UFC 4-022-01
27 July 2017

UNIFIED FACILITIES CRITERIA (UFC)

ENTRY CONTROL FACILITIES ACCESS CONTROL POINTS

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ENTRY CONTROL FACILITIES
ACCESS CONTROL POINTS

U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND (Preparing Activity)

AIR FORCE CIVIL ENGINEER CENTER

Record of Changes (changes are indicated by ...)

Change No.	Date	Location

This UFC supersedes UFC 4-022-01, dated 25 May 2005.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DoD Field Activities in accordance with USD (AT&L) Memorandum dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and in some instances, Bilateral Infrastructure Agreements (BIA.) Therefore, the acquisition team must ensure compliance with the most stringent of the UFC, the SOFA, the HNFA, and the BIA, as applicable.

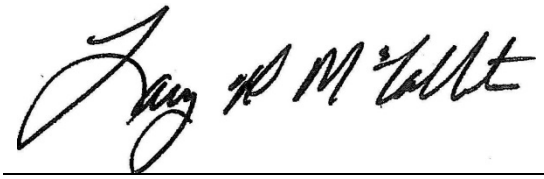
UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineer Center (AFCEC) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request. The form is also accessible from the Internet sites listed below.

UFC are effective upon issuance and are distributed only in electronic media from the following source:

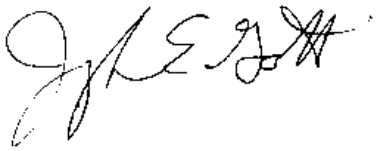
- Whole Building Design Guide web site http://dod.wbdg.org/.

Refer to UFC 1-200-01, *DoD Building Code (General Building Requirements)*, for implementation of new issuances on projects.

AUTHORIZED BY:



LARRY D. McCALLISTER, PhD, PE, PMP, SES
Acting Chief, Engineering and Construction Directorate of Civil Works
U.S. Army Corps of Engineers



JOSEPH E. GOTT, P.E.
Chief Engineer
Naval Facilities Engineering Command

EDWIN H. OSHIBA, SES, DAF
Deputy Director of Civil Engineers
DCS/Logistics, Engineering & Force Protection

MICHAEL McANDREW
Deputy Assistant Secretary of Defense
(Facilities Investment and Management)
Office of the Assistant Secretary of Defense
(Energy, Installations, and Environment)

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UNIFIED FACILITIES CRITERIA (UFC)
REVISION SUMMARY SHEET

Subject: UFC 4-022-01, Entry Control Facilities / Access Control Points

Cancels: UFC 4-022-01, Security Engineering: Entry Control Facilities / Access Control Points, dated 25 May 2005

Reasons for Revision: UFC 4-022-01 was updated for the following reasons:

- To eliminate information that could be referenced from other references, especially tables, charts, figures, and diagrams.
- To improve consistency and uniformity of terminology.
- To remove ambiguous language and clarify between recommendations and requirements.
- To minimize the amount of service-specific items.
- To incorporate new and updated standards and requirements.
- To eliminate extraneous information so pertinent information is more accessible.
- To reduce misunderstandings of some of its provisions.
- To address situations not previously addressed by the standards.
- To improve consistency of interpretation.
- To reduce redundancy or inconsistency with other UFCs that were not available at the time of the previous version of this document.
- To eliminate standards or recommendations that were unnecessary or that had been superseded by other UFCs.
- To eliminate materials covered by other documents and to reference them where appropriate.
- To incorporate information based on new studies and research or new or revised national standards.

Impact. Most of the changes result in overall life cycle cost savings. Further impacts include the following:

- More consistent application of the provisions of the document due to clearer and more consistent guidance.
- Improved designs and reduced construction costs due to the changes of requirements versus recommendations.

Non Unified Issues. Document content is unified and consistent for all services and agencies of the Department of Defense.

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CHAPTER 1 INTRODUCTION

1-1 PURPOSE.

This document presents the required baseline approach to the design of Continental United States (CONUS) and Outside Continental United States (OCONUS) Entry Control Facilities (ECFs) and Access Control Points (ACPs) at Department of Defense (DoD) military installations. The term “Entry Control Facilities/Access Control Points” encompasses the overall layout, organization, infrastructure, and facilities at entrance locations onto United States military installations. ECF is synonymous with the term Access Control Point (ACP) used in some service publications. This UFC identifies design features necessary to ensure that infrastructure constructed today will have the flexibility to support current and future technologies, a changing threat environment, and changes in operations.

1-2 APPLICABILITY.

This UFC provides planning and design criteria and guidance for DoD components and participating organizations. This document applies to all construction, renovation, modernization, and repair projects for entry control facilities/access control points (ECF/ACP).

This UFC is not intended to guide the development of entry control points (ECPs). ECPs are defined as an internal access control portal to a building or building compound once one passes through an existing installation ECF/ACP or after one has already been vetted and permitted into and within a controlled perimeter. The definition of a controlled perimeter is included in other security engineering UFC documents.

1-3 SCOPE AND GUIDANCE.

Commanders, security personnel, planners, designers, architects, and engineers must use this UFC when evaluating existing and providing new ECFs/ACPs of an installation. Technical information considered generally known to professional designers, architects, or engineers or readily available in existing technical references (Unified Facilities Criteria - UFC, FHWA, AASHTO, SDDCTEA etc.) has not been included.

1-4 VULNERABILITY AND RISK ASSESSMENT.

In accordance with DoD security and antiterrorism (AT) policies, a vulnerability and risk assessment must be conducted prior to beginning any security project. Upon identifying facility or asset vulnerabilities to threats, physical security measures such as access control, fences, gates, vehicle barriers and Electronic Security Systems (ESS) may be deployed to reduce vulnerabilities. In summary, this document assumes the planning phases, including the risk analysis, are complete prior to beginning design. For information on Security Engineering Planning and Design process, refer to UFC 4-020-01 and UFC 4-020-02FA (described in the section “Security Engineering UFC Series” in this chapter). The engineering risk analysis conducted as part of UFC 4-020-01 should

be consistent with the terrorism risk analysis conducted by the installation security/AT staff.

1-5 EXAMPLES AND APPLICATION.

The examples provided in this UFC are notional and will need to be site adapted using sound engineering and security practices as required by site constraints and the credentialing process of those professions. Consult with service guidelines and policies for specific facility related requirements. Consult with most recent source document for the most up to date information. This UFC is not intended to address procedural issues such as tactics and techniques; however, a well-designed ECF/ACP can enhance and improve operations. UFC 4-020-01, Security Engineering: Facilities Planning Manual contains information regarding the application and use of Security Engineering UFC documents and should be consulted prior to using this UFC in the project development process.

1-6 DOD BUILDING CODE.

Comply with UFC 1-200-01, DoD Building Code (General Building Requirements). UFC 1-200-01 provides applicability of model building codes and government unique criteria for typical design disciplines and building systems, as well as for accessibility, antiterrorism, security, high performance and sustainability requirements, and safety. Use this UFC in addition to UFC 1-200-01 and the UFCs and government criteria referenced therein.

1-7 ECF/ACP MISSION, PRIORITIES AND FUNCTIONS.

The objective of ECFs/ACPs is to secure the installation from unauthorized access and intercept contraband (weapons, explosives, drugs, classified material, etc.) while maximizing vehicular traffic flow by ensuring the proper level of access control and safety for all DoD personnel, visitors, and commercial traffic to an installation. ECF/ACP priorities include:

- Security
- Safety
- Capacity
- Sustainability

1-7.1 ECF/ACP Function.

An ECF/ACP and its facilities when required perform a variety of functions including visitor processing, vehicle registration, ID checks, privately owned vehicle (POV) inspections, and commercial/large vehicle inspections. An ECF/ACP when required should accommodate pedestrians and a variety of vehicles, including passenger vehicles, trucks, oversize vehicles, construction equipment, buses, recreational vehicles, motorcycles, and bicycles.

1-7.2 ECF/ACP Checklist.

Appendix D is a checklist for the development of ECF/ACP designs that is provided to assist in the planning and design stages to determine the requirements and major features for proposed ECF/ACP projects.

1-7.3 Security Concerns.

It is well established that installations must focus on threats that can be mitigated at the first line of defense–the installation perimeter. ECFs/ACPs and the access control they provide are extremely important to defense-in-depth and effective risk mitigation.

An ECF/ACP:

- Is a part of the installation perimeter and a legal line of demarcation and provides the first physical security boundary layer that restricts entry/access to DoD installations.
- Must accommodate Random Antiterrorism Measures (RAM), for sustained operations
- Must be able to operate at all Force Protection Conditions (FPCONs), including 100% vehicle inspections.
- Must have security features that protect against vehicle-borne threats and illegal entry.

1-7.4 Safety Concerns.

ECFs/ACPs must have a working environment that is both safe and comfortable for Security Forces personnel. Security Forces safety includes provisions for personal protection against attack and errant drivers; consider climate, location, and orientation.

Design the ECF/ACP so that persons and vehicles entering and leaving the facility do so in a safe and orderly manner to protect themselves, security personnel, and pedestrians from harm.

1-7.5 Capacity.

Design the ECF/ACP to maximize the flow of traffic without compromising safety, security, or causing undue delays that may affect installation operations or off-installation public highway users. A traffic engineering and safety study is recommended prior to the modification of an existing ECF/ACP and prior to the implementation of active vehicle barriers (AVB) and automated equipment. A traffic engineering and safety study is required prior to the major modification of an existing ECF/ACP and prior to the design of a new ECF/ACP.

1-7.6 Sustainability.

The ECF/ACP should reduce energy costs, facility maintenance and operations costs through sustainable design where appropriate. Refer to the DoD Building Code for additional guidance.

1-8 REFERENCES.

Appendix A contains a list of references used in this document. The publication date of the code or standard is not included in this document. The most recent edition of referenced publications applies, unless otherwise specified.

1-9 GLOSSARY.

Appendix E contains acronyms, abbreviations, and terms.

1-10 POLICY REQUIREMENTS.

The requirement to provide entry and access control comes from DoD Instruction/Directives, Geographic Combatant Commander (GCC) Instructions, Service Instruction/Directives, and Regional or Installation requirements. Consult Headquarters, Major Command, Regional, and Installation personnel to establish project requirements.

1-11 DOD REQUIREMENTS.

There are several instructions and publications within the Department of Defense (DoD) that establish required access control procedures for an installation, objectives of an ECF/ACP, and the responsibility for the operation of the facility. The most recent versions of these documents can be obtained from DoD, agency and service web sites. The intent of the references listed in Appendix A is to provide designers with the most relevant and specialized requirements for ECFs/ACPs. Other specific design requirements exist for various aspects of design such as buildings and roadways and are found in the DoD Building Code indicated above.

Specific to access control, Directive-Type Memorandum (DTM) 09-012, Interim Policy Guidance for DoD Physical Access Control establishes DoD access control policy and the minimum DoD security standards for controlling entry to DoD installations and stand-alone facilities.

1-12 NATIONAL REQUIREMENTS.

ECFs/ACPs must meet nationally accepted standards as applicable per Multi-Service Regulation (Army Regulation (AR) 55-80, Chief of Naval Operations Instruction (OPNAVINST) 11210.2, Air Force Manual (AFMAN) 32-1017, Marine Corps Order (MCO) 11210.2D and Defense Logistics Agency Regulation (DLAR) 4500.19) DoD Transportation Engineering Program and Code of Federal Regulations (CFR) – Title 23: Highways, Chapter I, Subchapter G, Part 655, subpart f: Traffic Control Devices on Federal-Aid and Other Streets and Highways. Title 32: National Defense, Subtitle A,

Chapter V, Part 634, Subpart D: Traffic Supervision. These references and other nationally recognized documents are found in Appendix A under National Design Standards.

1-13 GEOGRAPHIC COMBATANT COMMANDER REQUIREMENTS.

Geographic Combatant Commanders (GCC) issue requirements for antiterrorism and physical security for installations within their area of responsibility. Ensure any such requirements are incorporated in addition to the requirements found in DoD and Service Directive/Instructions. Resolve any differences in the requirements by applying the most stringent requirement.

1-14 INSTALLATION SPECIFIC REQUIREMENTS.

The FPCON and RAM specified in an installation AT Plan impact the operation, capacity, and design of the ECF/ACP. Ensure any such requirements are incorporated in addition to the requirements found in this UFC. Resolve any differences in the requirements for the design of an ECF/ACP by applying the most stringent requirement.

1-15 OCONUS REQUIREMENTS.

Code of Federal Regulations Title 32, National Defense, Part 634, Subpart D-Traffic Supervision establishes that it is the Commander's responsibility to develop traffic codes based on the Status of Forces Agreement (SOFA) with the host nation. For ECFs/ACPs developed at OCONUS installations, refer to the SOFA agreement for direction on which standard to apply. If the SOFA agreement is not explicit on which standard dictates, the most stringent requirement must be applied.

Specific service requirements may also apply.

1-16 DOD SECURITY ENGINEERING UFC SERIES

This UFC is one of a series of security engineering Unified Facilities Criteria documents that cover minimum standards, planning, preliminary design, and detailed design for security and antiterrorism. The manuals in this series are designed to be used sequentially by a diverse audience to facilitate development of projects throughout the design cycle. The manuals in this series include the following, and the intended process for applying them is illustrated in Figure 1-1.

1-16.1 DoD Minimum Antiterrorism Standards for Buildings.

UFC 4-010-01 establishes standards that provide minimum levels of protection against terrorist attacks for the occupants of all DoD inhabited buildings. This UFC is intended to be used by security and antiterrorism personnel and design teams to identify the minimum requirements that must be incorporated into the design of all new construction and major renovations of inhabited DoD buildings. They also include recommendations that should be, but are not required to be incorporated into all such buildings.

1-16.2 Security Engineering Facilities Planning Manual.

UFC 4-020-01 presents processes for developing the design criteria necessary to incorporate security and antiterrorism into DoD facilities and for identifying the cost implications of applying those design criteria. Those design criteria may be limited to the requirements of the minimum standards, or they may include protection of assets other than those addressed in the minimum standards (people), aggressor tactics that are not addressed in the minimum standards or levels of protection beyond those required by the minimum standards.

The cost implications for security and antiterrorism are addressed as cost increases over conventional construction for common construction types. The changes in construction represented by those cost increases are tabulated for reference, but they represent only representative construction that will meet the requirements of the design criteria. The manual also addresses the tradeoffs between cost and risk. The Security Engineering Facilities Planning Manual is intended to be used by planners as well as security and antiterrorism personnel with support from planning team members.

1-16.3 Security Engineering Facilities Design Manual.

UFC 4-020-02FA provides interdisciplinary design guidance for developing preliminary systems of protective measures to implement the design criteria established using UFC 4-020-01. Those protective measures include building and site elements, equipment, and the supporting manpower and procedures necessary to make them all work as a system. The information in UFC 4-020-02FA is in sufficient detail to support concept level project development, and as such can provide a good basis for a more detailed design. The manual also provides a process for assessing the impact of protective measures on risk. The primary audience for the Security Engineering Design Manual is the design team, but it can also be used by security and antiterrorism personnel.

1-16.4 Security Engineering Support Manuals.

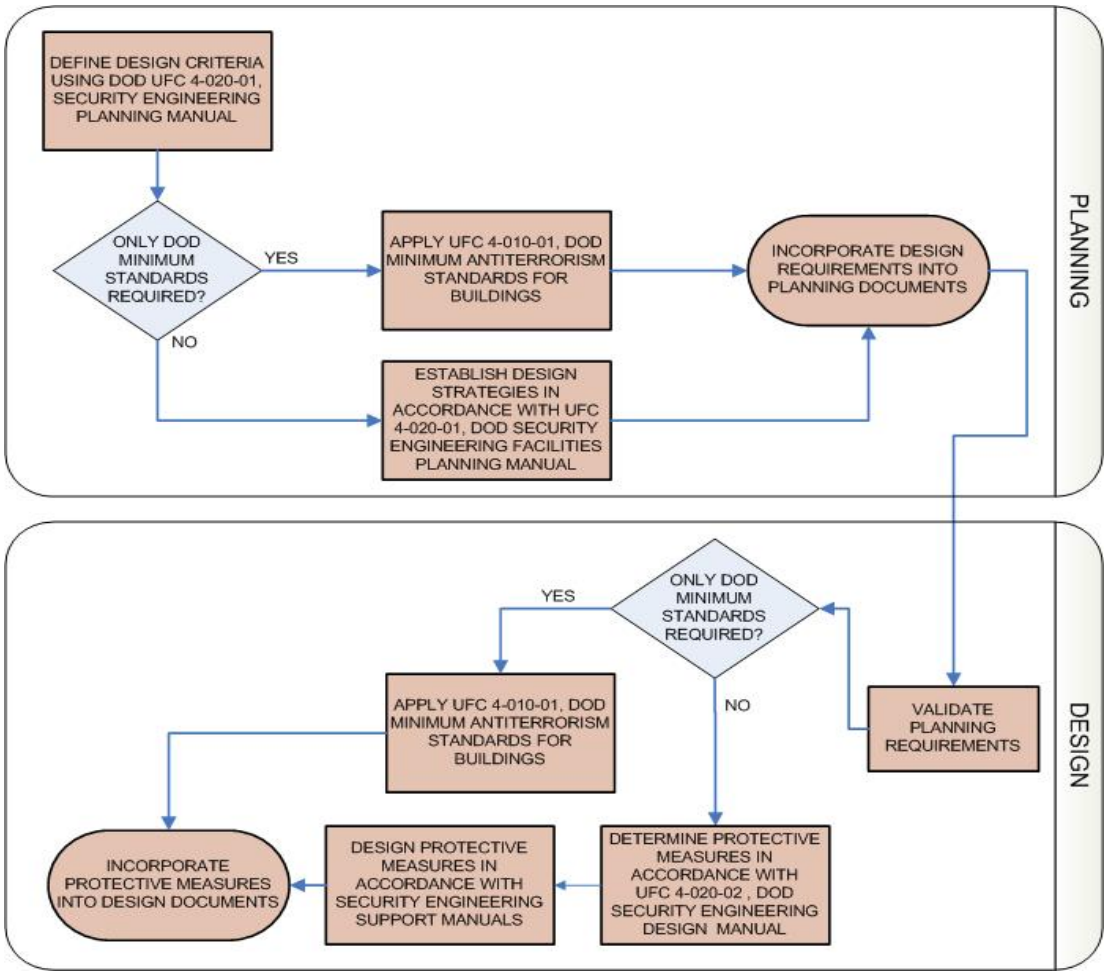
In addition to the standards, planning, and design UFCs mentioned above, there is a series of additional UFCs that provide detailed design guidance for developing final designs based on the preliminary designs developed using UFC 4-020-02FA. These support manuals provide specialized, discipline specific design guidance. Some address specific tactics such as direct fire weapons, forced entry, or airborne contamination. Others address limited aspects of design such as resistance to progressive collapse or design of portions of buildings such as mail rooms. Still others address details of designs for specific protective measures such as vehicle barriers or electronic security systems. The Security Engineering Support Manuals are intended to be used by the design team during the development of final design packages.

1-16.5 Security Engineering UFC Application.

The application of the security engineering series of UFCs is illustrated in Figure 1-1. UFC 4-020-01 is intended to be the starting point for any project that is likely to have security or antiterrorism requirements. By beginning with UFC 4-020-01, the design

criteria will be developed that establishes which of the other UFCs in the series will need to be applied. The design criteria may indicate that only the minimum standards need to be incorporated, or it may include additional requirements, resulting in the need for application of additional UFCs. Even if only the minimum standards are required other UFCs may need to be applied if sufficient standoff distances are unavailable. Applying this series of UFCs in the manner illustrated in Figure 1-1 will result in the most efficient use of resources for protecting assets against security and antiterrorism related threats.

Figure 1-1 Security Engineering UFC Application



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CHAPTER 2 CLASSIFICATIONS AND FUNCTIONS

2-1 ECF/ACP USE CLASSIFICATIONS.

ECFs/ACPs are classified based on the intended function and anticipated usage of the ECF/ACP. The four "use" classifications are outlined in Table 2-1. The use classification is a function of the type of traffic, hours of operation, and FPCON considerations.

Table 2-1 ECF/ACP Use Major Classifications

Use Classification	Operational Hours	FPCON Considerations	Typical Operation
Primary	24/7, Open continuously	Open thru FPCON Delta	Vehicle registration/Visitor Pass capacity. Regular operations, visitors with authorization. Could also be designated as truck and delivery ECF/ACP.
Secondary	Regular hours, closed at times	Potentially closed at or above FPCON Charlie	Regular operations, visitors with authorization. Could also be designated as truck and delivery ECF/ACP.
Limited Use	Only opened for special purposes	Closed at most times	Tactical vehicles, Construction Equipment/Vehicles, HAZMAT, special events, emergency access... etc.
Pedestrian Access	Varies	Potentially closed at or above FPCON Charlie	Personnel only. Could be located near installation housing areas, near schools, or as part of a Primary or Secondary ECF/ACP.

The guidance contained in this UFC is intended for primary and secondary ECFs/ACPs. Primary and Secondary ECFs/ACPs must provide the means to defeat a vehicular and/or pedestrian threat through permanent measures. Limited-use ECFs/ACPs or internal/restricted area entry control points (ECP) may require significantly less infrastructure due to reduced operations. Limited Use ECFs/ACPs must provide means to defeat vehicular and/or pedestrian threats through temporary or permanent measures. Limited Use ECFs/ECPs/ACPs do not have routine hours of operation. A Pedestrian ECF/ACP may be part of an ECF/ACP that accommodates vehicles or it may stand alone.

2-2 ECF/ACP FUNCTION.

An ECF/ACP can have many functions. Not all functions are required at every ECF/ACP. Functions for each ECF/ACP are based on the installation's mission, AT Plan, ECF/ACP use classification, and land area. Functions may change to meet the demands of higher FPCON levels. The basic functions associated with an ECF/ACP are:

- Processing visitors
- Vehicle ID checks
- Personnel ID checks
- Privately Owned Vehicle (POV) Inspections
- Commercial/Large Vehicle Inspections

2-2.1 Site Functions.

ECF/ACP site functions include, but are not limited to, Approach Zone, Access Control Zone, Response Zone, Passive Vehicle Barriers, Active Vehicle Barriers (AVB), Command and Control, ID check area, Overwatch, Canopies, Turn Arounds, Search Areas, Lighting, and CCTV.

2-2.2 Building Functions.

Visitor Control Center (VCC), Guard Booths (Vehicle ID Check and Pedestrian ID Check), Search Area Building, Command and Control, Communications, Mechanical, Electrical, Latrine, Storage, and Overwatch are some building function components of the ECF/ACP.

2-2.3 Multi-Function ECFs/ACPs.

Where appropriate, ECF/ACP functional requirements should be consolidated or isolated to best maintain an installation's mission.

2-2.3.1 Mixed Vehicles.

An installation with limited access control space may combine all the above functions within a single ECF/ACP or an installation with high commercial vehicle demand may designate one isolated ECF/ACP for commercial vehicle inspections. When combining or isolating ECF/ACP functional requirements, designers must consider the destination of each user (visitors, commercial vehicles, etc.) and the real estate available to provide adequate facilities.

2-2.3.2 Commercial Vehicles.

Within a combined ECF/ACP, truck processing must be segregated from POV processing. Traffic lanes that require speed management to delay a high performance passenger vehicle should exclude truck traffic from these lanes. The effectiveness of

most speed management techniques for passenger vehicles decreases when trucks must use the same lanes.

2-2.3.3 Oversized Vehicles.

When designating the functions for all ECFs/ACPs at an installation, give consideration to the requirements to support oversized, atypical vehicles such as those frequently encountered during construction operations or during mobilization of military vehicles and equipment. These atypical vehicles should be supported by at least one limited use or primary/secondary ECF/ACP, which may require modifications such as wider lanes, limiting the use of channelization islands, or limiting potential obstructions. It is recommended that canopies cover all inbound lanes and that random, infrequent oversized vehicles be directed to limited use ECFs/ACPs or be directed through outbound lanes with the appropriate traffic management.

2-3 ECF/ACP FUNCTIONAL DIAGRAMS.

The functional diagrams shown in Figure 2-1 through 2-4 illustrate general relationships and desired adjacencies for different types of ECFs/ACPs. These can be modified based on installation or site-specific requirements for an ECF/ACP. See SDDCTEA Pamphlet 55-15 *Traffic and Safety Engineering for Better Entry Control Facilities, Army Standard for Access Control Points' and 'Army Access Control Points Standard Design*, and Air Force Civil Engineer Center's *Facilities Dynamic Prototypes Design: Entry Control Facilities/Installation Access Control Points (ECF/IACP)* for additional layout options.

