loops must be diagonal quadrapole loop and sized per lane i.e. a loop crossing multiple lanes is not allowed. The VPD before the AVB starts 610 mm2 ft from the AVB and is 1829 mm6 ft long.

1.7 Warning Sign and Warning Beacons (wig-wags) (2 Beacons with alternating flashing yellow lights) located approximately 33.5 meters110 feet in front of the barriers. Beacon lamps will be LED.

1.8 One Master Control Panel, [one Guard Booth Control panel plus one smaller panel for each Guard Booth][one Guard Booth EFO Control Button], one Overwatch Position Control Panel, one Search Area Control panel per separate search area, Pedestrian booth, and a Local Control Panel or panels at each barrier along with all control switches and indicating lights as shown on the Drawings. Locate the Master Control Panel in the Command and Control location for use by the ACP/ECF guards. Locate each Local Control Panel at or near its respective barrier power unit.

1.9 Diagonal pavement striping. Provide white crosshatching pavement marking that covers the front and back VPDs. Do not stripe the stop line VPD.
[
[1.9 Red steady in-pavement lights on both sides of the barrier in each lane where there are inbound and outbound lanes adjacent to each other. If multiple lanes per direction of travel then the lights are only required where the AVB does not have lights facing normal traffic flow. Provide three lights per barrier on each side of the barrier. Locate approximately 610 mm2 ft in front of the stop line.]]

1.10 Horn located at the crash-rated active vehicle barriers. Provide the horn with a means to adjust the volume.

1.11 Actuated Traffic Arm for each inbound lane in the ID Check Area. Install ATAs near the Guard Booths as shown on the Drawings. Provide an ATA Control Panel with Open and Close control switches for the ATA in the guard booth or as directed.]

2 BARRIER OPERATING CONTROL PANELS.

[Operating panel layouts are found in Army Standard Design drawing package.][Operating panel layouts are found in the contract drawings.]

3 TRAFFIC SIGNAL AND BARRIER CONTROLS.

3.1 EFO MODE. Under normal operations, all barriers' mode selector switches on the Master Control Panel will be in the EFO position with the key removed and with that key being accessible only by the lead ACP/ECF guard. With the barrier's mode selector switch in the EFO position, EFO is enabled for that direction of travel, 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 are disabled.

3.2 EFO OPERATION. In the EFO mode of operation with the barrier open, the LED Do Not Enter signs are off. Activation of an EFO command from any armed EFO deploys the AVB, activates the warning beacons, turns on the in-pavement lights (if present), red signal, and LED Do Not Enter signs as soon as EFO is pushed. The barrier(s) in emergency fast mode is to be fully deployed within 2 seconds provided that the VPDs immediately in front of and behind the barrier are clear. If either or both VPDs detect a vehicle, then the barrier does not close; however, the emergency close signal is latched only for those barriers that were in EFO mode at the time of activation. Once both VPDs are clear, the barriers (those in EFO mode) deploy (unless EFO Reset had been activated). Horn is to sound for 10 seconds.

3.3 EFO RESET. After an EFO activation, guards will close all inbound and outbound lanes. Guards will obtain the EFO Reset key and then activate the EFO Reset switch on the Master Control Panel to reset EFO. This removes the latch command for the EFO circuit. The person in charge can then place the Master Control Panel mode switches into Test (or go through the sequence to use the Local panel) and use the Open buttons to lower each barrier. Once all the barriers are Open for a given direction of travel and the corresponding mode switches are back in EFO mode, then the warning beacons, red signal, and Do Not Enter signs for that direction of travel, and the in-pavement lights deactivate. This needs to be done for both directions of travel in order to have all signals off.

3.3 Test Operation.

3.3.1 An individual barrier can be test operated by installing the proper lane closure markings and barricades ahead of the active barrier and then placing the mode selector switch for that direction of travel into the Test position. With the mode selector switch in the Test position, the barrier's Open and Close switches on the Master Control Panel for that direction of travel are enabled, but the Open and Close switches on the Local Control Panel for that direction of travel are disabled. In addition all active EFO switches are disabled from operating any barrier for that direction of travel. Where a single barrier spans both inbound and outbound lanes, the test operation switch deactivates all EFO capability.

3.3.2 When a mode switch is placed in Test mode, the warning beacons, red signal, Do Not Enter signs, and in-pavement lights for that direction of

travel activate. The barriers for that direction of travel are allowed to operate without any time delay. The traffic signals for that direction of travel stay on until all the conditions are met for RETURN TO EFO MODE. The AVB must be down and back in EFO mode to deactivate the signals. The warning beacons, in pavement lights, Do Not Enter signs, and red signal all deactivate. WARNING: Installation is responsible for proper lane closure procedures (closing off the lane, bagging the traffic signal over the barrier if a long term operation, having guards present, etc) during a Test or Local mode operation.