The UFC defines functional flow requirements for ECPs/ACPs including visitor processing, truck inspection, and random inspections. All ECFs/ACPs must have a mechanism to conduct select inspections after the ID check area. In some cases, security requirements may require that all vehicles be inspected prior to entry. Where and when random inspection activities occur, facilities and procedures must be developed to minimize the impact to traffic flow on the main approach.

Figure 2-1 Visitors/DoD Personnel ECF/ACP – Functional Relationships

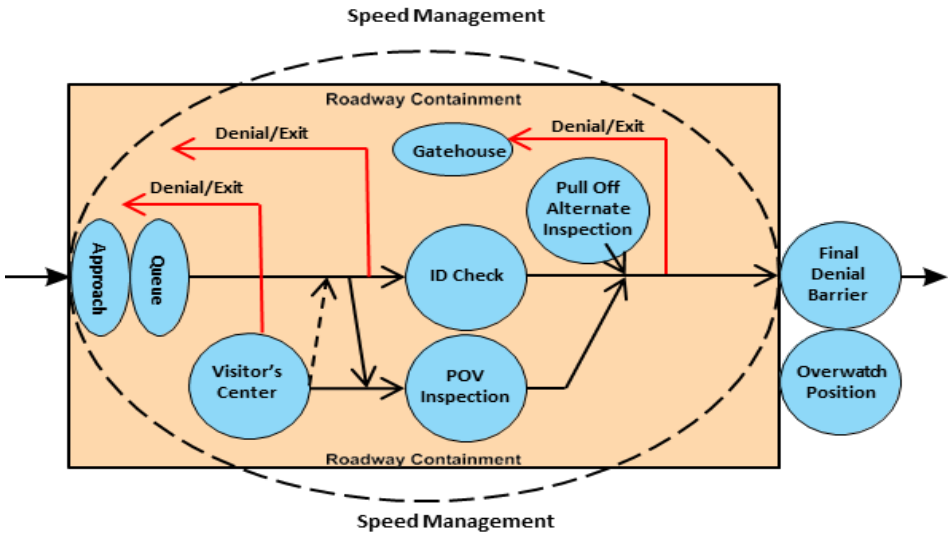

Figure 2-2 DoD/Authorized Personnel Only ECF/ACP – Functional Relationships

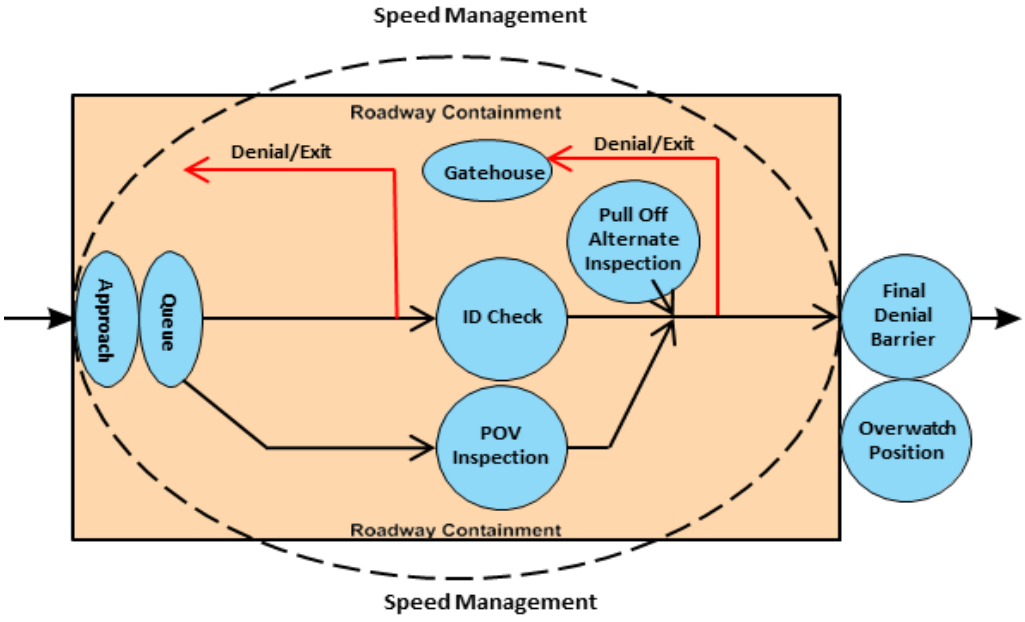

Figure 2-3 Commercial Vehicle ECF/ACP: Functional Relationships

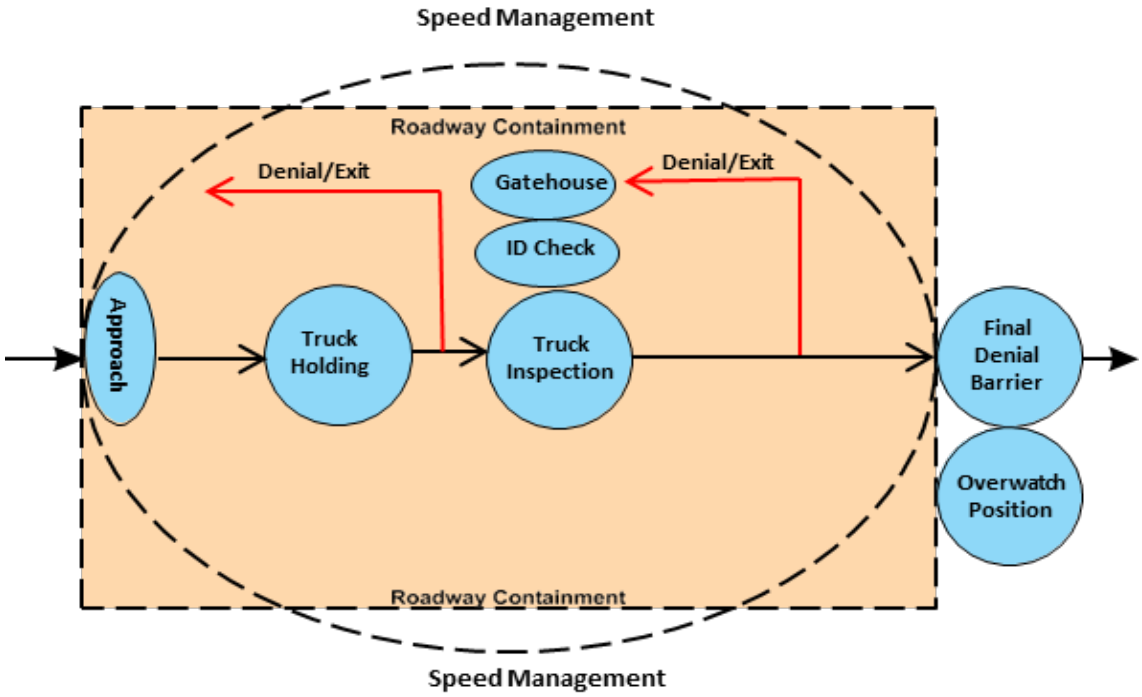

Figure 2-4 Primary ECF/ACP w/POV, Visitor, and Commercial Vehicle Processing

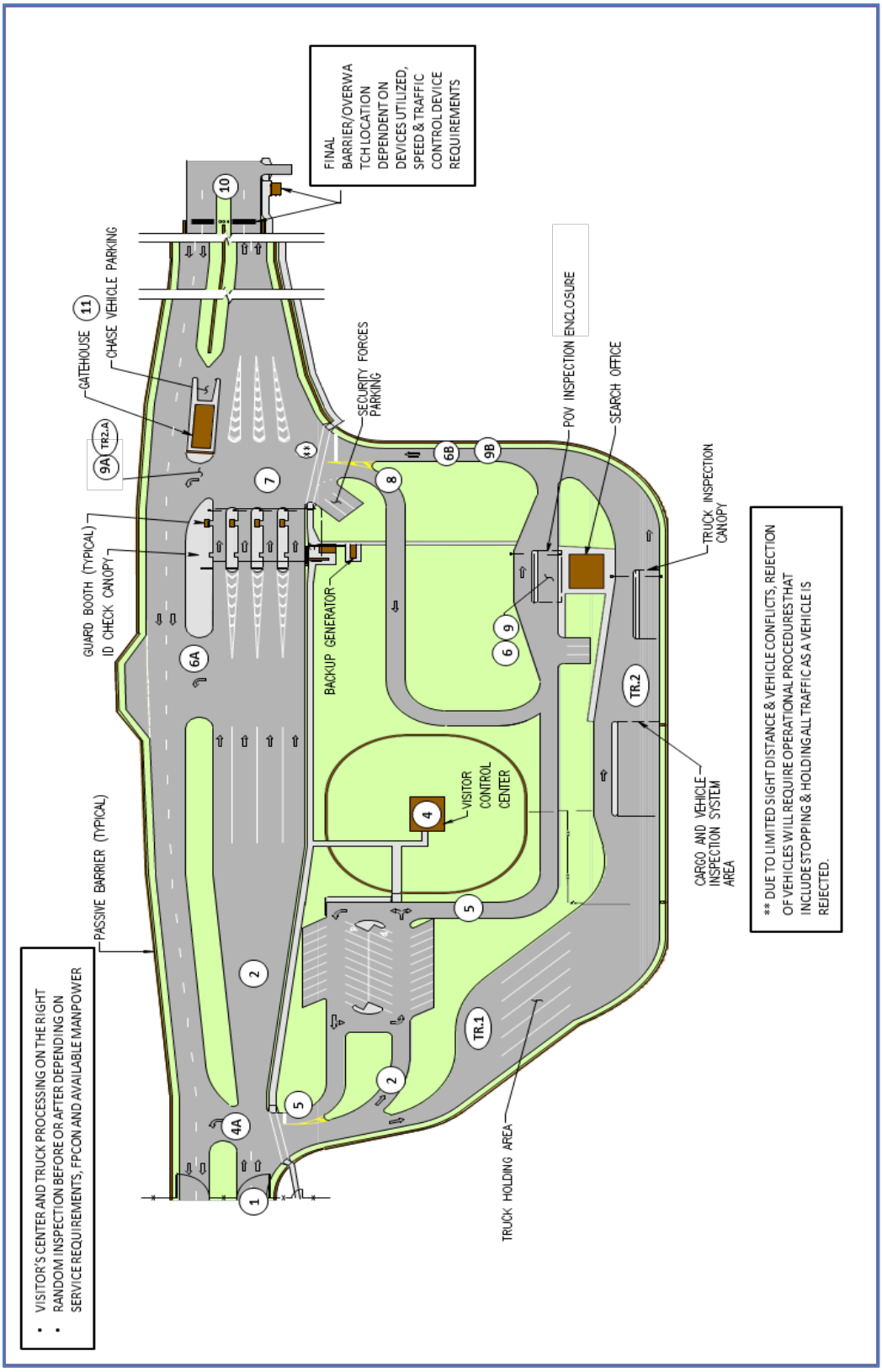

Table 2-2 ID #s for Figure 2-4

APPROACH ZONE	ACCESS CONTROL ZONE	RESPONSE ZONE
1 - Approach	**6/8/9** - ID Check Area POV and Truck including Search Office	**6B/9B** – Onto the Installation or Turnaround/Rejection Point at 9A/TR.2A
2 - Queue	**TR.2** – Truck Inspection	**10** - Final Denial Barrier and Overwatch Location
3/4/5 - Visitor Control	**7**- ID Check Area Guard Booth	
4A- Turnaround	**6A** – Turnaround/Rejection Point	
TR.1 - Truck Holding Area		

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CHAPTER 3 PLANNING AND SITE SELECTION CRITERIA

3-1 PLANNING.

Proper planning will help ensure that ECFs/ACPs meet an installation's needs, satisfy ECF/ACP priorities, satisfy ECF/ACP functions, and accommodate future development plans. Through proper ECF/ACP planning and design:

- Needed security can be achieved
- Safety of motorists can be provided
- Safety of guards can be enhanced
- Traffic and safety impacts can be mitigated
- Sustainable elements can be integrated
- Clear and intuitive transaction experience for entry candidate and gatekeeper can be achieved
- Facilities can provide an aesthetic sense of professionalism

The following stakeholders should be involved in the planning and design of an ECF/ACP:

Installation Stakeholders

- Antiterrorism Officer (ATO)/Security Forces
- Engineering and Public Works
- Community/Master Planning
- Safety Officers
- Communication Officers
- Installation Command
- Housing Contacts

Other Military Stakeholders

- Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA)
- ECF/ACP Service Branch Representative
- Command Groups
- Major/Tenant Commands

Other Stakeholders

- Local Police
- Emergency Services (Fire/Ambulance)
- Local Municipality/County
- State Department of Transportation (DOT)
- Federal Highway Administration (FHWA)

3-2 TRAFFIC ENGINEERING AND SAFETY STUDY.

A traffic engineering and safety study must be conducted or validated by SDDCTEA prior to initiating ECF/ACP planning and programming documentation. This engineering and safety study is recommended prior to the modification of an existing ECF/ACP and prior to the implementation of active vehicle barriers (AVB) and automated equipment. A traffic engineering and safety study is required prior to the major modification of an existing ECF/ACP and prior to the design of a new ECF/ACP. Traffic engineering and safety study guidance is defined in SDDCTEA Pamphlets 55-15 and 55-8. Traffic engineering and safety study must be performed in accordance with Institute of Transportation Engineers (ITE) or the host nation. As a minimum, the study must develop and identify demand requirements/volumes for vehicles, and also include pedestrians and multi-modal transportation. Recommend traffic engineering and safety study be included as part of the contracted engineering effort to develop the request for proposal (RFP) for a design build construction project.

The traffic engineering and safety study must, at a minimum, include the following:

- Current peak hour demand volume for both POVs and commercial vehicles.
- Current peak hour vehicle search demand volume for both POVs and commercial vehicles.
- Current peak hour pedestrian and bicycle demand volume.
- Reasonable development of proposed Design Hourly Volume (DHV).
- ECF/ACP capacity impacts caused by intersections or other roadway features prior to the approach zone and immediately after the response zone. Intersections and other roadway features that are located within the approach and response zones must also be analyzed for traffic volume impacts.
- Identify the required number of ID check lane.
- Identify visitor control center (VCC) processing and parking requirements.

SDDCTEA Pamphlets 55-15/55-8 provides additional study elements to be considered.

3-3 SITE SELECTION CRITERIA.

The ECF/ACP must be planned, designed, and so located as not to create un-safe off-Installation traffic queuing or any other un-safe traffic practices as defined by Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA) and all other applicable roadway standards/criteria.

When considering alternative locations for an ECF/ACP, a properly designed concept is needed. The concept must be drawn to a scale satisfying geometric design requirements, meeting service requirements and must include the appropriate number of lanes determined by the traffic engineering study and needed features. The concept can be used to determine if a site is a feasible location for an ECF/ACP. It is important

to include the stakeholders in the alternative evaluation process as they may have considerations to be addressed.

3-3.1 Location and Master Plan Coordination.

Installation Master Plans and Future Development Plans must depict future ECF/ACP needs and locations when possible. When ECFs/ACPs are depicted on master plans and future development plans, they must be based on the results of a traffic engineering and safety study and must be scaled to meet design requirements.

Comply with the requirements of UFC 4-010-01. ECF/ACP selection is dependent on several considerations and it is beneficial to consider alternatives. Key considerations include:

- Antiterrorism Standards
- Master Plans and Future Development Plans
- Compatible Land Use
- Environmental Constraints
- Topography
- Utilities
- Proximity to Majority of Final Facility Destinations
- Other Restrictions

3-3.1.1 Compatible Land Use.

If possible, ECFs/ACPs should not be located near mission-critical areas, restricted areas or residential areas unless the ECF/ACP's purpose is to serve that area. Carefully evaluate master and future development plans for the installation and the surrounding community when selecting a site for a new ECF/ACP or modifying existing facilities. All ECF/ACP development plans must accommodate future modifications necessitated by increased demand or revised security measures.

3-3.1.2 Environmental Constraints.

Consider the impact to existing environmental systems as well as constraints that may prohibit development in certain areas, including wetlands, protected habitats and resources, and restoration sites.

3-3.2 Master Plans and Future Development Plans.

ECFs/ACPs are key nodes within installation circulation plans. Base circulation/transportation plans address the critical relationship between circulation and land use. The installation's future development, mission changes, population, facilities, and infrastructure must be synchronized with its circulation system. The ECF/ACP designer must consult with the installation planner regarding development scenarios, future facility projects, land use patterns, strategic vision, base capacity profile and other

planning considerations impacting access to base cantonment area, military family housing, training and operating areas, and critical linkages with regional transportation systems.

The base planner can also facilitate coordination with Antiterrorism/Force Protection (AT/FP) experts to assist the designer's understanding of spatial separation requirements, controlling threats, and needed ECF/ACP levels of service. Growth and expansion must also be addressed during these conversations.

3-3.3 **Sustainability.**

Sustainability is a major factor in installation planning. Impacts on ECF/ACP design will include considerations for multi-modal (or intermodal) access to the installation. Emphasis on alternative transportation modes suggests future demand for pedestrian, bicycle, and van/car pool or bus lanes to expedite safe access to the installation. (Visitor Center projects must also be integrated into base transportation plans.) Intermodal suggests coordination with off-base circulation systems to consider connections to public transit, light rail, park & ride and pedestrian access points to emphasize sustainable transportation systems. Additionally, base planners will coordinate with local community planners for integrated circulation between the regional and installation networks.

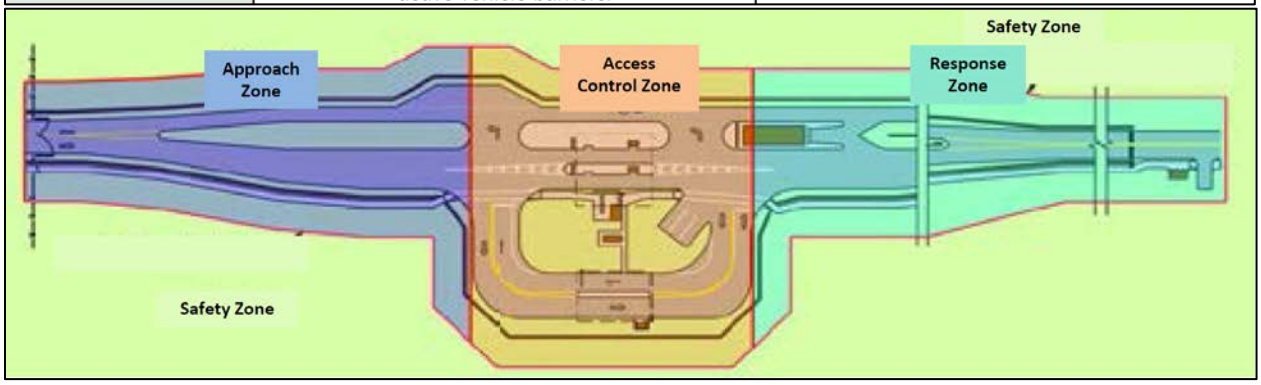
CHAPTER 4 ORGANIZATION AND OPERATION OF AN ECF/ACP

4-1 ECF/ACP ZONES.

An ECF/ACP is subdivided into four zones, each encompassing specific functions and operations. Beginning at the installation property boundary, the zones include the approach zone, access control zone, response zone, and the safety zone. Specific components are used within each zone to conduct the necessary operations. The location of each zone of the ECF/ACP is illustrated in Figure 4-1.

Figure 4-1 ECF/ACP Zones

Zone	Location	Goals
Safety	Extends in all directions beyond passive and active barriers.	Protect assets and personnel from explosions.
Approach	Installation boundary to a point just before the ID checkpoint.	Reduce speed, sort vehicles, provide stacking room, identify potential threats.
Access Control	A point just before and after the ID checkpoint.	Identify vehicles and personnel; provide surveillance, random inspection, visitor processing, and rejection capabilities.
Response	A point just after the ID checkpoint to the active vehicle barriers.	Provide measures to react to and resist a threat.



Source: SDDCTEA Pamphlet 55-15

4-1.1 Approach Zone.

The Approach Zone lies between the installation boundary/entrance and the beginning of the Access Control Zone. For the purpose of traffic and security analysis, it is appropriate to consider the approach beyond the installation boundary. The Approach Zone is the interface between the off-installation road network and the access control zone, and the area where all vehicles must traverse before reaching the ID checkpoint within the Access Control Zone. Refer to Section 5-3 for Approach Zone requirements and design methodology.

4-1.1.1 Design Elements.

The Approach Zone must include design elements to support the following functions and operations:

- Reduce the speed of incoming vehicles to, or below, the design speed of the ECF/ACP.
- Perform sorting of traffic by vehicle type (e.g., sorting commercial/large vehicles or visitors into the proper lane) before reaching the inspection area or checkpoint.
- Provide adequate stacking distance for vehicles waiting for entry, especially during times of peak demand, to ensure minimal impact on traffic approaching the installation and on traffic safety operations of adjacent public highways.
- Provide the first opportunity to identify potential threat vehicles, including those attempting entry through the outbound lanes of traffic.

4-1.1.2 Size of the Approach Zone.

The length of the Approach Zone is based on available land, distance required for queuing and performing traffic sorting, and the space required to create additional lanes of traffic without queuing excessively onto adjacent public highways, based on FPCON Bravo+ conditions. The design must also support measures that may be needed during higher FPCON levels, the use of RAMS at lower FPCON levels, and the temporary placement of traffic barriers as specified in the Installation AT Plan to constrain and slow traffic. Space may also be required to support speed management techniques to mitigate high-speed threats.

4-1.2 Access Control Zone.

The Access Control Zone is the central part of the ECF/ACP and includes guard facilities and traffic management equipment used by the security forces. The Access Control Zone begins at the turn around prior to the ID check and extends to the end of the turn around/rejection lane immediately after the ID check area. The design of the Access Control Zone must be flexible enough to ensure the infrastructure can support future inspection demands, access control equipment, and technologies. Refer to Section 5-4 for Access Control Zone requirements and design methodology.

When designing the Access Control Zone, evaluate impacts to process the following types of traffic depending on the intended functions of the ECF/ACP:

- Pedestrians
- Bicycles
- POV of authorized personnel
- Government vehicles
- Visitor vehicles
- Military convoys
- Delivery vans, commercial/large vehicles/trucks, and buses
- Construction Equipment/Oversized vehicles

4-1.2.1 Typical Operations in the Access Control Zone.

Access control zone procedures must include manual and automated actions to:

- Verify vehicle identity
- Verify personnel identity
- Conduct surveillance of the vehicle and its contents
- Conduct random or complete inspections of the vehicle and contents

Visitor and/or vehicle passes must be issued at a centralized visitor control center in the Approach Zone.

4-1.2.2 Inspection and Control of Vehicles.

The frequency of complete inspections is dependent of the FPCON level, the use of RAM, or the suspicions raised from general surveillance. Design inspection areas to accommodate one or more vehicles requiring detailed inspection. The number of inspection areas must be determined by the anticipated number of vehicles to be inspected during RAM or elevated FPCON levels. Generally, inspections take approximately 2 to 5 minutes. Consider monitoring and control of both inbound and outbound traffic. At high FPCONs, installations may conduct vehicle checks or check visitor passes as personnel are leaving the installation.

If a vehicle is denied entry during identification checks, the access control zone must have room for that vehicle to be re-directed to exit the installation. Traffic arms can be used to control traffic when a vehicle is being rejected from the ECF/ACP. Random and complete inspections must be done in the access control zone but not in the travel or ID Check lanes open for processing. Pull off alternate vehicle inspection area should be provided immediately after the ID check area to accommodate vehicles identified for search or other assistance.

4-1.2.3 Support for Automation.

In addition to supporting manual procedures, design of the Access Control Zone may need to accommodate automated identification equipment /entry (AIE) systems. To use automated systems, vehicles will need to be channeled to the proper locations. Design automated operations to mimic current procedures, which usually include identification of personnel and sometimes their vehicles.

Where the automated system is known, design the Access Control Zone to provide the required number of processing lanes and necessary infrastructure on the ID check islands to support the system. If the exact type of automated equipment and procedures used for vehicle or personnel identification is unknown, provide a flexible layout on the ID check islands where the electrical power, data and communications infrastructure is installed to support any existing or future installation of an automated system with limited disruption to operations of the ECF/ACP.

4-1.2.3.1 **Navy Automation.**

Appendix B provides information on the equipment, connectivity, and system schematic used for the Navy's Automated Vehicle Gate.

4-1.2.3.2 **Army Automation.**

Appendix C describes the Army's Automated Installation Entry program. Specific information must be acquired from the Product Manager for Force Protection Systems (PM-FPS).

4-1.3 **Response Zone.**

The Response Zone is the area extending from the end of the Access Control Zone to the final denial AVB. The Response Zone defines the end of the ECF/ACP. Design the Response Zone so that the security forces have time to react to a threat, operate the AVB, and close the ECF/ACP if necessary. When inbound and outbound travel is separated by a median, the response zone is measured from the trailing end of the last point of inspection or turn around/denial/exit roadways to the final denial AVB. When inbound and outbound travel is not separated by a median the Response Zone is measured from the trailing end of the inspection roadway (end of turn around/rejection lane immediately after ID check area) to the final denial AVB. Refer to Section 5-5 for Response Zone requirements and design methodology.

4-1.4 **Safety Zone.**

Consider the effects an explosion may have on nearby DoD personnel, buildings, or assets. The safety zone extends from the passive vehicle barriers in all directions to protect installation personnel from an explosion at the within the ECF/ACP corridor. Refer to UFC 4-010-01 for information on safety zone/stand-off distances at entry control facilities/access control points. The minimum explosive weights in UFC 4-010-01 apply to personal operating vehicle (POV) and Commercial vehicle ECF/ACP unless increased by other Service or COCOM policy. There is no required minimum antiterrorism standards for non-DoD personnel, buildings, or assets outside the installation and adjacent to the safety zone. Consider in the development of the safety zone any exclusion zones, which may be required to minimize radiation exposure for inspection systems. For explosive threats above the minimum antiterrorism standards see UFC 4-020-01.

CHAPTER 5 DESIGN GUIDELINES

5-1 INTRODUCTION.

The following design considerations are provided for primary and secondary ECFs/ACPs. For Commercial/Large Vehicle Inspection, follow the additional guidelines in Chapter 6.

5-2 GENERAL LAYOUT AND DESIGN GUIDELINES.

This section reviews the general layout and design guidelines for the various zones of an ECF/ACP. Further details concerning specific elements are provided in later sections.

5-2.1 Containment and Control of Vehicles.

The design of an ECF/ACP must ensure that vehicles are contained through an arrangement of passive and active vehicle barriers (AVB). AVBs require some action, either by personnel, equipment, or both, to prevent entry of a threat vehicle. Passive vehicle barriers are used to direct and channel the flow of traffic in the desired direction.

DoD approved passive and AVB systems are designed based on their capacity to stop two threat vehicles, a four door full size sedan and a 7.5 ton single unit truck. The characteristic of these two vehicles will be used to design the containment and control of threat vehicles within the ECF/ACP safety zone. However, the design basis threat may also be determined by a site-specific threat assessment or specified by the installation commander with respective service approval. In these cases the service or agency identified threat vehicle and/or barrier capacity must be considered baseline. Some services may establish minimum barrier capacities or specify threat vehicles for primary and secondary ECFs/ACPs. The velocity of the threat vehicle will be determined based on vehicle characteristics and the roadway layout. The allowable penetration following impact must be based on site considerations and the proximity of inhabited facilities or high value assets. Further information concerning design and specification of active and passive vehicle barrier systems is provided in UFC 4-022-02.

5-2.1.1 Perimeter Fence and Gate.

The ECF/ACP typically begins at the installation perimeter. In most cases, the perimeter is defined and secured with a fence. Each ECF/ACP must have a gate enabling the ECF/ACP to be closed at the installation perimeter when not in use. This gate must maintain an equivalent level of security as the adjacent fence/barriers. In addition, the gate must have signage and retroreflectivity as detailed in SDDCTEA Pamphlet 55-15 and Manual on Uniform Traffic Control Devices (MUTCD) and the Department of Defense (DoD) Supplement To The National Manual on Uniform Traffic Control Devices.

5-2.1.2 Vehicle Containment Within the Roadway.

Vehicle containment within the roadway is necessary to prevent inbound vehicles from unauthorized access and must extend from the installation perimeter to the final denial AVB to be effective. Passive vehicle barriers must encompass a contiguous perimeter around the ECF/ACP, with the final denial AVBs completing the containment. Arrange barrier to ensure that a vehicle will not circumvent the ECF/ACP once the vehicle has entered.

5-2.1.2.1 Passive Vehicle Barriers.

Passive vehicle barriers utilized must be tested products listed on the DoD Anti-Ram Vehicle Barrier List.

Consider the potential debris hazard produced by passive vehicle barrier systems exposed to a blast during an attack and the effect on any nearby buildings or assets. Further information concerning barrier debris minimization is provided in UFC 4-022-02. The aesthetics and design of the barrier system should be consistent with the installation's exterior architectural plan and the surrounding architectural and landscape features. Breaks in the passive vehicle barrier system of the ECF/ACP must not exceed 3 feet (0.9 m) in width for traffic having a 90-degree approach and 4 feet (1.2m) in width for traffic paralleling the barrier. The location and installation of passive vehicle barriers must conform to the requirements of the American Association of State Highway and Transportation Officials (AASHTO) *Roadside Design Guide* for objects placed near roadways. All passive vehicle barriers installed within the clear zone must meet the requirements of AASHTO's Manual for Assessing Safety Hardware (MASH) approved for crash safety.

5-2.2 Personnel Protection.

Design the ECF/ACP to enhance safety of the security personnel operating in the access control zone. All ECF/ACP facilities, or other manned posts, must be afforded crash protection (from traffic in either direction). Passive vehicle barriers such as bollards, reinforced concrete walls or knee-walls, or crash cushions must be used to protect personnel standing on the traffic islands; however, these elements must meet clear zone requirements as detailed in SDDCTEA Pamphlet 55-15 and AASHTO Roadside Design Guide.

An example of a barrier system would be a short, concrete bull nose wall with impact attenuator at the appropriate location on the traffic island. Traffic islands separating directions of travel require protective devices on both sides of the island. Traffic islands separating similar directions of travel only require protective devices on the leading edge of the island. By elevating the personnel on an island, they are protected from accidental impact during identification checks. The bull nose with impact attenuator is designed to protect the personnel from potential injury caused by a vehicle leaving the roadway or lane. This type of system not only enhances the safety of security personnel, but it also offers the personnel cover in the event of an attack. See SDDCTEA Pamphlet 55-15 for further information concerning barriers and crash

cushions. The height of crash protection barriers needs to be reviewed closely to assure there are no conflicts with traffic or guard sightlines.

5-2.3 Capability to Reject Unauthorized Vehicles.

Unauthorized vehicles may enter the ECF/ACP and the design must support rejecting these vehicles as follows:

- Provide turn around/denial/exit points as shown in Figure 2-1 through Figure 2-4; one located before the ID check area and one located immediately after the ID check area. See Access Control Zone Requirement and Guidelines for additional information.
- Implement operating procedures and consider the use of traffic arms to halt traffic such that rejected traffic can be safely directed to the turn around/denial/exit point.

Design turn around/denial/exit points in accordance with SDDCTEA Pamphlet 55-15 and with the following characteristics:

- Design turn around/denial/exit points for the largest vehicle identified in the traffic engineering and safety study that is expected to enter the installation on a regular basis, but not less than a single unit vehicle (SU).
- ECFs/ACPs designed for smaller vehicles (POV) must be capable of rejecting a commercial vehicle (AASHTO Wheel Base (WB)-67) before the post ID check area due to the likelihood of commercial vehicles attempting to enter the installation through POV ECPs/ACPs.
- If space is unavailable to support a single movement, consider the impact on the flow of traffic while a vehicle makes a three-point turn or similar movement. If the impact is infrequent or acceptable, or large vehicles are not expected at the ECF/ACP, then the required space can be minimized.
- Sign the turn around/denial/exit area per the Manual on Uniform Traffic Control Devices (MUTCD) and the DoD Supplement to the MUTCD.

5-2.4 Traffic Considerations.

The effect of an ECF/ACP design on the surrounding roadways and intersections is of paramount concern. If congestion occurs, and there is inadequate vehicle processing and stacking distance, the queues may extend into adjacent intersections or cause congestion on feeder roads. Find additional guidance in SDDCTEA Pamphlet 55-15.

5-2.4.1 Design Capacity.

The design capacity is based on the peak hour traffic demand volume that the ECF/ACP handles without unreasonable congestion and/or negatively impacting the surrounding local roadway system. Consider both current and future traffic demands. Since some disruption in the level of service is expected at high FPCON(s) (Charlie or Delta), design the ECF/ACP to minimize congestion at FPCON Bravo and below.

5-2.4.2 Traffic Congestion.

At FPCON Charlie and Delta, some congestion may occur but this is sometimes offset by the installation reducing the population seeking to enter the installation to mission essential personnel only. Where possible, minimize the congestion during FPCON Charlie or Delta. If the final capacity achieved at an ECF/ACP is below the expected peak hour traffic volume, congestion can be reduced by implementing staggered work hours, encouraging carpooling, adding lanes, and/or tandem processing (no more than two) guards per lane.

5-2.4.3 Lane Requirements.

The number of lanes planned for an ECF/ACP must be sufficient to handle the expected volume of traffic, especially during times of peak demand such as morning rush hour and must consider both manual and automated operations (handheld, structurally mounted). Additional guidance can be found in SDDCTEA Pamphlet 55-15.

Provide a number of ID Check lanes sufficient to process the traffic volume demand identified in the traffic engineering and safety study. Analysis must consider the length of the queue and the number of ID Check lanes required to preclude off-installation impacts to roadways.

5-2.4.4 ECF/ACP Smart Decision Evaluator.

The ACP/ECF SMART Decision Evaluator was developed to provide perspective on the issues associated with each approach to ECF/ACP vehicle processing so that when combined with practical knowledge, decisions are made with full awareness of the ramifications. The ACP/ECF SMART Decision Evaluator has been designed to require a minimal amount of data entry when determining lane requirements.

The SMART Decision Evaluator:

- Provides comprehensive perspective
- Provides awareness of ramifications through costs and associated risks
- Is derived from common engineering, security and economic principals

Recommend utilizing the ACP/ ECF SMART Decision Evaluator (or other methods to accomplish the same results) to evaluate the existing, short-term and long-term impact of security, manpower, automation, and roads and traffic for DoD developed ECF/ACP. For additional information visit the U.S. Army's Transportation Engineering Agency website:
https://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/TrafficEngineeringBranch/Pages/default.aspx

5-2.5 Geometric Design.

Geometric design is dependent on design speed, roadway classification, and design vehicle. Also, the type of ECF/ACP, space available, and traffic volume may impact design. This section is intended to provide basic guidance on general design features.

Design criteria can be classified into the following areas: cross-section features; horizontal curvature and alignment; and vertical curvature and clearances.

5-2.5.1 General Guidelines.

In general, the design criteria for inbound and outbound travel lanes must be based on the design vehicle (identified from the traffic engineering and safety study) and the speed at which the design vehicle is expected to travel. For roadways leading to/from inspection areas, visitor centers, and other facilities within the ECF/ACP, the design vehicle dimensions and maneuverability considerations must dictate the design. An example of maneuverability of the design vehicle is the minimum inside turning radius of the vehicle.

Consult with AASHTO's *A Policy on Geometric Design of Highways and Streets, Roadside Design Guide*, SDDCTEA Pamphlets 55-15 and 55-17, and service guidance regarding geometric design to include the following elements. Use the more stringent criteria. See Appendix A for references.

- Design guidelines and criteria
    - Design speed
    - Roadway classification
    - Design vehicle
- Cross-sections
    - Travel Way and Lane Width
    - Curb and gutter
    - Shoulders
    - Clear zone
    - Medians and traffic islands
- Turning movements and turning radii
    - Turn around/denial/exit points
- Horizontal alignment
    - Horizontal curves
    - Lane widening
    - Horizontal Tangents and Transitions
    - Horizontal Sight Distance
- Vertical alignments
    - Vertical clearance
    - Vertical curvature
- Other geometric elements
    - Transition tapers
    - Drainage
    - Landscaping

5-2.6 Speed Management.

The control of vehicle speeds at ECFs/ACPs is a common concern. The roadway geometry and passive vehicle barrier alignment will contribute in limiting the maximum attainable speed of threat vehicles. Speed management for threat speed mitigation must include horizontal curvature designed in conformance to SDDCTEA Pamphlet 55-15 along with national and state roadway design criteria.

To control the speed of non-threat vehicles, other options, such as traffic calming and signing can be considered. The use of traffic calming devices must be evaluated by a traffic engineering and safety study.

5-2.6.1 In-Roadway Barrier Guidance.

Do not design for in-roadway barriers, bollards, and other fixed objects as speed management techniques for threat speed mitigation at new ECFs/ACPs. In-roadway barriers and bollards may be utilized at existing ECFs/ACPs to obtain additional response time if they are installed and delineated as prescribed in SDDCTEA Pamphlet 55-15 and if it is demonstrated that the lane reductions do not unduly delay traffic or cause back-up into the public throughway or create other unsafe situation.

5-2.6.2 Speed Hump/Table Guidance.

Speed humps and speed tables are not for threat speed mitigation. Speed humps and speed tables may be used for speed management and to gauge motorist intent in the approach zone only. If used, provide speed humps and speed tables in accordance with the applications and profiles detailed in SDDCTEA Pamphlet 55-15 and per FHWA and ITE guidelines.

5-2.7 Traffic Control Devices.

All traffic signals, signs, and pavement markings must be in conformance with the MUTCD/ DoD Supplement to the MUTCD, SDDCTEA Pamphlets 55-15 and Pamphlet 55-17 as well as applicable state, local, and OCONUS requirements.

The above indicated documents provide guidance on the following:

- Signs and Signals
    - Requirements
    - Types
    - Sizes and Legibility
    - Retroreflectivity requirements
- Speed Limit Signing
- Guide Signing
- Pavement Markings
    - Longitudinal

  - Transverse
- Traffic cones
- Barrier delineation

5-2.8 Multimodal and Alternative Transportation Considerations.

The use of transit as well as pedestrian and bicycle activity must be considered while analyzing the conditions at an existing ECF/ACP or developing a new ECF/ACP. All modes must be accommodated to the appropriate level at ECFs/ACPs.

Accommodating alternate modes of transportation can help reduce the demand of vehicles seeking entry during peak periods.

5-2.8.1 Pedestrian Access.

When pedestrian access control is required, ensure that proper sidewalk and safety provisions direct pedestrian traffic to the Access Control Zone and separate it from vehicular traffic. Design pedestrian access to ensure security personnel can maintain visual contact with the pedestrians as they approach the ECF/ACP. Plan sidewalks to integrate into the existing site layout and accommodate new facilities. Breaks may be provided in the passive vehicle barriers surrounding the ECF/ACP to allow pedestrian access to the ECF/ACP. Provide sidewalks with a minimum width of 4 feet (1.2 m). Provide crosswalks with a minimum 6 feet (1.8 m) wide. Design elements for pedestrians must be compliant with Architectural Barrier Act (ABA) and AASHTO *A Policy on Geometric Design of Highways and Streets* requirements and to the requirements of Public Rights of Way Guidelines (PROWAG). PROWAG is endorsed by SDDCTEA and FHWA and provides additional guidance of the construction of ABA compliant facilities on or adjacent to roadways.

Where turnstiles or other pedestrian controls are utilized they must either be manned/controlled/metered by guard personnel or equipment that must be included to validate credentials. Other considerations in the selection of turnstiles or similar access control devices include the control of potential tailgating and the likelihood that personnel will have equipment or luggage, which may require additional space in the turnstile. Consider if pedestrian inspection areas will be required based on pedestrian demand and any requirement to inspect personnel and packages. See UFC 4-022-03, *Security Fences and Gates* for additional guidance on personnel gates including turnstiles.

5-2.9 Parking Guidance.

Incorporate parking in the design of the ECF/ACP to support security vehicles, visitors and vehicles associated with shift changes of security personnel. Where an ECF/ACP includes a visitor control center, sufficient parking will be necessary to support this facility. The number of parking spaces to provide should be based on the methodology outlined in SDDCTEA Pamphlet 55-15 and must meet ABA requirements.

Locate spaces to minimize the walking distance and potential interference with moving or parked vehicles. Implement UFC 4-010-01 as applicable.

5-2.10 Landscaping and Aesthetics.

ECPs/ACPs provide the first public impression of the installation. They should present the proper appearance for visitors, employees, and military personnel. The layout, landscaping, and architecture of the facilities are factors in this image. The architectural design of the facilities should comply with the installation or command's architectural design standards.

Include line-of-sight considerations in the landscape design. It is important that the line-of-sight of security personnel through the ECF/ACP not be impeded. This includes consideration of overwatch positions, which require an adequate and acceptable line-of-fire.

5-3 APPROACH ZONE REQUIREMENTS AND GUIDELINES.

Design the approach zone to accommodate design traffic demand without off-installation impacts per the direction previously indicated in the traffic engineering and safety study section of this document.

Base the layout of the approach zone on the following guidelines:

- Provide an entry gate that joins the installation perimeter that fully contains the ECF/ACP.
- Provide a passive vehicle barrier system that tie into the entry gate and the access control zone passive vehicle barrier system.
- Maximize the length of the approach zone to provide optimal stacking distance for the traffic queue.
- Reversible lanes can increase throughput and flexibility where space is unavailable for additional lanes.
- Sort traffic by vehicle type. For example, use the farthest right lane for truck traffic. Rejection of these vehicles requires additional space for their larger turning radii.
- Wrong way detection must be considered for all the outbound lanes.
- ECFs/ACPs must have the minimum ability for a wheel base (WB)-67 vehicles to be rejected prior to the identification (ID) check area for a POV only ECF/ACP. ECFs/ACPs that accept commercial vehicles (combined POV/truck gate or exclusive truck gate) must provide for a WB-67 vehicle to be rejected. OCONUS projects must have requirements similar to CONUS. OCONUS projects must provide a means to reject a WB-67 or OCONUS equivalent vehicle prior to the ID check area.

5-4 ACCESS CONTROL ZONE REQUIREMENTS AND GUIDELINES.

Design the access control zone to manage authorized vehicles and personnel, to reject unauthorized vehicles, and minimize the adverse impacts on traffic.

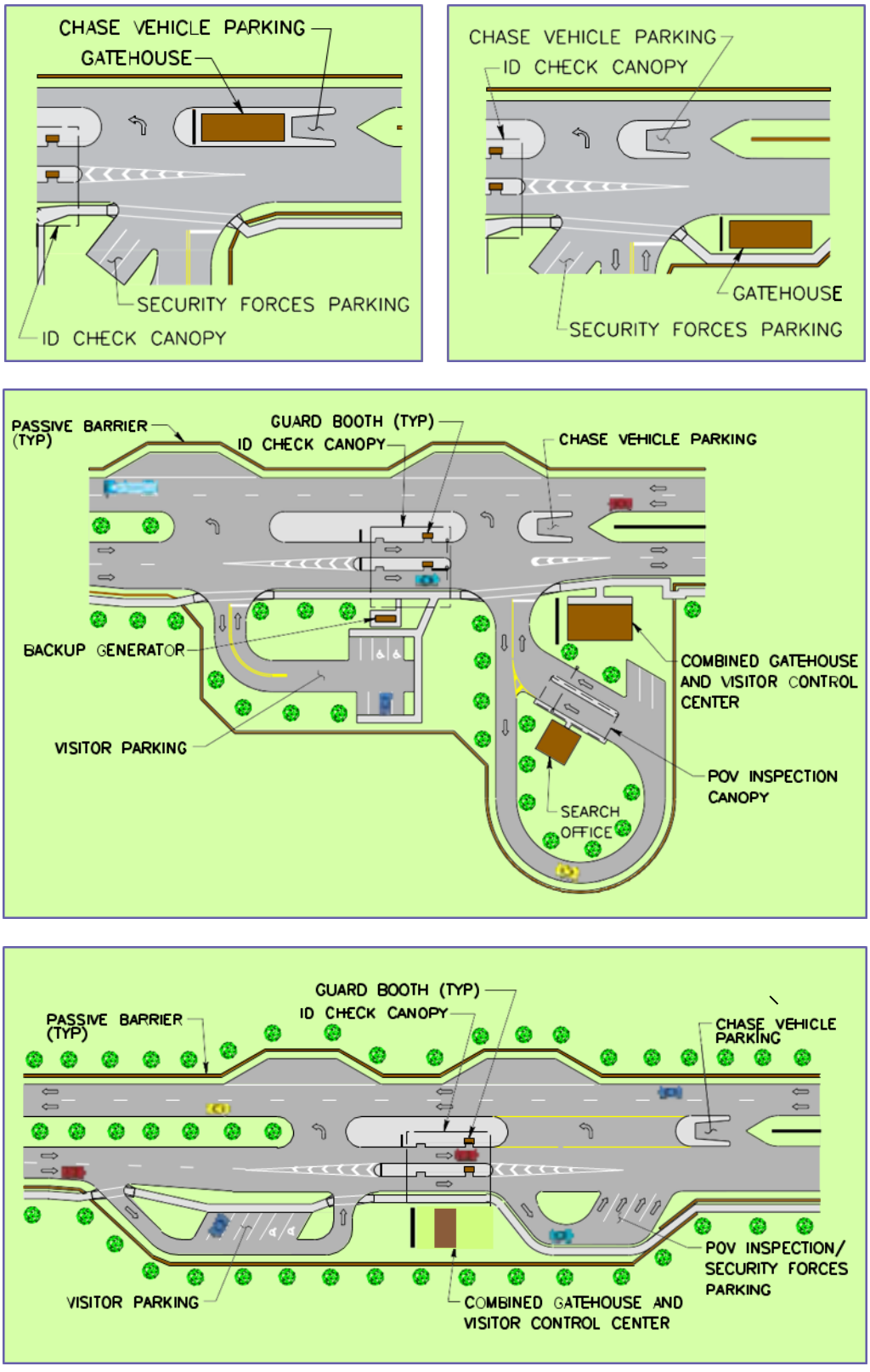
Base the layout of the access control zone on the following guidelines:

- Provide the capability to process visitors. Visitor processing must be conducted prior to entry into the installation.
- Provide an Identification (ID) check area where guards and/or automated equipment validate drivers and vehicle occupant's identifications. Provide infrastructure to support identification and search areas for the inbound lanes.
- Provide a passive vehicle barrier system that ties into the approach zone passive vehicle barrier system and the response zone passive vehicle barrier system that presents a fully contained ECF/ACP. If the site cannot accommodate an approach zone as described previously, provide a passive vehicle barrier system tied into the installation perimeter barrier system and the response zone passive vehicle barrier system that presents a fully contained ECF/ACP.
- Provide raised curbed islands between all inbound lanes or outbound lanes designed as reversible lanes in the ID check area. Islands must be 50 feet (15.25m) in length for single processing and 75 feet (23m) in length for tandem processing. Consider providing curb cuts or a step down area for security personnel at ID Check positions but make sure roadway drainage, equipment installation, and safety of the guard is not compromised. Cover all inbound lanes in the main ID check area and all search areas as required with an overhead canopy to protect against inclement weather, facilitate identification and inspection procedures, and provide a platform for lighting and Closed Circuit Television (CCTV). Maintain a minimum 3 feet (0.9m) setback from the face of curb to the guard facilities on the island. Must also include, as a minimum, a 1 foot (0.3 m) horizontal clearance between face of traffic island curb and guard facility roof, gutters or any other objects protruding from the guard facility. Maintain a minimum lateral clearance of 2 ft (610 mm) in the access control zone to allow security personnel to pass between fixed objects and obstructions and the roadway. See Figures 5-11 and 5-12 for additional details.
- As shown in Figures 2-1 through 2-4 and 5-1, it is recommended that two turn around/denial/exit points be provided. One occurring prior to the central ID check area guard booth and the other occurring after this point but prior to or within an area assessable from the gatehouse. Where only one turn around/denial/exit point is possible, the rejection should occur following the ID check area.
- Provide a gatehouse for each ECF/ACP. The gatehouse serves as the central control center for the ECF/ACP by providing shelter for security personnel and controls for the vehicle barriers, traffic control devices, access controls, lighting, and surveillance equipment. Where low numbers of visitors

are expected, the visitor center may be combined with the gatehouse to reduce the ECF/ACP footprint and maximize manpower; however, there must be a ballistic rated separation between the guards and the portion of the building accessible to the public. The gatehouse can be centrally located on a median, or may be positioned to the side of the ECF/ACP. See Figure 5-1 for gatehouse location options.