3.4 LOCAL MODE OF OPERATION

3.4.1 Local Operation. Local mode is used when maintenance personnel need to perform maintenance on the barrier.

3.4.1.1 Maintenance personnel would obtain the mode selector switch key from the lead ACP/ECF guard and place the key into the Master Control Panel 3-position mode selector switch for the appropriate direction of travel.

3.4.1.2 The person then turns the selector switch to the Local position to enable Local mode and then removes the key.

3.4.1.3 With the mode selector switch on the Master Control Panel in the Local position, Open and Close switches on the Master Control Panel for the barriers for that direction of travel are disabled and all EFO switches are disabled for that direction of travel. If a single barrier spans multiple directions of travel all EFO capability will be deactivated.

3.4.1.4 The maintenance person would then insert the key into the appropriate Off-Local mode selector switch on the barrier's Local Control Panel and turn the key to the "Local" position. This action activates the Open and Close switches at the Local Control Panel for the barriers in that direction of travel.

3.4.1.5 Maintenance personnel would also have to block and mark the lane ahead of the barrier in accordance with standard lane closure procedures/standards 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.

3.4.2 LOCAL MODE OF OPERATION (one barrier per direction of travel). When a mode switch is placed in Local mode, the traffic signals, in-pavement lights and LED blankout signs for that direction of travel activate. The barriers for that direction of travel are allowed to operate without any time delay. Everything stays activated for that direction of travel until all the conditions are met for RETURN TO EFO MODE. The in-pavement lights for that barrier activate when the traffic signal is red and stay red as long as the traffic signals are red. Note the warning beacons do not operate under Local, but can be allowed to operate if requested and approved. WARNING: Installation is responsible for proper lane closure procedures (closing off the lane, bagging the traffic signal over the barrier if a long term operation, having guards present, etc) during a Test or Local mode operation.

3.5 Vehicle Presence Detector consisting of safety loops on either side of a crash rated active vehicle barrier may require additional programming and hardware. If the loops are more than 3 meters10 ft apart, then add 0.5-1 sec additional time delay on the "back" loop. The alternative is to provide a latching logic between loops. In the latching logic, the master panel needs a

release pushbutton for each barrier.

3.6 Out-of-Service switch. This function is provided for times when a barrier is damaged in a lane and needs to be taken out of service for an extended period of time. The out of service switch is to be located at the AVB location and is allowed to operate in EFO, Test and Local modes. This allows an AVB to be locked out in a lane, but the other lane can operate under EFO. The switch locks out all functions for the AVB when activated. The up and down lights for that AVB will alternate going on and off. WARNING: Installation is responsible for proper lane closure procedures (closing off the lane, bagging the traffic signal over the barrier, having guards present, etc). The Out-Of-Service switch has two positions: Yes and No or use Enable and Disable.

3.6.1 No Position. All controls operate normally.

3.6.2 Yes Position. The Close/ Open position indicating lights for those barriers will alternate from one to the other approximately every 1 sec. This will happen at the Master Control Panel, Local Control Panel (if on) and at any other panel that has barrier position indicator lights. Controls for that AVB are all locked out.

3.7 RETURN TO EFO MODE. When the mode switch is placed in the EFO mode and all the barriers for that direction of travel are Open (not deployed), then the barrier's signs and warning beacons (wig-wags) deactivate. If a mode switch is placed in the EFO mode and any of the barriers for that direction of travel are Closed, then the barrier's signs stay on and an alarm is generated on the ACP/ECF TROUBLE window on the Gatehouse Control Panel.

3.8 AUDIBLE ALARMS. Provide an audible alarm at the Master Control Panel, Overwatch Control Panel, main Guard Booth Control Panel and Search Area Control panel(s). The volume must be adjustable either through a rheostat or other means. Provide a button that silences the audible alarm at each panel. This silence button does not affect the corresponding visual indicator. Silence button does not prevent an audible alarm if a new condition develops.

3.8.1. When an EFO is pushed an alarm will go off for 3 seconds unless silenced earlier.

3.8.2. Overspeed and Wrong-way will cause an alarm to go off for 3 seconds and then clear itself.

3.8.3. Duress activation.

3.8.4. AVB Trouble condition.

3.8.5. VPD Trouble condition.

3.8.6 VPD Activation for over the set amount of time period (typically 15 seconds) Light goes on immediately for VPD activation, but audible alarm activates after 15 seconds.

3.8.5. Out of Service activation. AVB indicator lights alternate being on.

3.8.6. Master Panel in EFO mode and Local Panel is in Local Mode. EFO mode and Local mode indicator lights alternate being on.

3.8.7. Master Panel in Test mode and Local Panel is in Local Mode. Test mode and Local mode indicator lights alternate being on.

3.8.8. Return to EFO mode with an AVB or AVBs in the incorrect position (not fully open). EFO mode indicator light and open/down AVB position light(s) flash.

3.8.9 Communication Loss alarm.

3.8.10 Tramper Switch. Any tamper switch activation triggers an alarm.

3.9 AUDIBLE ALARMS. Provide an audible alarm at the Local Control Panel. The volume must be adjustable either through a rheostat or other means. Provide a button that silences the audible alarm at each panel. This silence button does not affect the corresponding visual indicator. Silence button does not prevent an audible alarm if a new condition develops.

3.9.1. AVB Trouble condition.

3.9 AUXILIARY CONTACTS Provide auxiliary contacts (dry) to be used by the Intrusion Detection System and the CCTV system as specified herein and indicated on the drawings.

APPENDIX B			
Events and Alarms at ACP/ECF, CSMS, & Recorded			
Event/Alarm Point	Alarm at Command & Control	Alarm at CSMS	Record on SER
On Generator Power (Note 8)	Yes	No	No
Generator Low Fuel (Note 8)	Yes	No	No
UPS Trouble Alarm (Note 9)	Yes	No	No
Hydrogen Gas Alarm (Note 10)	Yes	No	No
Barrier #N Inbound - EFO Mode (Note 4)	No	No	Yes
Barrier #N Inbound - TEST Mode	No	No	Yes
Barrier #N Inbound -LOCAL Mode	No	No	Yes
Barrier #N Inbound - AUTO Mode (Note 12)	No	No	Yes
Barrier #N Outbound - EFO Mode (Note 4)	No	No	Yes
Barrier #X Outbound - TEST Mode	No	No	Yes
Barrier #X Outbound - LOCAL Mode	No	No	Yes
Barrier #X Outbound - AUTO Mode (Note 12)	No	No	Yes
Barrier #N Inbound AVB - Manual Close Command	No	No	Yes
Barrier #N Inbound AVB - Manual Open Command	No	No	Yes
Barrier #N Inbound Traffic Arm - Manual Close Command (Note 3)	No	No	Yes
Barrier #N Inbound Traffic Arm - Manual Open Command (Note 3)	No	No	Yes
Barrier #X Outbound AVB - Manual Close Command	No	No	Yes
Barrier #X Outbound AVB - Manual Open Command	No	No	Yes
Barrier #X Outbound Traffic Arm - Manual Close Command (Note 3)	No	No	Yes
Barrier #X Outbound Traffic Arm - Manual Open Command (Note 3)	No	No	Yes
EFO Activation - Master Panel	Yes	No	Yes
EFO Activation - Pedestrian Booth	Yes	No	Yes
EFO Activation - Guard Booth #Y	Yes	No	Yes
EFO Activation - Search Area	Yes	No	Yes
EFO Activation - Overwatch	Yes	No	Yes
EFO Activation - Any Location (Note 11)	No	Yes	No

APPENDIX B			
Events and Alarms at ACP/ECF, CSMS, & Recorded			
Event/Alarm Point	Alarm at Command & Control	Alarm at CSMS	Record on SER
Barrier #N Inbound AVB Close Circuit Energized Barrier #X Outbound AVB Close Circuit Energized Barrier #N Inbound AVB - Trouble Alarm Barrier #X Outbound AVB - Trouble Alarm Barrier #N Inbound AVB - Safety Loop Trouble Barrier #X Outbound AVB - Safety Loop Trouble	No No Yes Yes Yes Yes	No No No No No No	Yes Yes Yes Yes No No
Barrier #N Inbound AVB - Loop 1 (stop line) Malfunction (Note 13) Barrier #N Inbound AVB - Safety Loop 2 (threat side) Malfunction Barrier #N Inbound AVB - Safety Loop 3 (secure side) Malfunction	No No No	No No No	Yes Yes Yes
Barrier #X Outbound AVB - Loop 1 (stop line) Malfunction (Note 13) Barrier #X Outbound AVB - Safety Loop 2 (threat side) Malfunction Barrier #X Outbound AVB - Safety Loop 3 (secure side) Malfunction	No No No	No No No	Yes Yes Yes
EFO Reset Barrier #N Inbound AVB - Loop 1 (stop line) Activation (Note 13) Barrier #N Inbound AVB - Safety Loop 2 (threat side) Activation Barrier #N Inbound AVB - Safety Loop 3 (secure side) Activation	No No No No	No No No No	Yes Yes Yes Yes
Barrier #X Outbound AVB - Loop 1 (stop line) Activation (Note 3) Barrier #X Outbound AVB - Safety Loop 2 (threat side) Activation Barrier #X Outbound AVB - Safety Loop 3 (secure side) Activation	No No No No No	No No No No No	Yes Yes Yes Yes Yes