- Provide a vehicle search area(s) that is located with the access control zone, easily accessible from the ID check area, sized in accordance with the search volumes identified in the traffic engineering and safety study and provides an enclosed shelter for vehicle occupants removed from vehicles during search operations.
- Provide pull off alternate vehicle inspect area immediately after the ID check area to accommodate vehicles identified for search or other assistance. This alternate inspection area will not have the same requirements of a dedicated vehicle inspection facility.
- Provide guard booths for each entry lane within the ID check area.
- Where reversible lanes are utilized ensure that all MUTCD/DoD Supplement to MUTCD requirements are met.

Figure 5-1 Gatehouse Location Options



5-5 RESPONSE ZONE REQUIREMENTS AND GUIDELINES.

5-5.1 Layout Guidelines for the Response Zone.

Design the response zone with a sufficient length to provide adequate reaction time, safety time and deployment time in response to the applicable threat. Provide AVBs at the termination of the ECF/ACP to provide the capability to stop threat vehicles from gaining entry to the installation. The necessary length of the response zone and location of the final denial AVBs is based on the provision of adequate response time.

5-5.1.1 Determining Length of Response Zone.

The length of the response zone is calculated based on the velocity of the threat vehicle, the subsequent rate of acceleration, and the required response time. Response time is the time required for complete activation of the AVBs once a threat is detected. This implies the distance required to provide an adequate response time is measured from a starting position and velocity where threat can be assumed detected ,i.e., assessment of the threat, has already occurred. The location of the threat vehicle when first detected is based on the threat scenario and site plan. The rate of acceleration is dependent on the type of vehicle. Generally, the acceleration capabilities of threat vehicles are known.

The length of the response zone can be minimized, or the available response time maximized, by using speed management to control the velocity of vehicles as they travel through the approach and response zones. Also, by reducing the response zone length, there is reduction in the site area required for the ECF/ACP. Implementation of speed management measures are most effective when installed within the response zone because these measures are effective against all four threat scenarios indicated below.

5-5.1.2 Threat Scenarios.

The length of the response zone determines the placement of the final denial AVBs. AVBs must be installed on all inbound and outbound lanes in the response zone to defeat all threat scenarios.

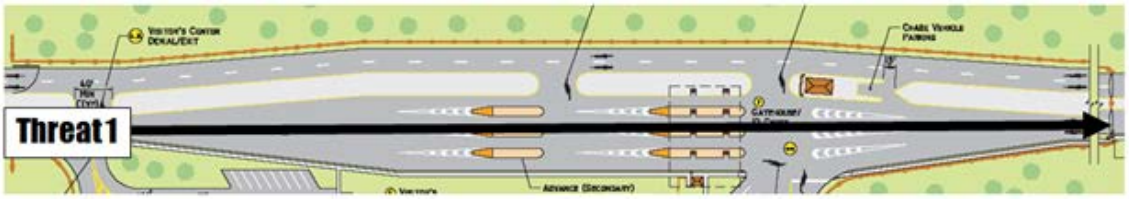
Consider all scenarios when designing the Response Zone, determine which scenario governs, and verify the adequacy of the response time and AVB selected. ECFs/ACPs must be designed to defeat the following four threat scenarios as a minimum.

5-5.1.2.1 Vehicle Threat Scenario #1.

Vehicle Threat Scenario #1 - Threat vehicle enters the ECF/ACP in the inbound or outbound lane(s) at the maximum speed attainable at the ECF/ACP entrance and then immediately accelerates at its maximum acceleration rate through the ECF/ACP. This scenario often includes either or both wrong way detection or over speed detection used to alert the ECF/ACP personnel of the threat and establishes the point within the

ECF/ACP in which the threat is detected. See Figure 5-2 for a graphic representation of this threat scenario.

Figure 5-2 Vehicle Threat Scenario #1 Diagram

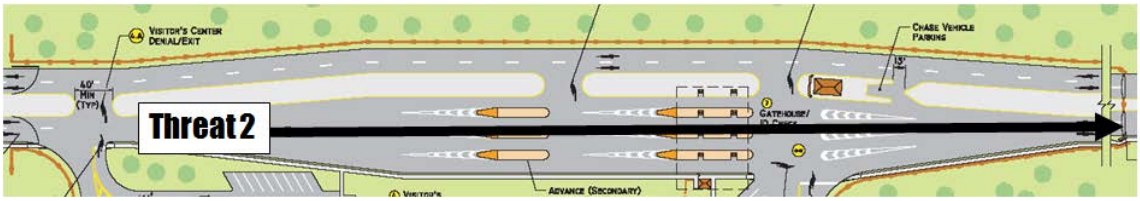


5-5.1.2.2 **Vehicle Threat Scenario #2.**

Vehicle Threat Scenario #2 - Threat vehicle enters the ECF/ACP in the inbound or outbound lane(s) at or under the posted speed limit and then, later at some point farther in the approach zone, accelerates at its maximum acceleration rate through the rest of the ECF/ACP. This scenario often includes overspeed detection to establish the starting point and the initial velocity of the threat vehicle. See Figure 5-3 for a graphic representation of this threat scenario.

Note that 'some point' must be interpreted as being the worst case threat delay time from point of detection to Active Vehicle Barrier (AVB) location(s) in the response zone. If multiple zones of overspeed detection are utilized the analysis will include the worst case situations for each overspeed zone.

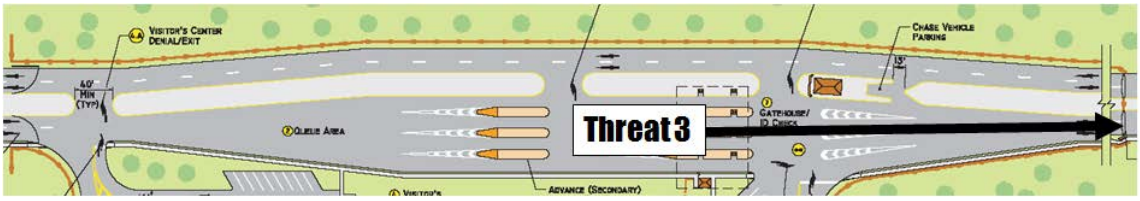
Figure 5-3 Vehicle Threat Scenario #2 Diagram



5-5.1.2.3 **Vehicle Threat Scenario #3**

Vehicle Threat Scenario #3 - Threat vehicle attempts to covertly enter the ECF/ACP, but is detected and denied entry by guards at the ID Check Area. Vehicle driver then defies guards and accelerates at its maximum acceleration rate through the rest of the ECF/ACP. The initial velocity of this threat must be 25 mph. See Figure 5-4 for a graphic representation of this threat scenario.

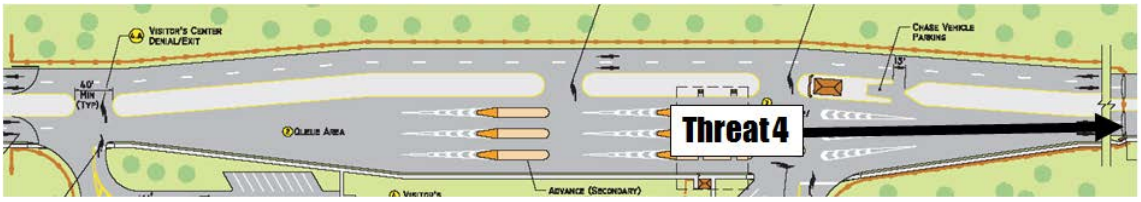
Figure 5-4 Vehicle Threat Scenario #3 Diagram



5-5.1.2.4 **Vehicle Threat Scenario #4.**

Vehicle Threat Scenario #4 - Similar to Threat Scenario 3 above, except the driver of the denied vehicle drives toward the turn around/denial/exit point or search area at the ECF/ACP speed limit of 10mph as if complying with guard instructions, but then fails to turn and instead accelerates through the rest of the ECF/ACP. The initial velocity of this threat is no less than 10 mph. See Figure 5-5 for a graphic representation of this threat scenario.

Figure 5-5 Vehicle Threat Scenario #4 Diagram



5-5.1.2.5 **Additional Threat Considerations.**

Additional threat scenarios and initial velocity conditions may be considered and analyzed if supported by a local vulnerability or threat assessment and/or variations in facilities located in atypical ECF/ACP configurations. Consult service subject matter experts for more guidance.

5-5.1.3 **Threat Vehicle Characteristics.**

- **Acceleration Rate -** Threat calculations must utilize the acceleration rate of 11.3 feet per second squared (feet/second/second - ft/s^2) (3.4 m/s^2) when determining delay
    - Where applicable the lower acceleration rates associated with trucks/commercial vehicles can be utilized for calculating the required stopping capability of passive and active vehicle barrier systems; however, lower acceleration rates are not relevant to delay calculations.
- **Deceleration Rate -** Threat calculations must utilize a deceleration rate of 24.1 feet per second squared (feet/second/second - ft/s^2) (7.3 m/s^2) when calculating delay.
- **Friction Factors -** Threat calculations must utilize a friction factor of 1.0. Calculations performed for threat purposes differ significantly from calculations typically performed for consideration of driver comfort. Lower friction factors associated with highway safety must not be used for threat calculations.
- **Maximum Velocity -** The maximum velocity of the 4,630 pounds (2100 kg) baseline threat vehicle utilized for delay calculations must be 130 mph (210

kph). This parameter must be utilized for calculation of delay unless a 'local' threat assessment and/or policy identifies a vehicle that is capable of a greater velocity. The addition of larger vehicles or trucks through mandatory incorporation of threats identified in 'local' threat assessments and/or policies must not be considered justification for use of a reduced velocity in delay calculations.

- The maximum velocity of specific threat vehicles (where local threat analysis and/or policy identifies a specific vehicle) must be obtained from manufacturer specifications.

- The maximum velocity of other vehicle classes (where a type of vehicle e.g. 'pickup truck' is identified in local threat analysis and/or policy) must be calculated through acquisition of information on at least five vehicles within the type and averaging the top speed of the lot. If significant outliers (atypical vehicles with unusual characteristics) exist they may be removed from the sample set.

- **Vehicle Mass -** The baseline threat vehicle must be a large passenger car as defined in ASTM F2656. The weight of the baseline threat vehicle is 4,630 pounds (2100 kg) and the mass is 143.8 slugs (2100 kg). This mass must be utilized for kinetic energy calculations unless a vehicle of larger mass is included due to the aforementioned incorporation of local threat analysis and/or policy.

  - **Modification of baseline vehicle threat -** The baseline threat vehicle must be adjusted in accordance with all applicable 'local' threat analysis and policy. All relevant 'local' threat analyses and policy must be reviewed and incorporated. Classification of such documentation is not justification for exclusion of baseline threat vehicle for barrier impact energy and/or delay calculations. Both the baseline vehicle and the additional vehicle(s) (identified by 'local' threat assessment and/or policy) must be analyzed and the more stringent of results must be applied.

5-5.1.4 **Threat Delay Calculation.**

Key considerations in evaluating threats include:

- The minimum acceleration rate of a threat vehicle must be no less than 11.3 ft/s^2 (3.4 m/s^2) indicated above . Initial velocities for Threats 1 and 2 will be established based on geometric constraints. The maximum velocity for unconstrained conditions (no geometric curvature or features that will limit maximum speed must be 130 mph (210 kph). 130 mph (210 kph) is also the maximum velocity for threat calculations unless a higher speed is identified by local threat assessment and/or service policy.

- On declines, the acceleration must be adjusted by the angle of the decline. An adjustment on inclines will be considered if response zone requirements cannot be satisfied.
- The threat calculations will not consider the use of speed humps, speed tables, removable bollards, etc., as a factor in reducing the velocity unless validated through an traffic engineering and safety study by the responsible service in coordination with SDDCTEA or as detailed in SDDCTEA Pamphlet 55-15.

The following equations are the primary equations used for calculating response time for an ECF/ACP. Additional instructions can be found in the UFC 4-022-02.

Formulas for Calculating Velocity

For Tangents: $V_F = \sqrt{V_O^2 + 2aL}$ For Curves: $V_S = \sqrt{(f + e)gR}$

Formulas for Calculating Time

For Tangents: $T = \frac{2L}{V_F + V_O}$ For Curves: $T = \frac{L}{V_S}$

V_F = Final Velocity
V_O= Initial Velocity
a = Acceleration
L = Distance
T= Time

V_S= Skidding Velocity
f = Coefficient of friction
e= Super elevation (%)
g= gravity coefficient (9.8)
R= radius of horizontal curvature

5-5.1.5 **Response Time.**

The response time begins the instant the threat is detected. The response time includes guard reaction time, time for barrier safety system, and barrier deployment time. The response time minimums are as follows:

- Guard reaction time must be no less than 3 seconds for Threat Scenarios #1 through #3 and a minimum of 1 second for Threat Scenario #4 based on the emergency operation controls being in the immediate vicinity of the guard personnel.
- Safety and signal sequence time must be no less than 4 seconds. Barriers collocated at neighboring intersections may require additional time as prescribed by SDDCTEA Pamphlet 55-15. Note: The four seconds is specific to the Signs and Signals safety scheme. Other approved SDDCTEA safety systems as well as other parameters (posted speed limit, barriers at an intersection, road geometry) may require a different time.
- Threat calculations must not assume less than 2 seconds for AVB deployment.

- The time for security personnel to react to a threat and initiate the response is dependent on the standard operating procedures and location of emergency operation controls.
- Barriers located on roadways with a posted speed limit in excess of 30mph may require additional safety time.
- The time assumed for the reaction of personnel must be determined based on the specific conditions and layout of the ECF/ACP; however, it must not be assumed to be less than 3 seconds as noted above. When evaluating the threat scenario associated with rejection, the reaction time for personnel may be reduced to 1 second only where the guard personnel have been notified of a specific action to be taken by an identified vehicle and guard personnel have had time to prepare for activation of AVBs.

If possible, maximize the response time by lengthening the Response Zone, which will increase the distance between the Access Control Zone and the final denial AVBs. In certain instances, there may not be enough space available to provide an acceptable response time. In those cases, it may be necessary to utilize a different barrier deployment and/or speed management strategy that must be approved by the appropriate service representative with consultation from SDDCTEA.

5-5.2 Passive Vehicle Barriers.

Provide passive vehicle barriers that tie into the access control zone passive vehicle barriers as well as the final denial AVBs presenting a fully contained ECF/ACP. The DoD anti-ram vehicle barrier list contains many tested commercial passive barriers systems. This list is available on the PDC Web site: https://pdc.usace.army.mil . Additional guidance is detailed in UFC 4-022-02.

5-5.3 Active Vehicle Barriers.

ECFs/ACPs must be provided with active vehicle barriers (AVB) to enable the ECF/ACP to be closed (fully contained) and to prevent a threat vehicle from breaching the security. Recommend either net or wedge-style AVBs for each lane as required. Drop arm/beams and bollards are not recommended as AVBs in an Emergency Fast Operation (EFO) system. Tire shredder and claw type systems are prohibited as AVBs. These devices are not capable of stopping a potential threat vehicle with any certainty or specified distance. At ECFs/ACPs, AVBs must be capable of deploying in less than 2 seconds or less. Additional considerations:

- The non-deployed AVB must not result in unsafe roadway obstruction.
- AVBs across multiple lanes (intersections or alone) must consider vehicle presence detection system vulnerabilities (i.e., a vehicle presence detection system in one lane will suppress entire system).
- Wedges are desirable for AVBs at intersections since they operate independently.

- Use separate AVBs on the inbound and outbound lanes, when there is more than one lane per given direction of travel.

5-5.3.1 Barrier Certification.

Selected active vehicle barriers (AVBs) must be included on the list of DoD Certified Anti-Ram Vehicle Barriers maintained by the U.S. Army Corps of Engineers (USACE) Protective Design Center (PDC). The DoD certified anti-ram vehicle barrier lists are available on the PDC Web site: https://pdc.usace.army.mil . Additional guidance is detailed in UFC 4-022-02.

5-5.4 Design and Safety Considerations.

The design and operation of the ECF/ACP must include provisions to protect innocent users of the ECF/ACP from operation of the AVB whether deployment is accidental, during a test, or during an actual response to a threat. AVBs must be programmed with the required response time necessary to allow the sequencing of the AVB safety system to warn motorists of the activation, and to allow non-threat vehicles within the vicinity of the AVBs to safety traverse or stop before the AVBs prior to their deployment.

AVBs must be designed, implemented, and operated in accordance with UFC 4-022-02, UFGS 34 71 13.19 *Active Vehicle Barriers,* and UFGS 34 41 26.00 10 *Access Control Point Control System.* AVB safety requirements include proper signage, signals and delineation as well as providing adequate sequencing and timing as defined in SDDCTEA Pamphlet 55-15. Specific safety elements include:

- Delineation of AVBs
- Approved Safety Schemes
- Vehicle Presence Detection

5-5.4.1 Delineation of AVBs.

AVBs must be delineated as prescribed in Department of Defense (DoD) Supplement To The National Manual on Uniform Traffic Control Devices (MUTCD) and detailed in UFGS-34 71 13.19 *Active Vehicle Barriers*. This includes:

- Red and white retroreflective markings/material that is visible on both sides of the barrier when deployed.
- Supplemental barrier lights for AVBs with limited deployable surfaces.
- Use of in-roadway lights where the previous alternatives are not suitable/feasible or additional delineation is warranted.

5-5.4.2 Recommended Safety Scheme.

A SDDCTEA Pamphlet 55-15 recommended safety scheme must be implemented. Deviations from these safety schemes must be approved by the appropriate service

representative with consultation from SDDCTEA. The recommended safety schemes are:

- Conventional AVB Traffic and Safety Control System
- AVB System Collocated at an Intersection
- AVB System Staggered at an Intersection
- High Efficiency Presence Detection System
- Stop Control Safety Scheme
- Barrier Normally Closed/Platooning Safety Scheme
- Other systems approved by SDDCTEA that provide an equivalent level of safety

Refer to SDDCTEA Pamphlet 55-15 for additional guidance, updates, and example layouts for each of safety schemes.

5-5.4.2.1 **Conventional AVB Traffic and Safety Control System.**

Proper signing, signaling, and delineation are required on the approach to the AVBs for the inbound and outbound lanes. Refer to SDDCTEA Pamphlet 55-15 for additional guidance, updates, and example layout with appropriate signs and signals.

5-5.4.2.2 **AVB System Collocated at an Intersection.**

If necessary, AVBs should be collocated to downstream intersections if the inbound traffic queue from the intersection extends through the proposed AVB location or the proposed AVB location is too close to the intersection for outbound traffic to stop safely after traversing the intersection When an AVB system is collocated at an intersection, the intersection must be signalized on all approaches and should operate a normal phasing sequence unless preempted by barrier deployment.. Refer to SDDCTEA Pamphlet 55-15 for additional guidance, updates, and example layout with appropriate signs and signals.

5-5.4.2.3 **AVB System Staggered at an Intersection.**

An alternative AVB system can be incorporated at an intersection where the additional time required for an outbound vehicle to clear the intersection cannot be met. To eliminate the additional clearance time required, outbound AVB(s) can be moved a minimum of 200 feet (61 m) away from the intersection towards the identification check area. Both the inbound and outbound AVB(s) locations must meet the minimum response time of 9 seconds. When utilizing this strategy, the outbound threat will typically govern the design of the ECF. Designers should implement additional speed management strategies and technologies on the outbound lane(s) to mitigate a wrong way threat. Refer to SDDCTEA Pamphlet 55-15 for additional guidance, updates, and example layout with appropriate signs and signals.

5-5.4.2.4 **High Efficiency Presence Detection System.**

The high efficiency presence detection scheme is a modified version of vehicle presence detection system that is no longer an option. The system uses a conventional traffic signal with detection to improve traffic flow across the AVBs.

If there are no vehicles detected, the traffic arm is down and the traffic signal is red. When a vehicle approaches, it is detected, the traffic arm rises and the signal turns green allowing the vehicle to continue. If more vehicles are following, the signal remains green, the traffic arm stays up and vehicles continue on. Once the last vehicle exits and a new vehicle is not detected after a few seconds, the traffic signal turns yellow then red and the traffic arm lowers. The high efficiency presence detection system can also operate in a normally closed configuration. The operation is similar to the prior description, except the active vehicle barrier will open prior the traffic arm opening and the active vehicle barrier will close after the traffic arm closed. Refer to SDDCTEA Pamphlet 55-15 for additional guidance, updates, and example layout with appropriate signs and signals.

5-5.4.2.5 **Stop Control Safety Scheme.**

The Stop Control Scheme is an alternate AVB strategy to signalization. It utilizes stop signs instead of signalization at AVBs to reduce the required response time and distance. By utilizing stop signs, motorists are forced to stop at the barriers eliminating the required safety time with signalization (yellow and red time). This system is useful where there is limited real estate and vehicle volumes are below 800 veh/hr/ln. Refer to SDDCTEA Pamphlet 55-15 for additional guidance, updates, and example layout with appropriate signs and signals.

5-5.4.2.6 **Barrier Normally Closed/Platooning.**

Barrier Normally Closed/Platooning Safety System requires that two sets of barriers be installed to create an “entrapment area” in each inbound and outbound lane. One of the two barriers in each entrapment area must be closed to prevent unauthorized entry. This system can be utilized when real estate for the ECF is limited and vehicle volumes are low. The distance between the two sets of barriers must be large enough to accommodate the largest vehicle served by the ECF/ACP, or it could be made larger to provide space for platooning multiple vehicles to increase vehicular throughput. Refer to SDDCTEA Pamphlet 55-15 for additional guidance, updates, and example layout with appropriate signs and signals.

5-5.4.2.7 **Exit Only.**

The Exit Only safety scheme is used at locations that will operate with the traffic leaving the installation. The system operates in the same manner as described under High Efficiency Presence Detection System for normally closed operation.

5-5.4.3 Vehicle Safety Detection.

For all options (midblock or collocated at intersections) install AVB vehicle safety detection systems immediately before and after the AVBs to prevent deployment of barriers while a vehicle is crossing. The vehicle safety detection system must be able to detect all roadway vehicles including high clearance trucks, motorcycles, and bicycles. Refer to SDDCTEA Pamphlet 55-15 for additional guidance and updates. The vehicle safety detection system must be installed in conformance with UFGS 34 41 26.00 10 *Access Control Point Control System*. The vehicle safety detection system for each lane must be tied to the Emergency Fast Operation (EFO) sequence; however, they must be capable of operating independently of one another. During EFO activation, a barrier must not initially activate if the vehicle safety detection system indicates the presence of a vehicle.

To avoid tailgating to defeat the barriers, it may be necessary to deploy the barrier as soon as that first vehicle clears the vehicle safety detection system, regardless of whether a second vehicle enters into the vehicle safety detection system. This may add a requirement for additional equipment and programing. Refer to Traffic Detector Handbook (FHWA-HRT-06-139) for additional guidance on vehicle safety detection systems.

5-5.5 Control Requirements.

AVB controls must conform to UFGS 34 41 26.00 10 *Access Control Point Control System*.

Locate the main, multi-function control panel for the AVB systems in the Command and Control (Gatehouse) location.

- The control panel must require a key for normal operation and control all lanes.
- Provide a single separate emergency activation control on the panel to initiate the EFO mode of the AVBs in all entrance and exit lanes.
- A protected, emergency activation control for the AVBs must be located, as a minimum, at each guard facility or post (channelization island, gatehouse, ID Check Island and guard booth, search area(s) and overwatch position). Controls located in the overwatch position must be capable of being secured, deactivated or removed when the position is not manned.

5-5.6 Detection Systems.

Due to the dangers associated with EFO/emergency activation of AVBs and the potential for false alarms, in no case will emergency activation of the AVBs be triggered through automatic detection and response. All AVB deployments must be based on the actions of the security personnel manning the ECF/ACP (such as push button or hand operated switches).