APPENDIX B			
Events and Alarms at ACP/ECF, CSMS, & Recorded			
Event/Alarm Point	Alarm at Command & Control	Alarm at CSMS	Record on SER
Barrier #N Inbound AVB - Loop 1 (stop line) Deactivation (Note 13)	No	No	Yes
Barrier #N Inbound AVB - Safety Loop 2 (threat side) Deactivation	No	No	Yes
Barrier #N Inbound AVB - Safety Loop 3 (secure side) Deactivation	No	No	Yes
		No	Yes
		No	Yes
Barrier #X Outbound AVB - Loop 1 (stop line) Deactivation (Note 3)	No	No	Yes
Barrier #X Outbound AVB - Safety Loop 2 (threat side) Deactivation	No	No	Yes
Barrier #X Outbound AVB - Safety Loop 3 (secure side) Deactivation	No	No	Yes
Barrier #N Inbound AVB Close Limit Switch Activated	No	No	Yes
Barrier #X Outbound AVB Close Limit Switch Activated	No	No	Yes
Barrier #N Inbound AVB Open Limit Switch	No	No	Yes
Barrier #X Outbound AVB Open Limit Switch Activated	No	No	Yes
Master Panel Power Off	No	No	Yes
Local Panel Power Off	No	No	Yes
EFO Not Armed - Guard Booth #Y	No	No	Yes
EFO Not Armed - Overwatch	No	No	Yes
EFO Not Armed - Search Area	No	No	Yes
Overspeed Activated (Alarm)	Yes	No	Yes
Wrong-way Activated (Alarm)	Yes	No	Yes
Inbound Traffic Signal Red On	No	No	Yes
Inbound Traffic Signal Yellow On (Note 14)	No	No	Yes
Inbound Traffic Signal Green On (Note 15)	No	No	Yes
Outbound Traffic Signal Red On	No	No	Yes
Outbound Traffic Signal Yellow On (Note 14)	No	No	Yes
Outbound Traffic Signal Green On (Note 15)	No	No	Yes
Duress Activation - Any Location (Note 11)	Yes	No	No
Duress Activation - Guard Booth #Y (Note 11)	No	No	Yes

APPENDIX B			
Events and Alarms at ACP/ECF, CSMS, & Recorded			
Event/Alarm Point	Alarm at Command & Control	Alarm at CSMS	Record on SER
Duress Activation - Overwatch (Note 11) Duress Activation - Command & Control (Note 11) Duress Activation - Search Area (Note 11) Duress Activation - Visitor Control Center (Note 11) Intrusion Detection Activation - Guard Booth #Y (Note 11)	No No No No No	Yes Yes Yes Yes Yes	No No No No No
Intrusion Detection Activation - Overwatch (Note 11) Intrusion Detection Activation - Command & Control (Note 11) Intrusion Detection Activation - Search Area (Note 11) Intrusion Detection Activation - Visitor Control Center (Note 11)	No No No No	Yes Yes Yes Yes	No No No No
Intrusion Detection Activation - Any Location (Note 11)	Yes	No	No

NOTES:
1. CSMS - Central Security Monitoring Station
2. SER - Sequence of Events Recorder
3. Monitor on Hybrid Beacon, if used, HEPD, and Stop Control Safety Schemes
4. This command is for any safety scheme that has an EFO.
5. N = number of inbound crash rated active vehicle barriers.
6. X = number of outbound crash rated active vehicle barriers
7. Y = number of guard booths
8. Alarm can be by a Remote Generator Alarm/Status Panel.
9. Alarm can be by a Remote UPS Alarm/Status Panel.
10. Alarm can be separate from Master Control Panel.
11. Alarm is to be monitored by the Intrusion Detection System Panel. Alarm signal is sent by the IDS panel.
12. Only used on Full Containment (Platooning/Sally Port) Safety Scheme. Number is number of lanes.
13. HEPD and Full Containment.
14. Hybrid Beacon, HEPD and Full Containment.
15. HEPD and Full Containment.

-- End of Section --