Detection devices such as video, radar, Light Detection and Ranging (LIDAR) and inductive loops may be utilized for the following purpose:

- Wrong-Way Detection - Wrong-way sensors can be deployed in all outbound lanes at the ECF/ACP entrance and after each turn-around to monitor for illegal outbound entry. Wrong-way detectors are allowed to be several different types per UFGS 34 41 26.00 10.
- Overspeed Detection - Detection devices in the approach zone can be used to monitor vehicles approaching at a high rate of speed. In many cases, the system can be developed to distinguish between cars and trucks. Point overspeed monitors speed at a particular location, while, continuous overspeed detection provides overspeed for the entire approach zone and access control zone. Continuous overspeed detection may be more suitable for addressing the various threat scenarios. Overspeed detectors are allowed to be several different types per UFGS 34 41 26.00 10; however, local weather conditions and topology requirements must be taken into account.
- Vehicle Presence Detection and AVB Safety - Vehicle presence and AVB safety sensors must be deployed at all AVBs to detect a vehicle immediately over the barrier. Where practical and when the vehicle presence safety scheme is utilized, redundancy must be integrated into the design by deploying multiple technologies such as loops and break beams. This will provide protection should one technology fail and will increase the likelihood that motorcycles and bicycles are detected.
- Traffic Flow Monitoring - Detection devices can be used to monitor queuing traffic at an ECF/ACP or on a neighboring roadway.

Additional guidance on detection devices is contained in SDDCTEA Pamphlet 55-15.

5-6 VEHICLE INSPECTION CONSIDERATIONS.

All ECFs/ACPs must have a process in place to conduct select inspections. Vehicle inspections are dependent on local directives and RAM, but generally take two forms:

- Random inspection
- Select inspection based on guard concern or random anti-terrorism measures

Once vehicles have been inspected, they should not have to pass through the ID check area again. The inspection area exit lane may bypass the ID check area and merge with other inbound traffic in the response zone.

5-6.1 Location of Inspection Area.

Since vehicle content inspection can be time consuming, it is important to allow the inspection to occur without impeding the flow of traffic through the ECF/ACP. To the extent possible, the inspection area should not be immediately adjacent to inbound traffic lanes. While this separation is primarily for safety reasons, some screening of the inspection procedure from public view is also desired. Appropriate obscuration features must be in place to accomplish this. Also, the inspection area will be equipped with an inspection office that is ABA compliant. At ECFs/ACPs with a visitor's center, direct access from the visitor's center to the inspection area should be provided if practical.

The inspection area can occur prior or adjacent to, or after the ID check area in the access control zone.

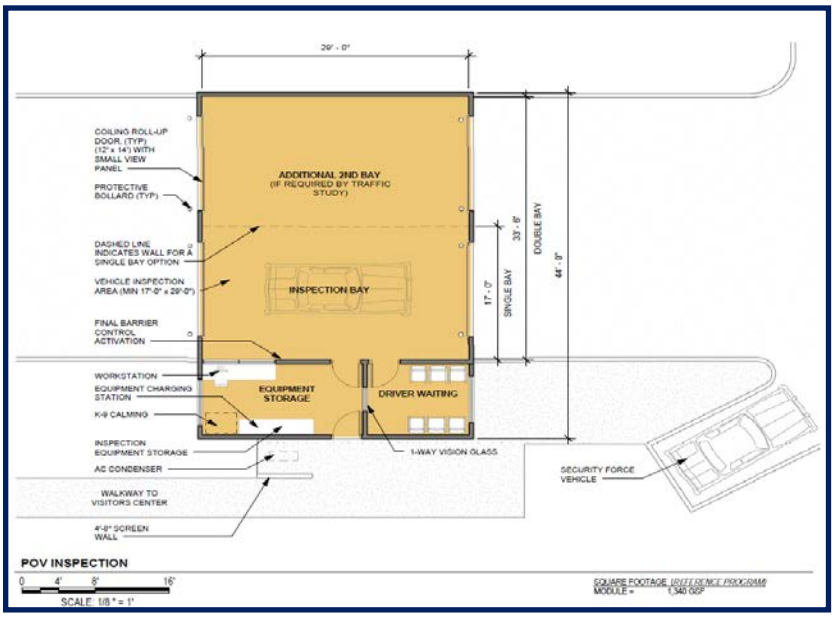
- Prior to ID Check - For advance random inspections, especially when there are numerous lanes, it is beneficial to provide advance islands for the guards to stand on as they select and direct motorists into random inspection areas and direct suspect vehicles to the inspection area. A pull-off/alternate inspection area will be provided if the typical inspection area layout cannot be provided. The pull-off area provides an area just after the ID check area where alternate inspections can be conducted, ID discrepancies addressed, or driver's questions answered. When required, include a pull-off area on the exit lane where vehicle inspections can be conducted.
- After ID Check - When inspections take place after the ID check area, the access to the inspection area needs to be as close as geometrically possible and must be within the line of sight of the guard.
- To facilitate both random and select/RAM inspections, access to the inspection area must be provided both before and after the ID check location.

If possible, design inspection facilities adjacent to the ID check area to allow bi-directional access. This permits advance random inspections as well as post ID inspections and maximizes operational flexibility.

5-6.2 Inspection Shelters.

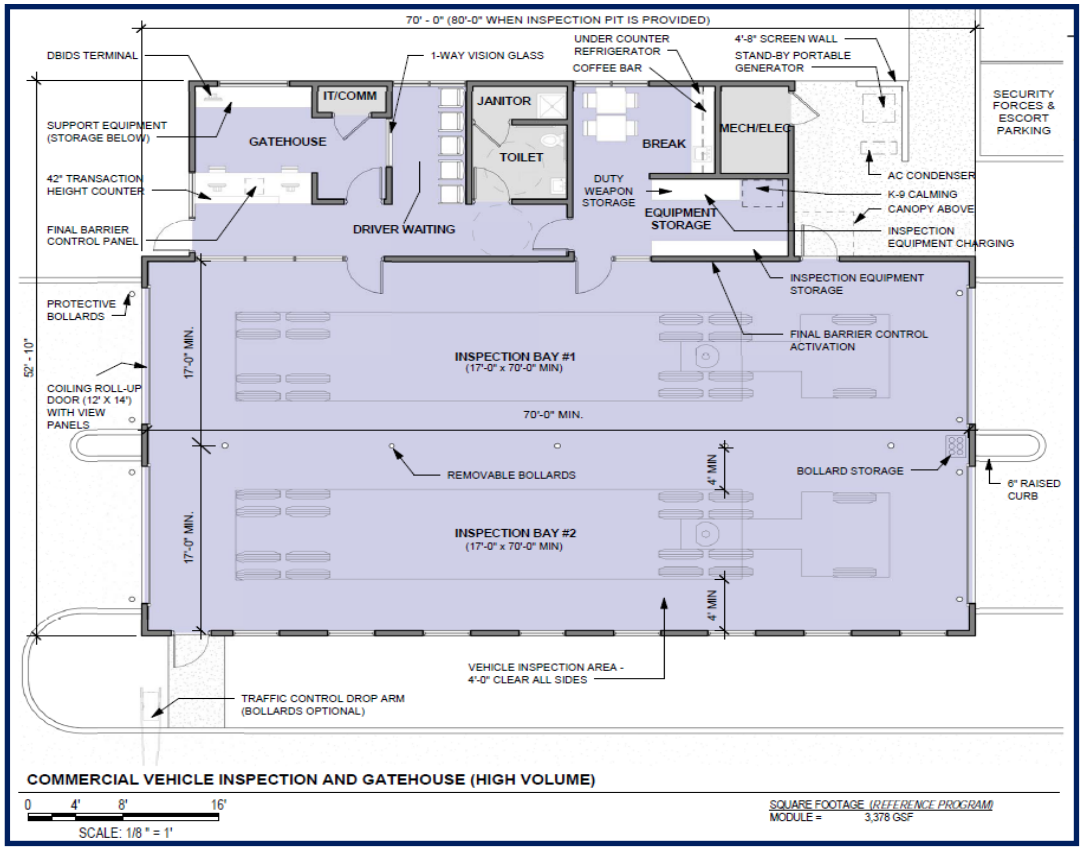
When required, include a covered inspection area. Provide sufficient seating for the number of expected occupants who will be undergoing or queuing up to undergo vehicle inspections. A small waiting area should be provided to protect vehicle occupants from inclement weather and moving vehicles. Figure 5-6 shows an example plan for a POV inspection area and shelter. For larger (commercial and large vehicle) ECFs/ACPs, an inspection office combined with a gatehouse may be considered. Figure 5-7 shows an example of a combined commercial vehicle inspection and inspection office.

Figure 5-6 Inspection Shelter and Inspection Office Example - POV



Source: Air Force Civil Engineer Center

Figure 5-7 Inspection Shelter and Inspection Office Example - Commercial



Source: Air Force Civil Engineer Center

5-6.3 Location and Support for Inspection Equipment.

Most vehicle inspections are conducted with manual procedures using tools or hand-held detectors. Provide space required to store this equipment and to conduct battery-charging operations. Other types of inspection equipment are of a more permanent nature, and require planning for their deployment.

5-7 FACILITY DESIGN GUIDELINES.

This section outlines design guidelines for the various facilities associated with an ECF/ACP. Facilities (visitor control center, gatehouse, guard booths, overwatch) at the ECF/ACP should provide a comfortable, safe working environment for security personnel. Consult with service guidelines for specific facility requirements. The basic considerations in determining the size of the facilities are:

- Number of personnel assigned during normal operations
- Usage
- Space required for electronic, electrical, and mechanical equipment, and counter or work space

5-7.1 Gatehouse, Guard Booth, and Overwatch.

Since gatehouse, guard booths and overwatch facilities are located in the immediate vicinity of the explosive threats they are trying to prevent from entering the installation; it is impractical and impossible to provide protection from the possible effects of an explosive device. In addition, the occupancy of the gatehouse, guard booths, and overwatch facilities are typically below the threshold for the requirements of UFC 4-010-01 *DOD Minimum Antiterrorism Standards for Buildings*. Therefore, typically no protective design elements are required for the gatehouse, guard booths and overwatch facilities to mitigate the effects of an explosive device. However, in some instances Service Secretary and/or Agency Head and/or Geographic Combatant Commander policy requires one or more of these building types to be hardened against a blast of a specific charge weight.

5-7.2 Visitor Control Center.

The visitor control center (VCC) occupancy may exceed the threshold for the requirements of UFC 04-010-01 and protective elements may be required.

5-7.3 Personnel Safety.

Where facilities are located near the roadway, provide a minimum platform width of 3 feet (0.9m) behind the curb. This width is the minimum necessary for security personnel to stand post adjacent to the facility, therefore additional platform width is recommended to provide additional safety through increased lateral clearance and space for security personnel carrying weapons or equipment.

5-7.4 General Requirements.

This section outlines the requirements that are common to all guard facilities.

5-7.4.1 Construction.

Design the facilities as required in UFC 1-200-01. Provide corrosion resistant materials for the guard facilities, especially pre-manufactured facilities, due to the perils of environmental exposure commonly encountered at some installations and the high visibility of these structures.

5-7.4.2 Physical Security and Protective Design.

Determine the required physical security design features in accordance with installation requirements and UFC 4-020-01*, Security Engineering Facilities Planning Manual.*

Threats that may commonly be considered include forced entry and ballistic attack. Provide ballistic protection equivalent to Underwriters Laboratories (UL) 752 Level III for all guard facilities as a minimum. Consult with COCOM/Service policy if protection from a higher threat is required. Provide this protection in the design and construction of the exterior envelope including windows, doors, walls, and other equipment. Table 5-1 provides examples of the wall thickness required for commonly encountered materials adequate for ballistic resistance against UL 752 Level III. Table 5-2 provides examples of the wall thickness required for commonly encountered materials adequate for ballistic resistance against UL 752 Level V. Additional information and guidance can be found in UFC 4-023-07, *Design to Resist Direct Fire Weapons.*

Table 5-1 Thickness of Common Materials for Resistance Against UL 752 Level III

UL 752 Level III (.44 Mag)	
Wall Material	**Wall Thickness**
Concrete Masonry (Fully Grouted)	4 in (102 mm)*
Brick	4 in (102 mm)*
Reinforced Concrete (3000 psi)	2.5 in (63.5 mm)
Steel Plate (mild)	5/16 in (8 mm)
Steel Plate (armor)	1/4 in (6 mm)

Table 5-2 Thickness of Common Materials for Resistance Against UL 753 Level V

UL 752 Level V (7.62 mm)	
Wall Material	**Wall Thickness**
Concrete Masonry (Fully Grouted)	6 in (152 mm)*
Brick	6 in (152 mm)*
Reinforced Concrete (3000 psi)	4 in (102 mm)
Steel Plate (mild)	9/16 in (14.3 mm)
Steel Plate (armor)	7/16 in (11.1 mm)

Some mechanical equipment installed in the exterior envelope of a guard facility may not be capable of providing sufficient ballistic resistance. Therefore, locate the equipment to minimize potential exposure to projectile penetration or provide ballistic hardened equipment and/or louvers. As an example, it may be prudent to install the heating, ventilating, and air conditioning (HVAC) equipment on the roof of the gatehouse or guard booth to reduce penetrations in the walls. Provide roof ballistic protection only where there are sightlines to the roof.

5-7.4.2.1 **Passive Vehicle Barrier Protection.**

Provide passive vehicle barrier protection for facilities located less than 3 feet (0.9 m) behind the face of curb when adjacent to a curbed roadway section.

Provide passive vehicle barrier protection for facilities located less than 7 feet (2.1 m) from the traveled lane when adjacent to a shouldered roadway section.

5-7.5 **Common Facility Requirements.**

5-7.5.1 **Windows and Glazing.**

Provide translucent or figured glazing per UFC 4-023-07. Glazing must limit viewing into the facility to the extent possible without restricting views out of the facility during day and night operations. The intent is to reduce the visible signature of security personnel, as seen from the outside of the gatehouse, without reducing the ability of security personnel to see out. The Illuminating Engineering Society of North America (IESNA) Handbook-10 suggests specular-reflecting, low transmission glazing at a tilted angle can be used in the windows to limit view into the guard facilities from the exterior.

Any windows provided in the overwatch positions must not interfere with the capability to respond to an attack. Therefore, any windows must be capable of being fully

opened/removed quickly or have a substantial gun port to enable unobstructed line of fire from the position.

5-7.5.2 Floors/Walkways.

The finished floor elevation must be 6 inches (152 mm) or more above grade or the adjacent walkways, unless the facility is located on a raised island. If the facility is on an island, the minimum finished floor elevation will be the elevation of the island. Provide floors and walkways with anti-skid surfaces. Anti-fatigue mats should be provided at all security personnel posts to relieve fatigue and discomfort from standing for long periods of time.

5-7.5.3 Environmental Control.

Provide heating and cooling appropriate for personnel, the electronic and electrical systems or fixtures, and the security support equipment. The HVAC requirements must be based on existing service design guidance and installation requirements. Consider protection from chemical or biological agents used during an attack based on the anticipated threats. However, due to the small size of the facility, comprehensive protection is often not feasible. To limit airborne contamination and maximize the time for security personnel to shelter in place to initiate a response, utilize protective gear, and respond to an attack. When required, design of the HVAC system to include the minimum measures outlined in UFC 4-010-01. For guard booths and overwatch positions, provide adequate storage for all CBRN personnel protective equipment.

5-7.5.4 Interior Lighting.

Interior lighting must comply with UFC 3-530-01 “Design: Interior and Exterior Lighting and Controls “and with the sustainability requirements. The interior lighting must be diffused lighting and must be provided with dimmer controls to aid with night vision and reduce the ability of those outside the guard facility to see inside. The interior lighting must be connected to the backup power source. As discussed in the IESNA Handbook-10, the illuminance inside the guard facility must be limited to the minimum required for comfortable completion of the expected tasks and functions. As indicated in Figure 29-17 of the IESNA Handbook-10, the recommended average illuminance for the gatehouse is 30 foot-candles (323 lux) on the work plane in the gatehouse. Additional recommendations from the Hanbook-10, include providing well-shielded task luminaires to avoid reflections on monitors and windows. Consider providing magenta filters for interior lighting to lessen the impact of interior lighting on the night vision of security personnel.

5-7.6 Visitor Control Center.

Most installations require one visitor control center (VCC). The visitor occupancy number is calculated by dividing the peak hourly visitor demand by the number of processors, then divided by the number of visitors processed per hour. Then add the number of security processing personnel within the building to obtain the number of personnel routinely occupying the VCC. Example: Peak hourly visitor demand of 120

visitors, divided by 2 processors then divided by 12 to represent a 5 min processing time per visitor. This equals 5 visitors. Add the 2 security personnel processing the passes plus 1 security supervisor and the routine occupancy of the visitors center is 8. This calculation is used to determine in the VCC is required to comply with UFC 4-010-01. Where appropriate, future demands and accommodations for installations with special periodic demands will be considered and evaluated based on traffic engineering study. Figures 5-8 and 5-9 shows example plans for a visitor control center. Table 5-3 provides information on the areas/elements that are typical for a visitor center. Consult with the installation/service for specific requirements.

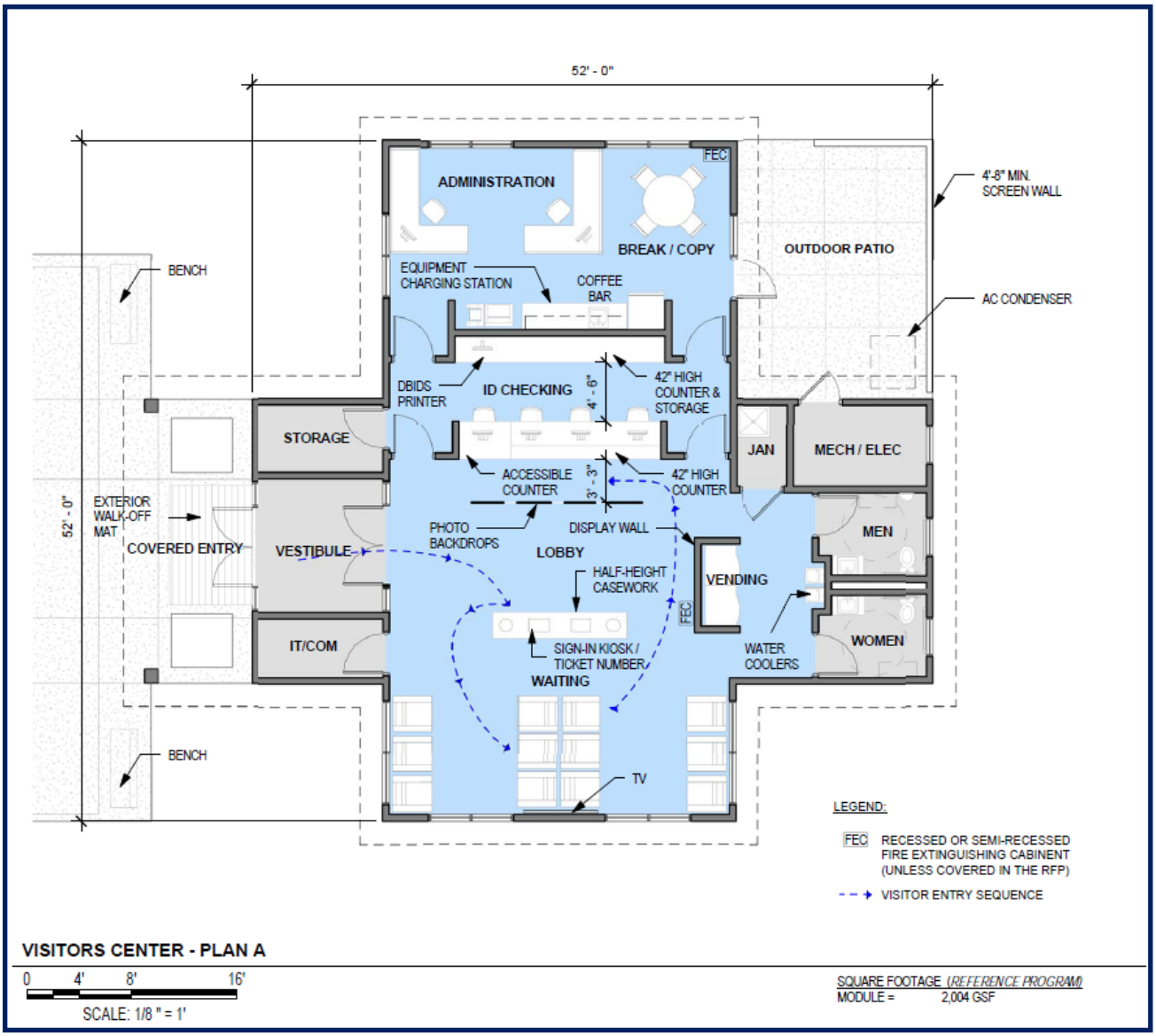
5-7.6.1 **VCC Parking.**

Adequate parking must be provided for all visitors and employees. Parking must be designed in accordance with SDDCTEA Pamphlet 55-15 and must include adequate parking based on typical peak volume. Provide employee parking based on normal operating conditions. . Refer to SDDCTEA Pamphlet 55-15 for additional guidance, updates, and example layouts.

5-7.6.2 **VCC Design and Location Considerations.**

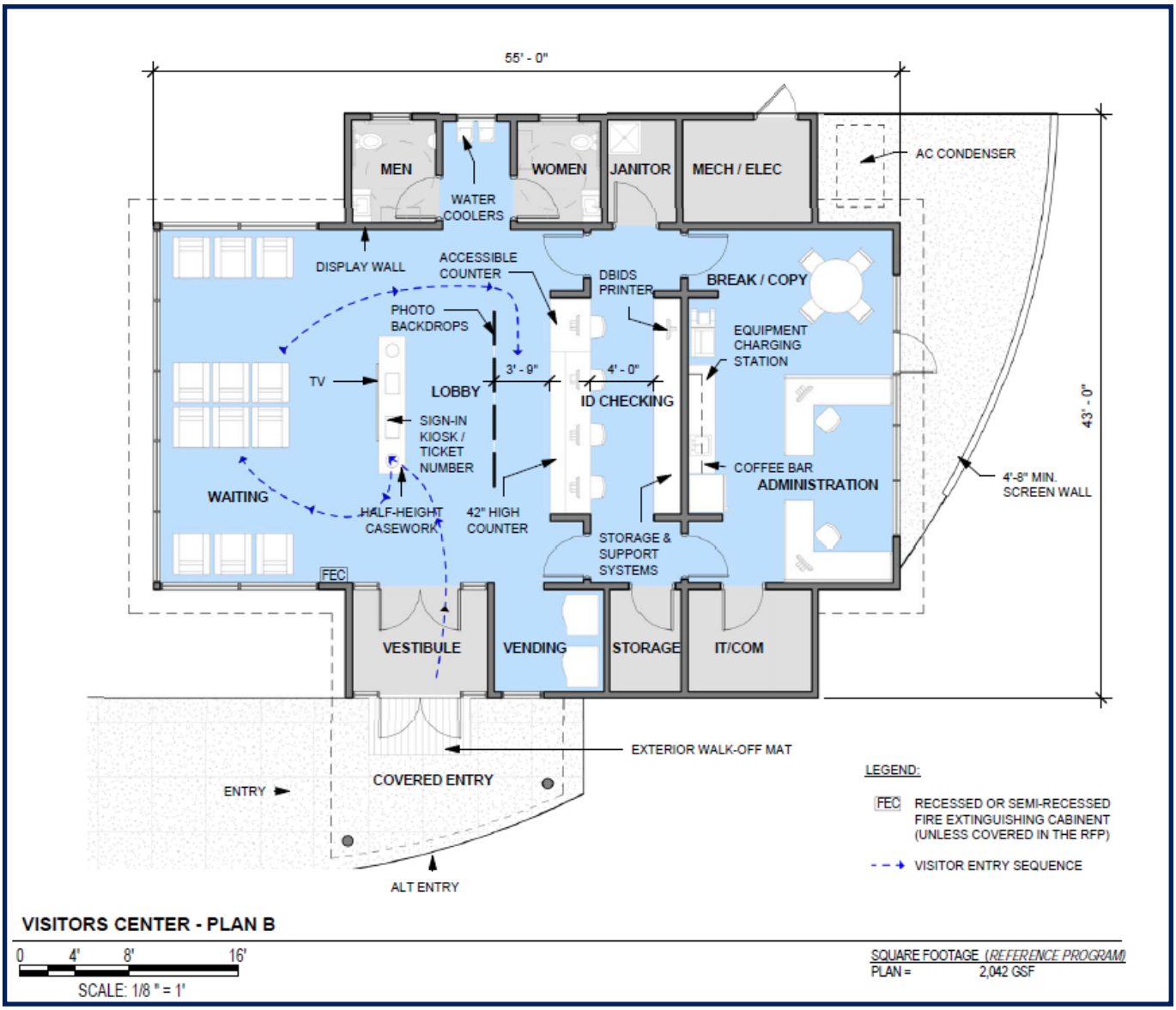
The Visitor Control Center (VCC), if present, must be placed such that the processing of visitors is done prior to entry into the installation. This means that the visitor vetting is conducted prior to inbound traffic (vehicular and pedestrian) reaching the ID check and search area. The building and surrounding site must be highly visible and must be understandable to visitors as a public facility. The building and site must be designed and constructed in accordance with the Architectural Barriers Act including required reserved accessible parking, curb ramps, and sidewalks. The visitor's center may need to meet the required stand-off distance if it is considered an "inhabited" facility (see UFC 4-010-01). If an "inhabited" Visitor's Center cannot meet the required distances, it may need to be hardened per UFC 4-010-01.

Figure 5-8 Model Visitors Center



Source: Air Force Civil Engineer Center

Figure 5-9 Model Visitors Center



Source: Air Force Civil Engineer Center

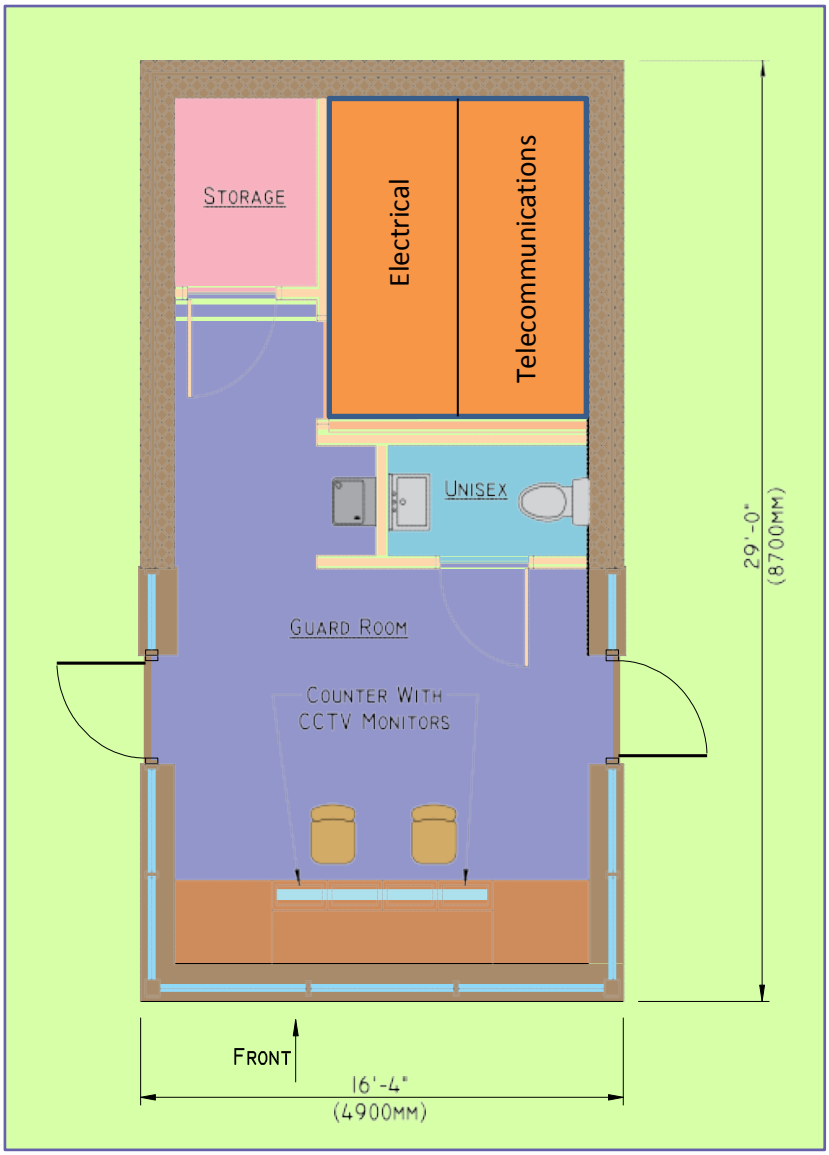
Table 5-3 Visitors Center Elements

Area	Element
Waiting Area	• Provide a comfortable environment with adequate seating for visitors. • Provide a water fountain. • Provide a vestibule with walk-off mat • Provide a designated area for a computer station to be used by visitors to enter registration information. This computer station must network from each processing station to the office area so that registration information can be accessed.
Service Counter	• Include sufficient desktop work surfaces and countertop space for required processing station based on anticipated usage. • Allow three to five minutes per person for processing. • Assume that approximately 12-20 people can be processed each hour on average per processing station. • Include a computer station with networking and Internet access for each processing station. • Provide photo ID capability at each processing station. Install a photo backdrop. • Provide wiring at each processing station for a duress alarm.
Administration Area	• Provide an enclosed office for two workstations and a filing cabinet. • Provide video surveillance equipment for the interior and exterior areas of the Visitors Center. • Provide Internet connectivity, telecommunications, a closed-circuit television system, and a radio battery recharging area.
Break Room	• Locate the break room so that it is out of the direct line of sight of the waiting/seating area. • Provide a refrigerator, microwave, and sink. • Provide seating for four staff.
Rest Rooms	• Provide men's and women's restrooms for public and security personnel use per ABA requirements. • Consider accommodations for baby-changing stations in each restroom if appropriate.
Environmental Controls	• Provide heating and cooling appropriate for personnel, the electronic and electrical systems or fixtures, and the security support equipment. The HVAC requirements must be based on existing service design guidance and installation requirements.

5-7.7 **Gatehouse.**

The gatehouse serves as the control center for the ECF/ACP and provides shelter for security personnel. Every Primary and Secondary ECF/ACP must have a gatehouse designed to support the desired number of security personnel. As the control center, the gatehouse controls the AVB and other ECF/ACP security systems. Do not locate controls for other aspects of an installation security system in the gatehouse or at other facilities associated with an ECF/ACP. Locate the installation security center or emergency control center within the controlled perimeter of the installation. The gatehouse must serve only as the control center for equipment associated with the ECF/ACP only.

Figure 5-10 Model Gatehouse Floor Plan



5-7.7.1 **Design Considerations.**

Base the design of the gatehouse (See Figure 5-10) on the following equipment and functions:

- Communications equipment
- Electronic control panels for all current or anticipated future equipment for automated entry
- Monitor stations for closed circuit television or computer monitors associated with automation controls
- An electrical room for the main electric panel boards
- Storage for traffic control devices, weapons, and personnel equipment including vehicle inspection kits and the storage of personal protective equipment for Chemical, Biological, and Radiological (CBR) exposure
- Computer servers for future AIE systems
- Counter or work space
- A unisex restroom

5-7.7.2 **Location Considerations.**

Typically, a gatehouse is centered in the ECF/ACP between the inbound and outbound lanes and adjacent to the ID check area (see Figures 5-11 and 5-12), or alternatively the gatehouse may be located to the side of the roadway. The gatehouse may also be located after the last turn around/denial/exit point to give security personnel in the gatehouse an overall view of the access control zone operations and vehicles directed to the turn around/denial/exit point or vehicle inspection area. If the gatehouse is located to the side of the roadway or after the last turn around/denial/exit point, consider providing a guard booth in the central island of the access control zone or in between entry lanes to provide easily accessible shelter and protection for the guards operating the ECF/ACP. See Figure 5-1 for additional gatehouse location options.

5-7.7.3 **Parking Considerations.**

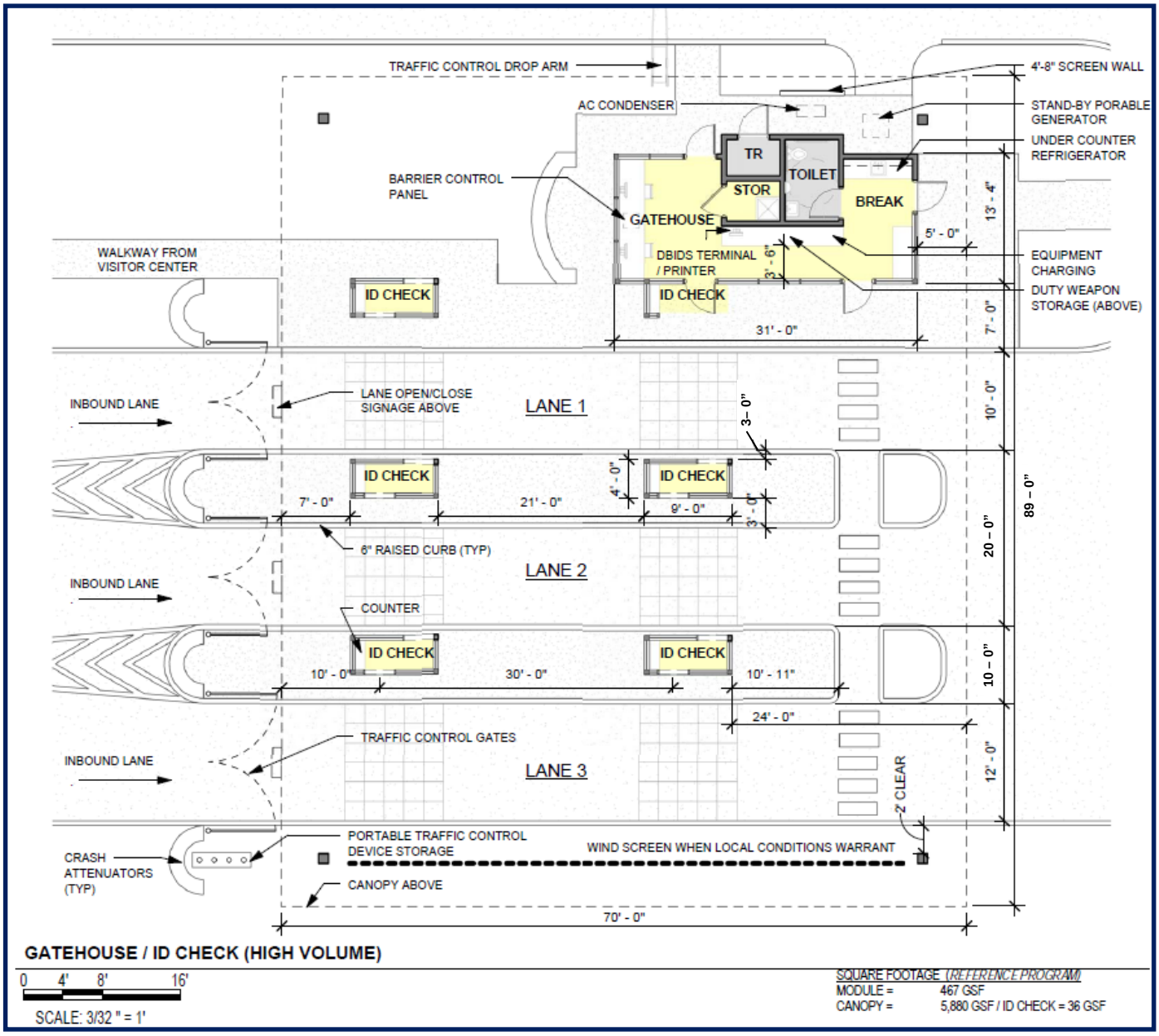
It is beneficial to provide parking for security forces staff in close proximity to the gatehouse. At a minimum, provide one space for a chase vehicle sited as close to the gatehouse as practical. The chase vehicle parking will be located for quick response and will be sized for the planned response vehicle.

5-7.8 ID Check Island and Guard Booth.

The ID check is located in a median island or channelization island between traffic lanes. The area must provide minimum of one guard with protection against the weather and potential threats. The island must have appropriate pavement markings identified in SDDCTEA Pamphlet 55-15. The guard booth must have space allotted for electronic control panels for ECF/ ACP automation equipment, EFO, duress alarm, intercom, workspace incorporating space for computer monitors, and an electrical panel board. There may be up to two guard booths per lane; however, at installations where the second processing area is not readily utilized, it may be more appropriate to not construct a second guard booth but to reserve an area for processing.

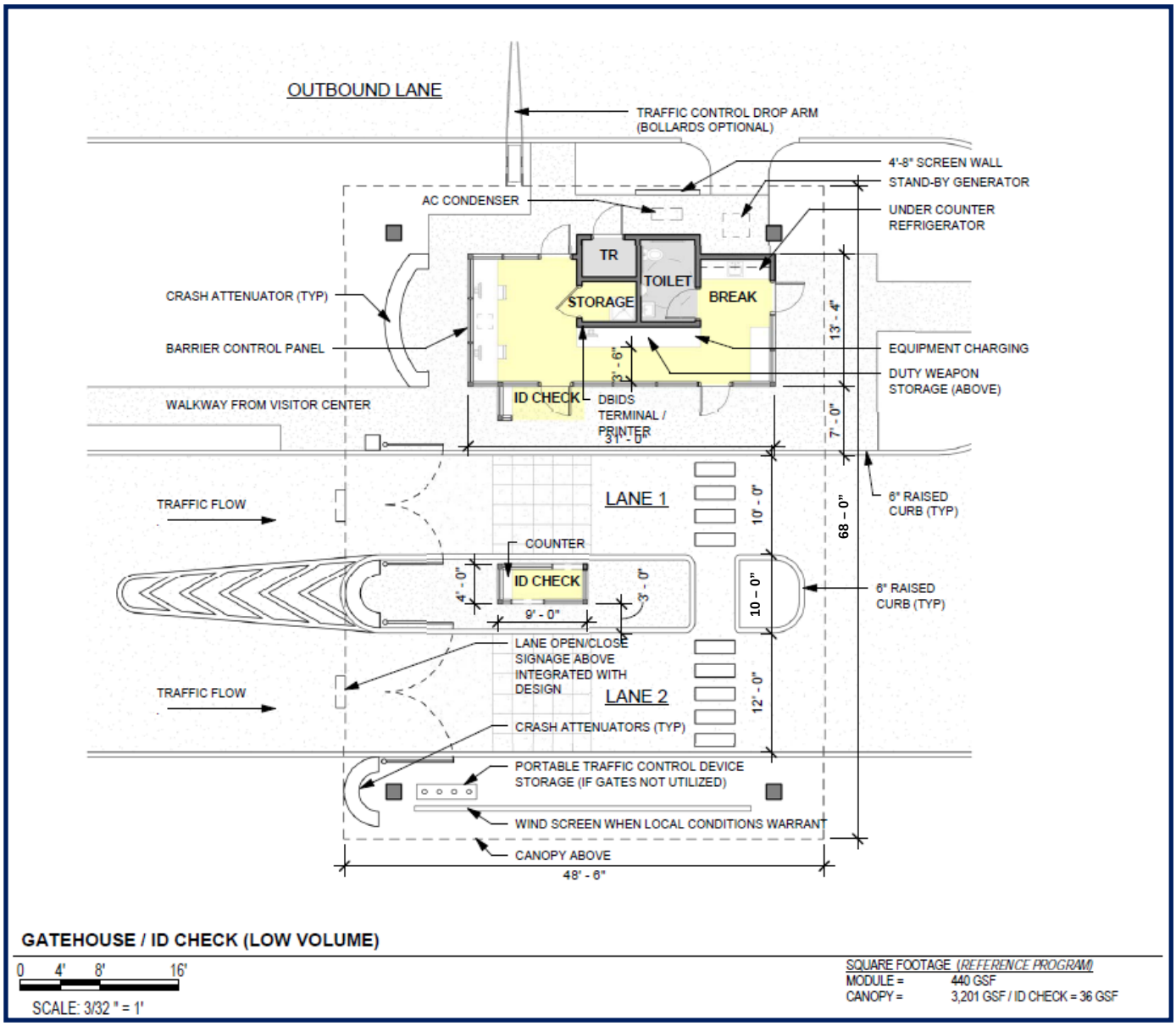
When guards need to stand between lanes of traffic, raised islands provide a measure of safety and separation. Consider designing the ID check area with a depressed step down area so that guards can process motorists at eye-level without having to bend over or step into traffic. The depressed area or sloped area must be designed to promote proper drainage so that it does not become an impediment to vehicular traffic. For all designs, items like guard safety, ponding water and automated equipment installation need to be reviewed in detail and impacts (both pro and con) identified and evaluated. Typically, ID check areas should be 50 (15.25 m) to 75 feet (23 m) long. Providing 75 feet (23 m) of length will allow tandem checking of vehicles, if required. Maintain a minimum 3 foot (0.9 m) setback from the face of curb to the guard facilities on the island. Must also include, as a minimum, a 1 foot (0.3 m) horizontal clearance between face of traffic island curb and guard facility roof, gutters or any other objects protruding from the guard facility. Maintain a minimum lateral clearance of 2 ft (610 mm) in the access control zone to allow security personnel to pass between fixed objects and obstructions and the roadway. See Figures 5-11 and 5-12 for additional details.

Figure 5-11 Model ID Check Island Details – High Volume



Source: Air Force Civil Engineer Center

Figure 5-12 Model ID Check Island Details – Low Volume



Source: Air Force Civil Engineer Center.

5-7.9 **Overwatch Position.**

Installations must consider additional position(s) for security personnel to facilitate a response to a threat. These positions known as overwatch are normally placed in the response zone to facilitate surveillance and armed response. This position may be fixed or temporary/portable. Manning of the overwatch position must be in accordance with the installation physical security plans. If an overwatch position is not being considered in the initial design, the site plan must provide a location and utility stub out or a future permanent/temporary one.

The overwatch (Figure 5-13) must be provided with an intercom, EFO controls to activate the AVBs and an enunciator to alert security personnel of the duress alarm being triggered at the other guard facilities. The overwatch must maximize visibility with 360-degree visibility. The overwatch position must have a direct line of sight to the access control zone of the ECF/ACP including identification and inspection areas.

5-7.9.1 **Permanent Facility.**

In most cases, the overwatch position will be located at or near the end of the response zone to provide sufficient distance for this response. In all designs, coordinate the location with security personnel to ensure proper line of fire and safety considerations. If required, elevate the facility to aid the observation of incoming traffic and reduce incidental/collateral damage by creating a plunging fire scenario.

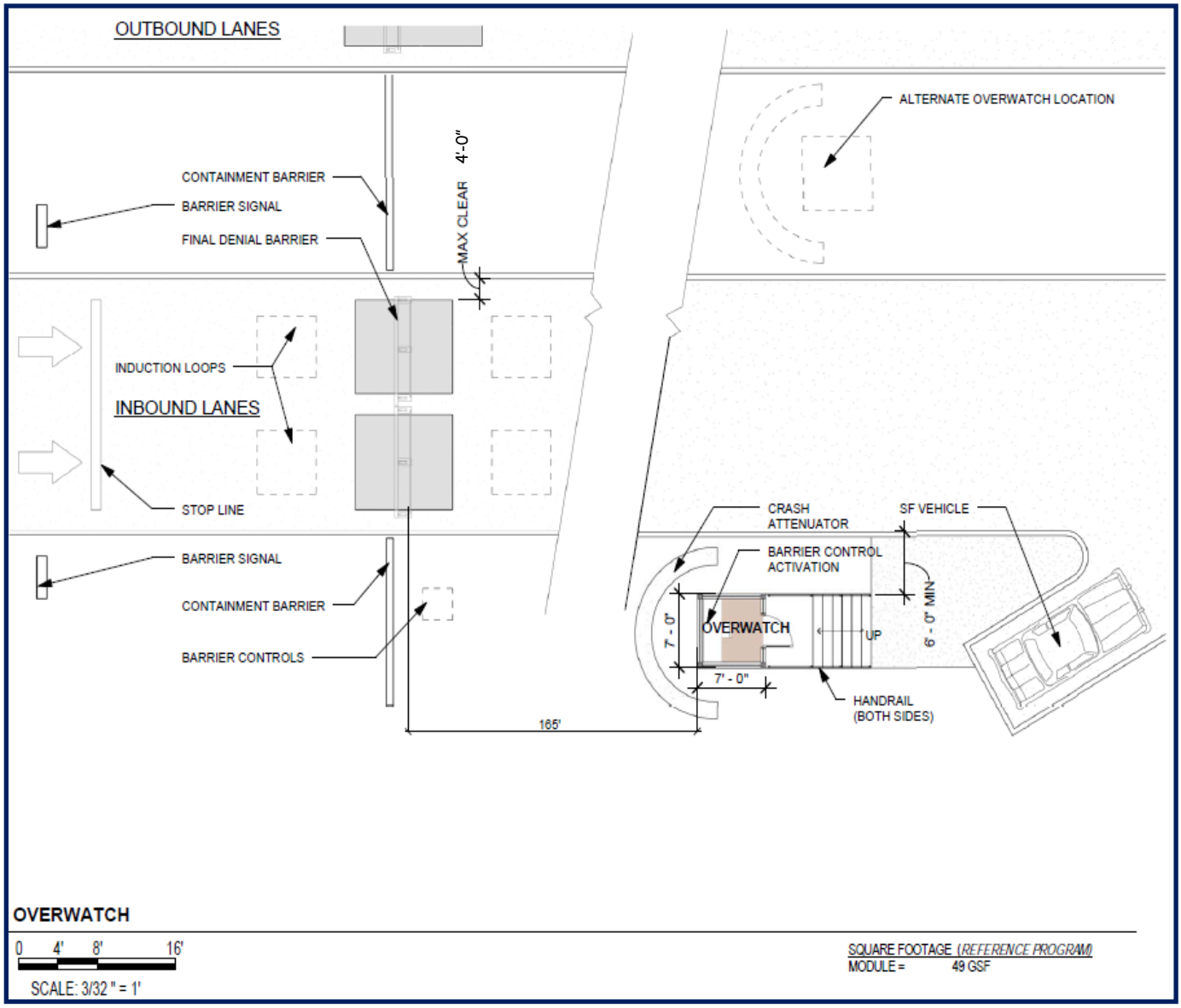
5-7.9.1.1 **Dimensions.**

Dimensions must be sufficient for movement of guard personnel within the structure. Design must provide adequate space for movement of a guard and use of both handgun and shoulder fired weapon with gunports. Gunports must be provided on each face of the overwatch. All gunports must be usable for both handgun and shoulder fired weapons. Gunport design must not require weapons to be oriented in an unusual way (e.g. gunport being placed immediately above counter and counter interfering with vertical orientation of pistol magazine).

5-7.9.2 **Temporary Facility.**

If the overwatch position is established as a temporary facility, an asphalt or otherwise paved pad must be provided at the overwatch location to accommodate a security forces vehicle or temporary facility during increased FPCONs. A communications stub must be provided for this facility as well as ruggedized and lockable EFO AVB controls.

Figure 5-13 Model Overwatch



Source: Air Force Civil Engineer Center

5-7.10 **Overhead Canopy.**

Provide canopies in the following areas:

- ID check area/access control zone (inbound lanes)

Provide an open/close visual indicator on canopy(s) over each lane that is controlled in accordance with the MUTCD/ DoD Supplement to the MUTCD. The preferred style of indicator is the red “X” and green “Arrow”, but the two head traffic signal (red/green) is

allowed. If there is only one search lane, then it is up to the installation to determine if a visual indicator is desired.

5-7.10.1 Benefits.

Canopies provide the following benefits:

- Protection from weather (sun, rain, and snow) for ID check and inspection areas.
- Improved lighting since lighting can be installed under the canopy.
- Improved security since CCTV can be installed under the canopy.
- Improved security by allowing for more thorough processing during inclement weather.
- Support for automation systems.
- A structure to mount lane use signals and signs.
- A “gateway” for motorists which encourages lower speeds.

5-7.10.2 Vertical Clearance Requirements.

The minimum desirable clear height must be 17.5 feet (5.3 m) where commercial traffic at the ECF/ACP is allowed and facilitate use of the overhead canopy for signage, lighting or security equipment. Where the ECF/ACP use is limited to POVs the clear height must be 15 feet. This clear height is measured from the pavement to the lowest point on the overhead canopy, including light fixtures and other equipment.

5-7.10.3 Design Considerations.

The architectural appearance of the canopy should match surrounding features and meet the requirements of the installation exterior architectural plan. Avoid the use of structural elements that could obstruct visibility where individual canopy columns must limit field of view from ID check guard booth by no more than 11 degrees. Structural elements should be strategically located where possible behind attenuators or barrier walls and must be placed at least 3 feet (0.9 m) behind the face of curb.

5-8 ELECTRICAL AND COMMUNICATIONS REQUIREMENTS.

Electrical design must consider current power demands as well as the communication and power requirements for future traffic control devices, identification equipment, and other devices associated with potential automation of the ECF/ACP. Coordinate power requirements for security systems with the manufacturer. Some systems may require three-power configuration.

5-8.1 General Guidance.

Space must be reserved in the gatehouse for the controls and electric panel boards associated with the future control systems.

5-8.2 Alternate Electrical Power Source.

In the event of a loss of the primary electrical source, a reliable alternate power source is necessary to ensure continuous operation of the ECF/ACP. Follow service guidance for approval of backup power authorization and design.

The alternate power source status must be monitored at Command and Control (Gatehouse) to include alarms for loss of normal power, malfunction, and low fuel. It is recommended that generator be installed so that it is at least 30 feet from the service entrance transformer to allow for ease of maintenance. Ensure the alternate power source location allows access for maintenance of the unit as well as adding fuel.

5-8.2.1 Standby Generator.

Use a standby generator or other equivalent means as the alternate electrical power source. Provide an automatic means of starting the generator and load transfer depending on the permissible duration of the electrical power outage per UFC 3-550-01, UFC 3-520-01, and UFC 3-501-01. Recommend the generator be installed so that it is at least 30 feet (9 m) from the service entrance transformer to allow for ease of maintenance and adding fuel.

5-8.2.2 System Considerations.

Equipment on back-up power must include:

- Command and Control / Gatehouse interior and exterior lighting
- Canopy lighting
- Exterior lighting in the access control zone
- Roadway lighting within 100 ft (30.3m) of both sides of the access control zone
- ID check area and inspection area traffic arms
- Roadway lighting within 150 feet (47.5m) at the final denial vehicle barrier location(s)
- Exterior lighting in the inspection area(s) including 100 feet (30.3m) on both sides of the canopy
- Traffic control systems
- Automated systems
- Uninterruptible power supply (UPS).

Generator systems must include Command and Control / Gatehouse notification of the following

- Loss of primary power
- Standby generator malfunction
- Low fuel.

5-8.2.3 Back-up Power and Auto-start Requirements.

The generator must be provided with sufficient fuel to provide back-up power for a period of at least 12 hours or as required to support the installation's plan for refueling operations. For a fixed generator provide auto-start capability within 10 seconds of primary source failure. When natural gas generators are allowed they are not required to have a 12 hour tank.

5-8.2.4 Portable Generators.

In some cases, installations may specify the use of portable generators in addition to stationary auxiliary electrical power sources. Where portable units are utilized, provide a suitable location, power connection point, and access for trailer mounted portable generator.

5-8.3 Uninterruptible Power Supply.

To maintain security and barrier safety functions, provide a UPS for use during generator starting and load transfer. The UPS system supports computerized equipment to avoid power disruption. At a minimum, provide UPS for the following:

- Primary communications system
- Duress alarm system
- Computers
- CCTV systems
- Intrusion Detection Systems (IDS)
- Enunciator
- Access Control Equipment including AVB systems, traffic control devices and automated systems.
- AVB Systems include:
    - Active vehicle barrier controls.
    - Active barrier activation system for one complete operation cycle (opens to close and close to open). Hydraulic systems do not need to have the pump motor on UPS, if the system can maintain enough pressure for one complete cycle. The hydraulic pump motor then only needs to be on generator back-up power.
    - Traffic arms located at the active vehicle barriers.
    - Traffic sensors (wrong way, over speed, and presence detectors).
    - Traffic signals and warning lights.

An UPS is not normally used for security lighting per UFC 3-530-01 due to the nonlinear nature of most luminaires. Provide limited lighting at the control consoles in the gatehouse (command and control) and inspection (search) office. Provide some luminaires at the ID check area (one per lane near the guard position) and at the active vehicle barrier location when required by other criteria or by the installation. The design

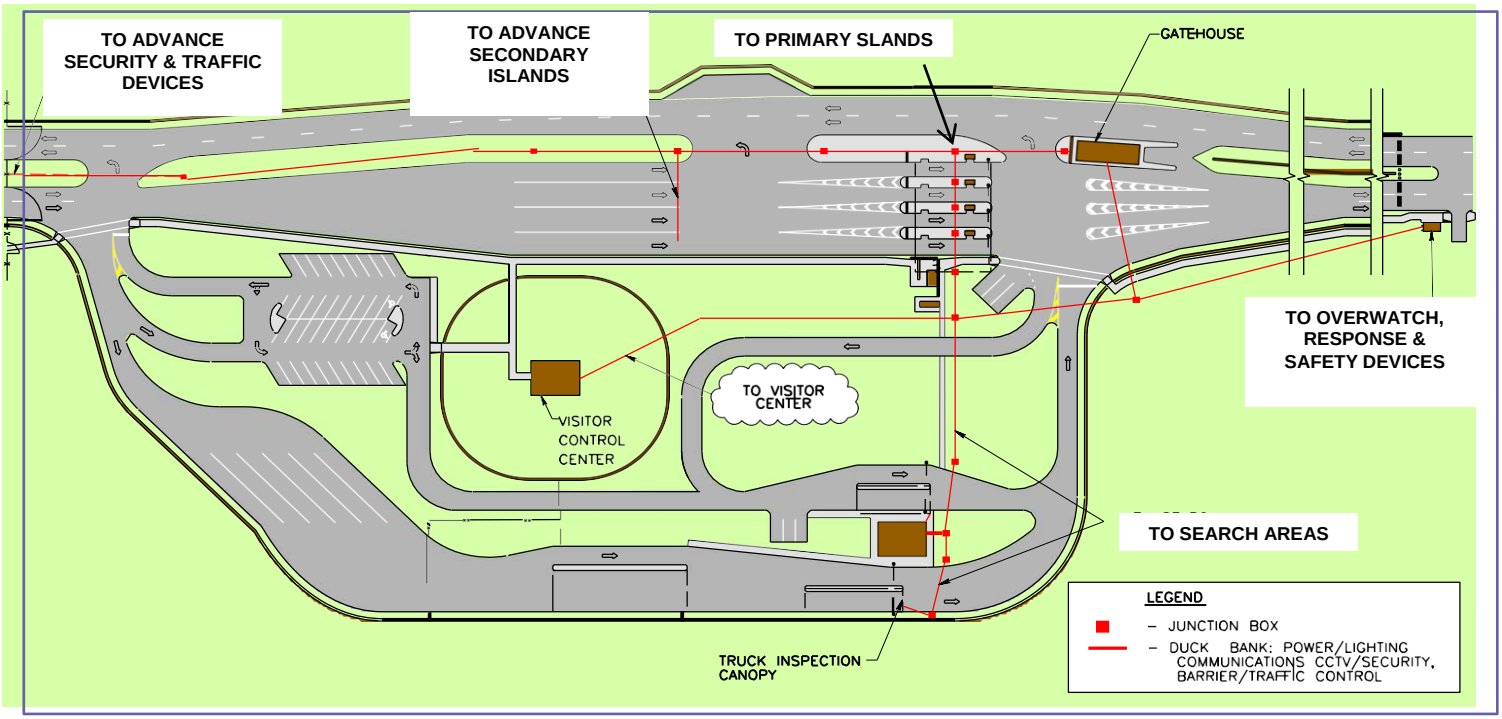
should clearly identify the nonlinear nature and switching patterns of the load to be served by the UPS. It may be desirable to place limited lighting on the UPS to avoid restrike concerns.

5-8.4 **Infrastructure.**

In areas close to the gatehouse, physical interconnection is more feasible. In those cases, conduits and duct banks must be part of the overall design. Communication conduits are to be separated from power conduits and from signal/security system conduits. Provide spare conduits in all exterior pathways so that future devices can be added to the ECF/ACP. Conduits must connect all key features to the gatehouse including guard booths, inspection areas, AVBs, overwatch positions, and the visitor's center.

At a minimum, provide a system of underground duct banks and hand-holes for distribution of power, control, and communications/data wiring from the ECF/ACP gatehouse to each area as illustrated in Figure 5-14 Model Duct Bank Plan.

Figure 5-14 Model Duct Bank Plan



Source: SDDCTEA Pamphlet 55-15

5-8.5 Information Technology.

Each ECF/ACP must have at least two means of communication from the ECF/ACP to a central monitoring point. The type of communication is dependent on the devices being utilized and site conditions. CCTV systems require higher bandwidth. Coordinate the requirements for radio-based communication with the installation. Some installations may require an emergency ring down telephone, which provides a direct, hard-wired duress alarm to the installation emergency dispatch or control center.

Provide a central duress alarm, which signals the installation emergency control center, dispatch center, or similar designated location in each gatehouse, guard booth, inspection area, and overwatch position. The duress alarm must be silent in the ECF/ACP to avoid alerting aggressors of its activation.

5-8.5.1 Installation-Wide Networks.

The ECF/ACP must be capable of connecting to installation-wide, information technology systems. As services continue to enhance security at ECFs/ACPs, the need for reliable, high-speed data connectivity at installation perimeters becomes increasingly important. While many installations have been proactive in extending their fiber optic backbone to the perimeter, many ECF/ACP security upgrade projects continue to be hampered by the inability to transmit data from ECFs/ACPs back to security monitoring and administration facilities. Although a dedicated copper phone circuit is generally sufficient for transmitting basic ECF alarm messages (guard duress, door forced, enclosure tamper, etc.), ECF/ACP video and access control data demand a much faster connection that is best provided by fiber optic cable. To ensure adequate connectivity for an ECF/ACP security upgrade, the project team must first confirm the availability of fiber at each ECF/ACP and then design and build a network capable of transmitting all required data.

5-8.5.2 Stand-Alone Networks.

A stand-alone ECF/ACP network, physically separated from the information management network, is preferred due to the criticality and sensitivity of the data being transferred. This network must provide multiple connections at each ECF/ACP and at security administration, monitoring and dispatch facilities. For example, the network switch at a single ECF/ACP could require local ports/connections for a digital video recorder (DVR), video workstation computer, automated system servers and workstation computers. The port configuration of the ECF/ACP switch should include a fiber optic uplink to the backbone switch and enough local spares to accommodate new equipment in the future. The network must support Ethernet and Transmission Control Protocol/Internet Protocol (TCP/IP) protocols, and the data rate must be no less than 100 Mbps. A properly designed ECF/ACP network will support “plug-and-play” connectivity for a wide range of security equipment and ultimately enhance the force protection posture at the installation perimeter.

5-8.6 Closed Circuit Television (CCTV).

ECFs/ACPs must be equipped with a CCTV system. The system must be equipped with DVR capability for 24 hours and 7 days a week operation. Camera(s) must provide a perspective of ECF/ACP operations to include the following:

- ID check area
- Inspection areas
- Visitor's center
- The approach zone
- Response zone to monitor traffic approaching from both directions unless not required by the individual service.
- Neighboring intersections and roadways that may be impacted by ECF/ACP operations.

Each inbound lane of traffic must be equipped with cameras capable of reading license plates and viewing drivers in the identification check areas and inspection areas.

The CCTV system must be monitored in the gatehouse, inspection office, and the Installation's Central Security Monitoring Station (Military Police (MP) Desk, 911 Desk, Installation Emergency Operations Center (EOC), etc.).

5-8.7 Intrusion Detection System (IDS).

Coordinate with the installation and the service for these requirements. Provide balanced magnetic switches (BMS) on the exterior doors to the Command and Control/Gatehouse, Guard Booths, Overwatch, Search Office, and Visitors Control Center. Provide BMS on interior doors that go to rooms that contain communication, CCTV, or security equipment. Storage rooms that do not contain any security, CCTV or Communication equipment are not required to have BMS. See UFC 4-021-02, Electronic Security Systems (ESS) for additional information and guidance.

5-8.7.1 Tamper Switches.

Coordinate with the installation and the service for these requirements. The tamper switch can be part of the equipment itself and monitored by its system e.g. the active vehicle barrier control system can monitor the tampers on its system including the manholes/handholes. When the IDS panel is not monitoring the tamper switches, then the IDS panel must receive a general alarm from the other system when a tamper switch is activated.

Provide tamper switches on the following:

- Electronic control cabinets for Communications, AIE, CCTV, and security controls.

- Active vehicle barrier cabinets that contain controllers and power units. Operating control panels associated with the AVB controls (master, guard booth, local, etc.) are required to be equipped with tamper switches.
- The junction box at the Overwatch Position pad (if provided).
- Manholes and handholes that contain duress alarm, AIE, CCTV, intrusion detection or AVB control wiring and have splices present.
- Uninterruptible power supply (UPS) cabinets must be equipped with tamper switches.

5-8.8 General Power Requirements.

- Ensure power panel board are not be installed below a counter which includes pre-fabricated structures such as the guard booths, pedestrian check area booth and overwatch.
- Direct buried wiring is not allowed unless specifically requested by the installation or service in writing. Provide all 600V or less wiring in conduit. If the conduit is within eight (8) ft of a roadway, then concrete encased the conduit or use rigid steel conduit.
- Provide power receptacles per NFPA 70. The following are in addition to the general requirements.
  - Search Function/Bus Shelter is to have at least one duplex receptacle.
  - ID Check Guard Booth, Pedestrian ID Check, Overwatch Building. Provide one duplex receptacle at the counter that is either on a UPS circuit or provide a standalone UPS.
  - ID Check Guard Booth. Provide an exterior receptacle on each of the narrow ends. Provide at least one receptacle below the eave along each of the long sides.
  - Overwatch Pad. Provide a duplex receptacle at the pad.
  - ID Check Canopy. Provide at least one duplex receptacle per island.
  - Truck Search Area Canopy, Passenger Vehicle Search Area Canopy. Provide at least one duplex receptacle on a column on each side of the inspection space. Provide a dedicated circuit for each side of the inspection space receptacles.
  - ID Check Canopy, Truck Search Area Canopy, Passenger Vehicle Search Area Canopy. Provide one 20 amp circuit at either 208VAC, 240VAC, 277VAC or similar voltage depending on the country that can be used by heaters or other equipment. Provide an appropriate receptacle for the amperage and voltage configuration and have an adjacent disconnecting means.

5-9 EXTERIOR LIGHTING.

Lighting is required for guards to perform their security functions. ECF/ACP lighting is important so that motorists and guards can see each other. ECFs/ACPs must be

designed with lighting features that support the operational requirements during dawn, dusk, or nighttime periods. Even if the ECF/ACP is intended to be used only during daytime hours, lighting must be considered in the event there is a change in usage.

Lighting must be complete and continuous. Specific areas of the ECF/ACP require their own lighting requirements. These requirements are governed by UFC 3-530-01 and criteria established by the individual services. The lighting plan for the ECF/ACP must transition from the existing roadway lighting so that it does not blind the driver or backlight signs. Proper design of the lighting system will increase safety and efficiency, aid security forces, enhance appearance, and reduce light pollution.

5-9.1 General Requirements.

Provide the ECF/ACP with multiple, redundant luminaries to ensure the loss of a single luminaire does not seriously degrade the total lighting available for security personnel. Transitional lighting is necessary on approaches (approach zone) and departures (response zone) to the ECF/ACP to minimize blinding effects as drivers travel into and out of a brightly illuminated access control zone of the ECF/ACP. Within the ECF/ACP, the lighting requirements vary depending on the zone of the ECF/ACP as noted UFC 3-530-01 Table 6-1, Minimum Lighting for Unaided Guard Visual Assessment.

The lighting at the ECF/ACP must be designed as controlled lighting, to reduce light pollution and increase traffic safety. Glare projection or glare lighting must be avoided where a safety hazard would be created. Use luminaires that are classified as cutoff or semi-cutoff.

5-9.1.1 Placement of Luminaires.

Light poles can be placed along the roadway or in the median. In some cases, light poles in the median may reduce the number of poles needed. However, at wider ECFs/ACPs with numerous lanes, the needed illumination may not be achievable with light poles only in the median. Therefore, light poles must be placed on both sides of the road. Provide exterior lighting poles and the electrical connections that are frangible when required by MUTCD/ DoD Supplement to the MUTCD. Poles can be no shorter than 15 feet.

When light poles are in uncurbed areas, the pole must be located outside of the roadway clear zone. In curbed areas, light poles must be located at least 2 feet (0.6 m) behind the face of the curb.

5-9.1.2 Color Rendition Index.

The ability to identify colors accurately and confidently is determined by the light source spectral power distribution and the illuminance level. This capability is commonly referred to as color rendition and is measured by the color rendition index (CRI). To ensure appropriate color rendition, use a light source with CRI greater than or equal to 65-in the ID check area, access control zone, and search areas, and use any nominally

white light source (CRI greater than or equal to 50) at the illuminances typically encountered in the remaining areas of an ECF/ACP.

When CCTV is used as part of the security operations, it is important to coordinate the design of lighting and CCTV systems such that enough illumination and CRI is provided per CCTV equipment specifications.

5-9.1.3 Restrike or Restart Capability.

Another important consideration in the design of the site lighting, is the restart or restrike time for the selected lamps. Restart occurs when a lamp experiences a loss of power and there is a time delay before backup power restores power to the lamp and the subsequent restrike or restart of the lamp. Coordinate the restart capability with the user. As an example, high intensity discharge (HID) lamps are more energy conserving than incandescent lamps, however, they require several minutes to warm up and restart after power is interrupted. This period of time, which could be 15 to 20 minutes, is unsatisfactory for security operations. The installation should designate the maximum acceptable period for which loss of illumination can be tolerated, however, without specific data two minutes is considered the maximum outage period acceptable. The selection of light sources, especially in the Access Control Zone, must include an evaluation of restart or restrike time. It will be necessary to provide lamps and auxiliary equipment for rapid startup and restrike to provide minimal adequate lighting in the event of a power interruption.

5-9.2 Approach and Response Zone Lighting.

The approach and response zones require roadway lighting. The roadway lighting must provide enough intensity so that pedestrians, security personnel, islands, signage, and other hazards are visible. The lighting must not be directed in the driver's eyes and it must not backlight important signage. See UFC 3-530-01 and criteria established by the individual services.

Transitional lighting is necessary on approaches to the ECF/ACP so that drivers are not blinded during arrival and departure. See UFC 3-530-01, SDDCTEA Pamphlet 55-15, and criteria established by the individual services for transitional lighting guidance. Transition lighting goes from the lower light levels prior to the Approach Zone up to the required light level for the Approach Zone and then again up to the required level for the Access Control Zone. Then the lighting will transition from the Access Control Zone to the lower level for the Response Zone. After the active vehicle barriers the light level needs to transition down to the lower light level for the street. Roadway geometry may impact the ability to do the transition lighting per the criteria. Actual lighting locations must be determined on a case-by-case basis and depend on the height, light source, and lens distribution.

5-9.3 Access Control Zone Lighting.

In the Access Control Zone, area lighting is provided in the vicinity of the facilities. The lighting needs to illuminate the exterior and interior of a vehicle to facilitate identification

of the occupants and the vehicle contents. Good vertical illuminance facilitates the identification and inspection procedures per UFC 3-530-01. Lighting levels above those indicated in UFC 3-530-01 Table 6-1 or those established by the individual services may be appropriate where practical and desired. However, careful consideration of the potential adaptation problems and the design of the lighting of surrounding areas are required for the safety of traffic and security personnel.

It may also be necessary to provide additional task lighting in the ID and inspection areas to support adequate identification of vehicle occupants and contents. Such lighting must be directed transverse to the roadway; it will then illuminate the roadway in front of the gatehouse, the driver, and the guard.

5-9.3.1 Under-Vehicle Inspection Lighting.

Per UFC 3-530-01, lighting may also be mounted at or below pavement level to facilitate under vehicle inspection. The system must eliminate shadows and create contrast.

5-10 CONSTRUCTION PHASING.

If the project involves the modification of an existing ECF/ACP, pay considerable attention to the phasing of construction. In most cases, it is desirable to minimize the interruption of the ECF/ACP operations especially during periods of peak demand.

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CHAPTER 6 LARGE COMMERCIAL VEHICLE AND TRUCK INSPECTION FACILITIES

6-1 INTRODUCTION.

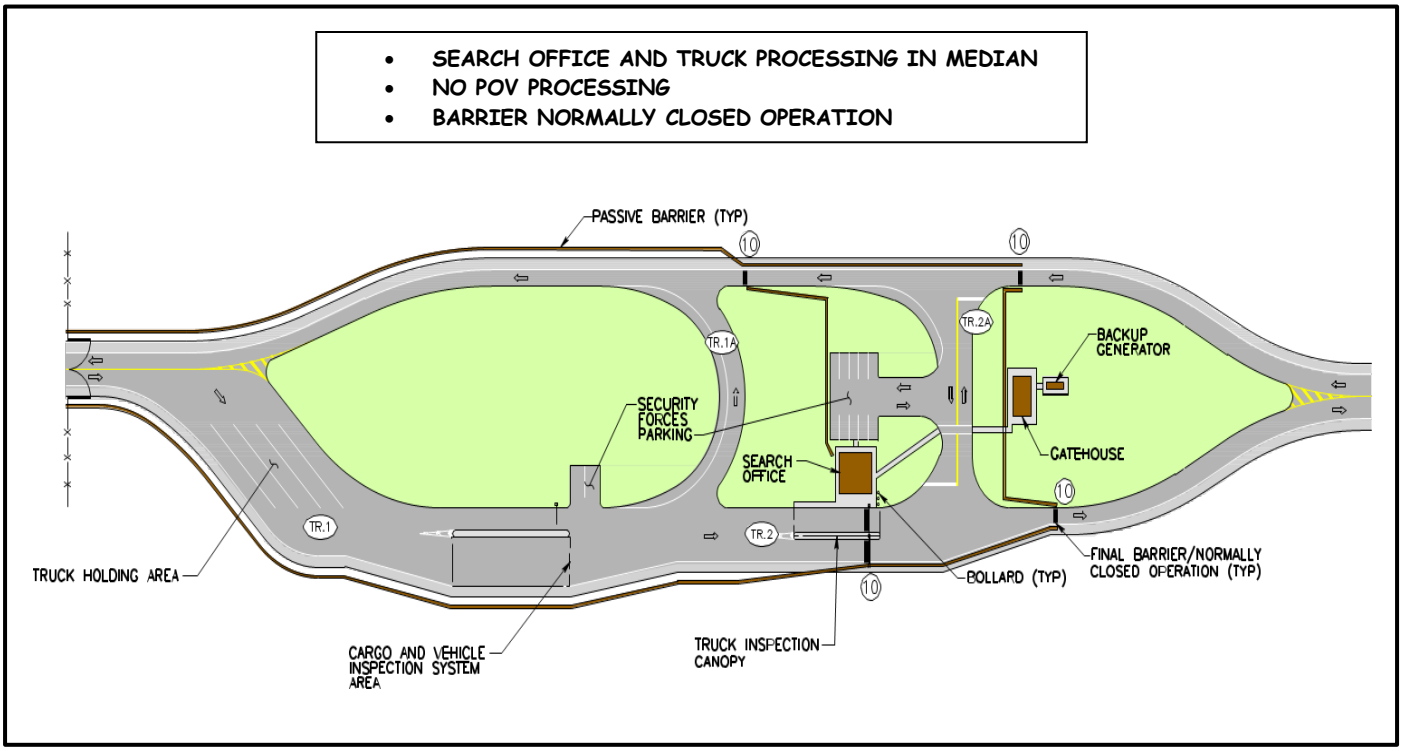
A large vehicle inspection facility may be a separate centralized facility or combined into the functions of a primary ECF/ACP as indicated in the function diagram in Figure 2-4. See Figure 5-7 for example layout of Commercial Vehicle Shelter and Inspection Office.

Key considerations in determining the need for segregated facilities include:

- Mission
- Location
- Population
- Truck traffic volume
- Security procedures
- Availability of land

The following criteria are intended to provide minimum requirements and general considerations in the design of such an inspection facility. The same ECF/ACP design features (i.e. IDS, duress system, and lighting) employed for POV only facilities are required for commercial vehicle/truck ECF/ACPs. See Chapter 5 Design Guidelines for design criteria/guidance on those features.

Figure 6-1 Example of Commercial Vehicle Only ECF/ACP



6-2 MISSION AND OPERATION.

An installation large vehicle inspection facility is intended to be the single point of inspection for all large commercial and truck traffic intending to enter the installation. It is envisioned that once a vehicle is inspected and authorized to access an installation, that the vehicle may be tracked and monitored until it enters the installation.

6-3 SIZING OF LARGE VEHICLE INSPECTION FACILITIES.

The capacity and truck holding requirements of a large vehicle inspection facility must be determined by a traffic engineering study as per SDDCTEA Pamphlet 55-15. The calculations must consider the longer processing times of trucks and the larger vehicle size. In some cases, where there is significant truck volume over several hours, the cumulative demands must be considered. All hours of the day when trucks are being accepted must be reviewed to determine the actual design truck demand.

Processing times vary based on security procedures, but often range from three to five minutes per vehicle, which equates to 12 to 20 trucks per hour processed. Where two inspection lanes are present, these rates are doubled. Once the number of vehicles not processed is known, that number represents the size of holding area needed.

6-4 INSPECTION EQUIPMENT.

Base the design of the large vehicle inspection station on the use of large vehicle inspection equipment. Some examples of these technologies are x-ray, ion mobility spectrometry, gamma ray imaging, and neutron analysis. An ever-increasing number of these devices are being installed. The design must include space for vehicle inspection equipment and utility conduits. The inspection equipment may be a mobile or fixed installation. It must be noted that some detection equipment is built-in to a large, drive-through structure. If this type of equipment is anticipated, then this must be coordinated and incorporated into the inspection office, drive through structure or overhead canopy facilities.

In addition, many installations desire CCTV inspection of the top and underside of vehicles. Mount these cameras on the overhead canopy and in the pavement below the vehicle. As a minimum, the inspection facility must possess the infrastructure to support the installation of CCTV inspection equipment, including adequate lighting to illuminate the underside of the vehicles during inspection. Some installations may also consider the use of vehicle inspection pits, although this type of facility is not recommended due to commonly encountered soil conditions and anticipated operational safety issues. The following sections contain information on various inspection-related devices to facilitate the layout of the truck inspection facility and the determination of the required infrastructure to support inspection equipment.

Follow service guidance for approval of inspection equipment authorization and design.

6-4.1 Under Vehicle Search Systems (UVSS).

If a CCTV UVSS is utilized, evaluate the following considerations and guidelines.

- Consider maintenance requirements.
- If installed below grade, the enclosure must be waterproof.
- Install the system within the ECF/ACP footprint so that the largest vehicle can pass over the equipment without entering the installation.
- Drainage must be established such that water drains away from the equipment.
- When providing drains from the equipment enclosure, provide backflow prevention valves to prevent water from entering the vault. Ensure any water that may be captured in the vault will not drain through control conduit to the control center.
- The electrical circuit serving the equipment must be a ground fault interrupt (GFI) circuit.
- Monitoring area must be free of glare.
- Vehicle speed must be kept below 15 mph (24.1 km/h) to ensure adequate performance.
- Where exposed to freezing temperatures, the equipment installation must include heaters.

6-4.2 Cargo and Vehicle Inspection Systems.

There are many types of automated inspection equipment for large vehicle or cargo inspection. Some of the types available, which provide an image of the contents of a vehicle or container, include X-ray and Gamma Ray inspection systems. There are other systems available, such as neutron or vapor/particle analysis, which aim to detect the common chemical elements associated with explosives or other contraband. Many installations are considering procuring mobile systems that afford the possibility of varying the location of the equipment amongst various ECFs/ACPs. Consider a fixed installation for Installations that plan centralized truck inspection facilities, which potentially have an increased throughput and a reduced space requirement. Due to the wide-ranging requirements for the different manufactured systems, it is not possible to provide detailed guidance that will support all types of this equipment. Consult with manufacturers of these systems during the design of an ECF/ACP to ensure data concerning operational considerations is both current and the best available, and to assure that the area where the system will be used is properly sized.

6-4.2.1 Safety and Regulatory Considerations.

Due to the use of gamma or x-ray radiation, there are safety and regulatory considerations in the use of these systems. The requirements vary depending on the system. Normally an exclusion zone, an area where personnel are not permitted during operation of the equipment, is established within and around the inspection equipment.

The region outside of the exclusion zone is considered safe for personnel during scanning operations. The size of the exclusion zone varies greatly depending on the type of equipment.

Nuclear Regulatory Commission regulations state that radiation dose limits in Public-Uncontrolled areas are 2 milli-Roentgens (mR) in any hour or 100 mR in any year. Therefore, depending on the characteristics of the source, the frequency of scans, and the expected occupancies, the exclusion zone can vary. Additionally, a shielding wall can be constructed to reduce the dose substantially. Some x-ray systems have qualified as a “cabinet x-ray system” in accordance with Food and Drug Administration (FDA) regulations or similar standards, meaning minimal shielding is required and the exclusion zone does not extend outside of the footprint of the inspection area. To qualify for this designation, FDA regulations require an emission limit of 0.5 mR per hour at 2 inches (5 cm) from the surface of the cabinet. Other regulatory considerations are that systems utilizing radioactive sources may require operation under a radiation materials license held and administered by the owner of the equipment (the installation) and a permit for operation may be required**.**

6-5 LAYOUT OF COMMERCIAL VEHICLE INPECTION FACILITY.

The layout of the large vehicle inspection facility is extremely important to ensure the facility will function properly. The civil design must consider the turning radius and other operating characteristics of the expected vehicle types. In addition, the facility should consider having multiple lanes of inspection to support different vehicle types, or varying inspection levels. The design must have adequate stacking distances for the anticipated queue and parking for vehicles to be inspected and security vehicles. Size parking areas for the range of expected vehicles and consider the anticipated volume of vehicles to be inspected.

6-5.1 Security Considerations.

Consider providing a “sally port” in the inspection area. A “sally port” configuration is created through the use of vehicle barricades or traffic gates. These barriers are intended to confine the vehicle during inspection until it is determined that the vehicle is authorized to proceed or if the vehicle is denied admission to the installation. The barriers can also be used to aid in positioning the vehicle relative to inspection equipment.

Some installations may require screening of the inspection operations from the remaining portions of the ECF/ACP. Screening may increase safety and shields the inspection procedures from public view to prevent visual surveillance from unauthorized personnel.

6-5.2 Inspection Equipment Considerations.

The inspection equipment can have a significant impact on the layout of a truck inspection facility. It is difficult to develop a layout that can support all potential types of automated inspection equipment. If the installation specifies the anticipated inspection

systems, then the layout can be customized. If the specific system is not identified, but the use of imaging or related inspection equipment is anticipated, the layout must facilitate the future incorporation of this equipment.

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APPENDIX A REFERENCES

DoD REFERENCES	
Title	**Source**
Army Standard for Access Control Points' and 'Army Access Control Points Standard Design	https://mrsi.erdc.dren.mil/cos/army-standards/ https://mrsi.erdc.dren.mil/cos/standard-designs/
Air Force (AF) BIM Dynamic Prototype Entry Control Facility	http://www.wbdg.org/references/afbim_tools.php
DoDI 2000.16 *DoD Antiterrorism Standards*	http://www.dtic.mil/whs/directives/ (available for download)
Directive-Type Memorandum (DTM) 09-012, "Interim Policy Guidance for DoD Physical Access Control	http://www.dtic.mil/whs/directives/ (available for download)
Multi-Service Regulation AR 55-80/ OPNAVINST 11210.2/ AFMAN 32-1017/ MCO 11210.2D/ DLAR 4500.19 DoD Transportation Engineering Program	www.apd.army.mil/ (available for download)
Military Surface Deployment and Distribution Command – Transportation Engineering Agency (SDDCTEA) Pamphlet 55-8 *Traffic Engineering Studies Reference*	http://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/TrafficEngineeringBranch/Pages/default.aspx (available for download)
SDDCTEA Pamphlet 55-15 *Traffic and Safety Engineering for Better Entry Control Facilities*	http://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/TrafficEngineeringBranch/Pages/default.aspx (available for download)
SDDCTEA Pamphlet 55-17 *Better Military Traffic Engineering*	http://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/TrafficEngineeringBranch/Pages/default.aspx (available for download)
UFC 1-200-01, *General Building Requirements*	wbdg.org (available for download
UFC 2-100-01: *Installation Master Planning*	wbdg.org (available for download)
UFC 3-201-01:*Civil Engineering*	wbdg.org (available for download)
UFC 3-210-10: *Low Impact Development*	wbdg.org (available for download)
UFC 3-250-18FA: *General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas*	wbdg.org (available for download)
UFC 3-530-01: *Design: Interior and Exterior Lighting and Controls*	wbdg.org (available for download)
UFC 4-010-01 *DoD Minimum Antiterrorism Standards for Buildings*	wbdg.org (available for download)
UFC 4-010-02 *DoD Minimum Standoff Distances for Buildings* (FOUO)	wbdg.org (available for download)
UFC 4-010-03 *Security Engineering: Physical Security Measures for High-Risk Personnel*	wbdg.org (available for download)
UFC 4-020-01 *Security Engineering Facilities Planning Manual*	wbdg.org (available for download)
UFC 4-020-02FA *Security Engineering: Concept Design* (FOUO)	wbdg.org (available for download)

DoD REFERENCES	
Title	**Source**
UFC 4-020-03FA *Security Engineering: Final Design (*FOUO)	wbdg.org (available for download)
UFC 4-021-02 *Electronic Security Systems:*	wbdg.org (available for download)
UFC 4-022-02 *Selection and Application of Vehicle Barriers,*	wbdg.org (available for download)
UFC 4-022-03 *Security Fences and Gates*	wbdg.org (available for download)
UFC 4-023-07 *Design to Resist Direct Fire Weapons Effects*	wbdg.org (available for download)
UFGS 34 71 13.19 *Active Vehicle Barriers*	wbdg.org (available for download)
UFGS 34 41 26.00 10 *Access Control Point Control System*	wbdg.org (available for download)

NATIONAL DESIGN STANDARDS	
Title	**Source**
American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets (Greenbook)*	Transportation.org (available for purchase)
AASHTO *Roadside Design Guide*	Transportation.org (available for purchase)
AASHTO *Manual for Assessing Safety Hardware (MASH)*	Transportation.org (available for purchase)
Architectural Barrier Act (ABA) Accessibility Standard For Department Of Defense Facilities	www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/aba-standards
Code of Federal Regulations	www.ecfr.gov.
Federal Highway Administration *Manual on Uniform Traffic Control Devices (MUTCD)*	mutcd.fhwa.dot.gov (available for download)
FHWA-HRT-06-139 *Traffic Detector Handbook*	https://www.fhwa.dot.gov/publications/research/operations/its/06139/06139.pdf (available for download)
Department of Defense Supplement To The National Manual on Uniform Traffic Control Devices	https://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/TrafficEngineeringBranch/Documents/MUTCD_DOD_Supplement_Revision_20150601.pdf (available for download)
Federal Highway Administration *Standard Highway Signs*	mutcd.fhwa.dot.gov (available for download)

APPENDIX B NAVY GATE AUTOMATION

B-1 GATE AUTOMATION.

Entry control facilities ensure the proper level of access control to all DoD personnel, visitors, and commercial traffic entering an installation. Currently, security personnel visually inspect the vehicle and driver credentials as they enter DoD Installations. The DoD is moving to automate the vehicle and driver validation process to reduce manpower and improve access control for DoD Installations. An Installation's perimeter access control is the first line of defense in the concept of defense-in-depth. Access control measures such as guards, gates, passive vehicle barriers, and active barriers must perform as an integrated system to protect DoD installations from the terrorist threat.

The primary objectives of the Navy's Automated Vehicle Gate – Low Volume program are as follows:

- Protect personnel and operationally critical assets onboard Navy Installations.
- Standardize and integrate identification, authorization, authentication, credentialing, and access into an enterprise-wide system onboard Installations per Homeland Security Presidential Directive (HSPD-12) through the use of Navy Access Control Management System (NACMS) enabled Physical Access Control Systems (PACS).
- Limit access to Installations based on a Navy Physical Access Control System (NPACS) authorization and authentication process.
- Increase manpower efficiencies.

B-1.1 Major Equipment (Per Lane):

- Access Pedestal – Contains card reader, intercom, and driver's image capture.
- Vehicle Presence Sensor -Used to monitor vehicle transition through the ECF.
- Barrier Signal – Physically located on the drop arm, containment gate and final denial barrier. Red and flashing yellow lights.
- Drop Arm – Used to control vehicle movement at the access pedestal.
- Vehicle Trap – Used to control vehicle movement through the ECF during unmanned operations. Prevents tailgating and pass back of user credentials.
- Vehicle Trap Gate – Used to maintain a secure perimeter and forms the initial portion of the vehicle trap.
- Vehicle Trap Barrier – Not to be confused with AVBs. Used to form the final portion of the vehicle trap.

- Situational Awareness (SA) Closed circuit television (CCTV) cameras – Used to provide SA of the ECF as well as rear mounted vehicle license plate and vehicle operator.
- Dynamic Message Sign – used to notify vehicle operators of current gate status (Open / Closed).
- Fixed signage to indicate and direct traffic flow. Approach zone signage will become critical for traffic throughput. Provide signage to lane use and direct traffic into the appropriate lanes.
- Guard Interface Panel – NPACS enabled panel used by the Contact Guard to configure ECF automation.
- Wrong-way detection sensors (outbound lanes)
- Excessive speed detection sensors (inbound lanes)
- Gate automation hardware - Includes NEMA-4X rated enclosure, chassis/power supply, digital input modules and digital output modules used to control gate automation. The gate automation I/O modules interface the various input and output devices to include the following equipment:
    - Traffic Gate Arm
    - Vehicle Presence Sensors
    - Dynamic Message Sign
    - Guard Interface

B-1.2 Major Equipment (ABA Compliant Pedestrian Turnstiles).

- Access Pedestal – Contains card reader, intercom, and pedestrian image capture.
- Situational Awareness (SA) Closed circuit television (CCTV) cameras – Used to provide SA of the ECF as well as the card holder.

B-1.3 Major Equipment (Guard House):

- Storage for handheld credential scanners (2/inbound lane plus spares).
- Guard Interface– NPACS enabled panel used by the Contact Guard to configure ECF automation.

B-1.4 Major Equipment (Visitor's Center):

- Card holder ID management system with enrollment workstations.

B-1.5 Major Equipment (Primary and Secondary Monitoring locations):

- Main Distribution Frame – Houses servers, LAN gear, UPS, and other required equipment.

- Physical Security Information Management (PSIM) client - Used to monitor system status, alarms, communications, SA, and perform system administration.

B-1.6 Connectivity (Guard House):

- In addition to standard Installation voice and data connectivity, a minimum of one 12 strand single mode optical fiber cable is required for gate automation systems. Coordinate point of service with installation. Typically, point of connection/service will be the Installation's dispatch Center.

B-1.7 Connectivity (Visitor's Center):

- Connectivity will be supported by the Navy's PSNet network.

Figure B-1 Example of Lane Layout for Gage Automation

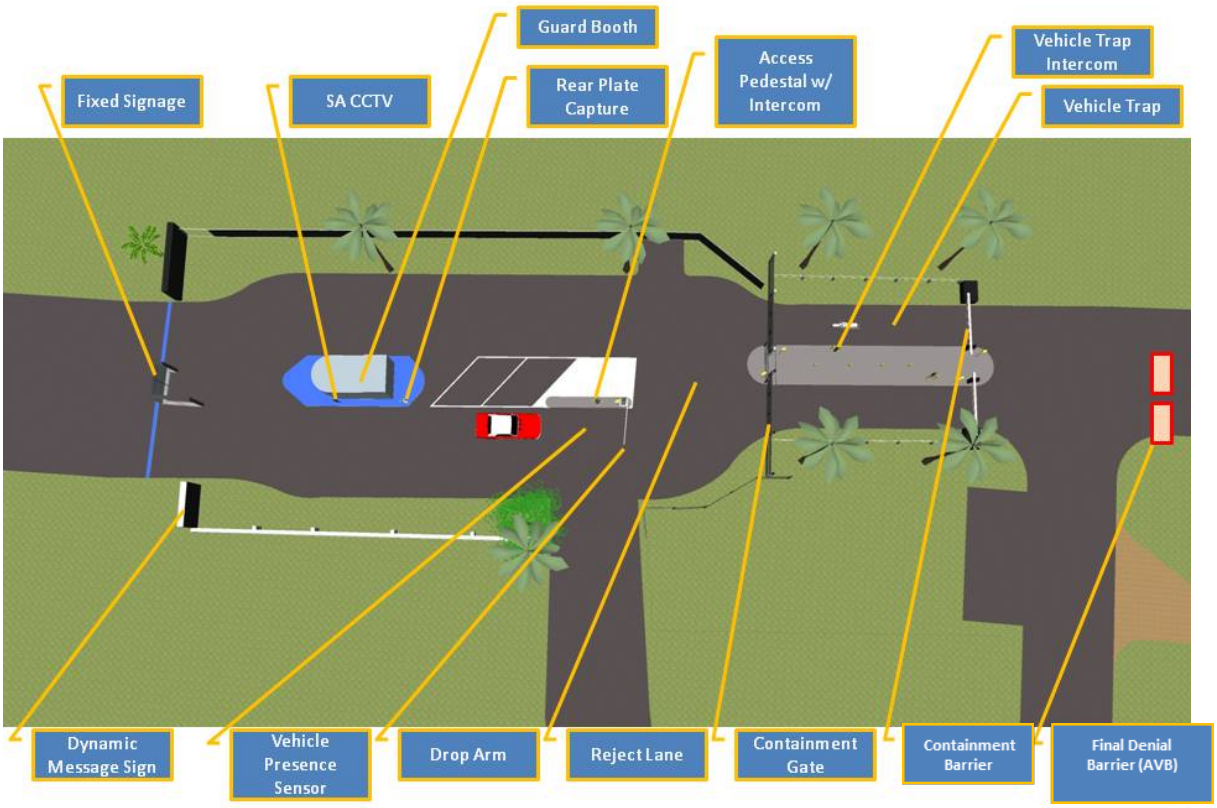
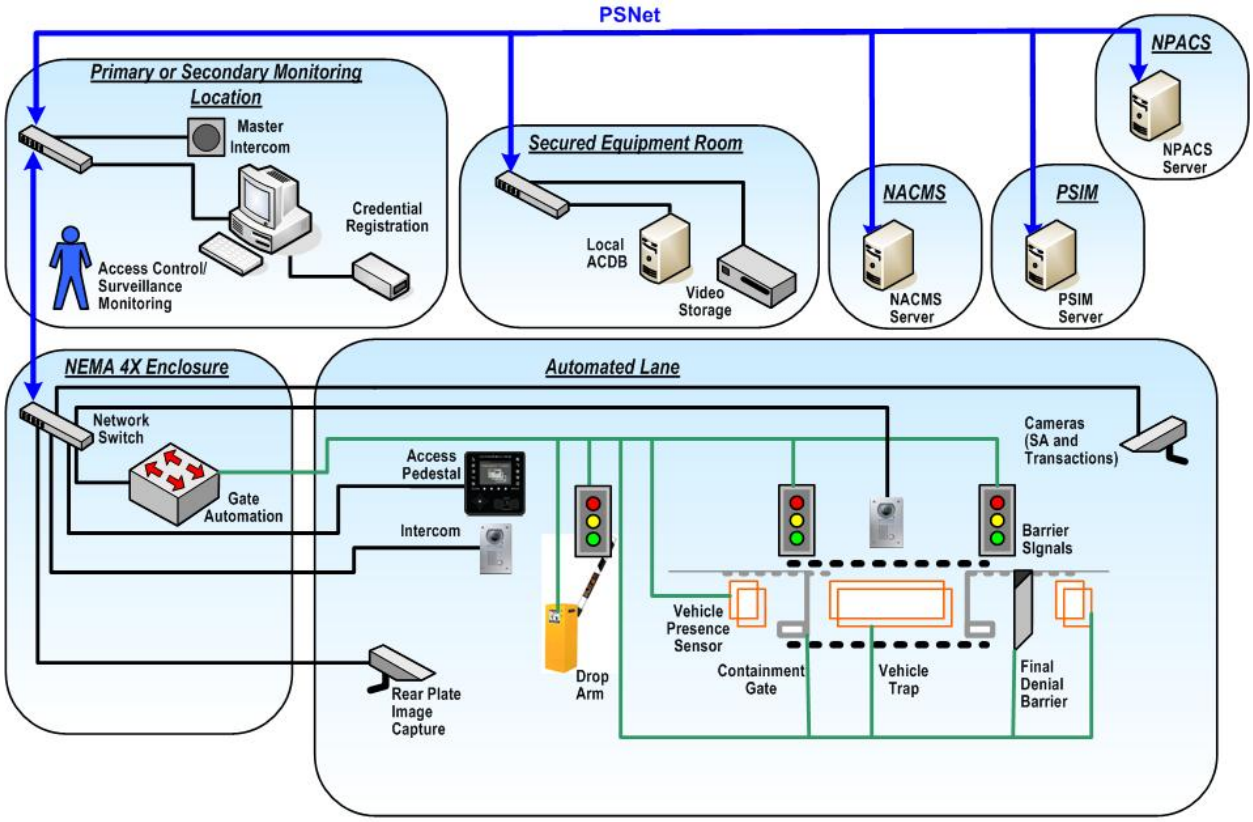


**Figure B-2 Gate Automation System Schematic
(Does not include wrong way and speed detection)**



Automated Vehicle Gate – Low Volume

APPENDIX C ARMY GATE AUTOMATION

C-1 GATE AUTOMATION.

The Automated Installation Entry (AIE) System provides a cost effective system that enhances security of Army Installation Access Control Points (ACPs), automates identity authentication and verification of authorized registered personnel entering the Installation, maintains or increases pedestrian and vehicle throughput with enhanced security, and allows for adaptation of increased authentication requirements at high threat levels.

The AIE System provides automated access control for vehicular traffic and pedestrians that have been enrolled in the system and are authorized access In Accordance With (IAW) the Department of Defense (DOD), Army and Installation Commander's policies. The System is modular and scalable to allow future extensions to other security, access control and force protection systems. The System is flexible and can support future upgrades and technical advancements. AIE consists of Fixed-Full and wireless Handheld configurations. The Handheld configuration provides AIE capabilities to Installations that do not require the full System.

C-1.1 Major Equipment (Per Lane).

Table C-1 Major Equipment Per Lane

Video Cameras	Cameras to capture font of vehicle, rear of vehicle (for vehicle lane), and person's face (vehicle and pedestrian gates).
Lane Control Workstation	Touch-enhanced workstation for use by Guard to monitor and control devices at the lane or multiple lanes.
ACP Monitoring Workstation	Touch-enhanced workstation for use by Guard to monitor and control devices at one or more lanes.
Remote Monitoring Workstation	Touch-enhanced workstation for use by Guard to monitor and control devices at one or more lanes.
Guard Booth Intercom Station	Intercom station that allows Guard to answer and initiate calls from/to the vehicle and pedestrian lanes.
ACP Intercom Station	Intercom station that allows Guard to answer and initiate calls from/to the vehicle and pedestrian lanes.
Remote Monitoring Intercom Station	Intercom station that allows Guard to answer and initiate calls from/to the vehicle and pedestrian lanes.
Rhino Reader Pedestal	Multi-credential reader with display, biometric verification, and PIN pad.
Handheld Device	Retrieves all data in real time from the ACP server and presents it to the operator for situational awareness
Traffic Light	The Traffic Light interface is the Human-Machine Interface (HMI) that informs the vehicle driver to proceed (green light) or not proceed (red light).

Drop Arm	Used to control vehicle movement at the access pedestal

C-1.1.1 Lane Controls.

Lane Controls is the physical interface between an access control card reader and the Physical Access Control System (PACS) that controls the gate arm and coordinates other activities such as situational awareness, common operating picture, and services management. The PACS responds with two signal lines generally intended to light a red (access denied) or green (access granted) indicator that are presented to the user (driver or pedestrian).

C-1.2 Major Equipment (Per ACP).

Table C-2 Major Equipment Per ACP

ACP Monitoring Workstation	Touch-enhanced workstation for use by Guard to monitor and control devices at one or more lanes.
ACP Intercom Station	Intercom station that allows Guard to answer and initiate calls from/to the vehicle and pedestrian lanes.

C-1.3 Registration Operations.

Registration Stations interface displays registration information for the registrar as it is collected. The registrar interacts with the Entry Point registration workstation through the touchscreen monitor or with keyboard and mouse to assist the registrant in presenting appropriate information in expected order. Registration of personnel can also be conducted at the vehicle lane using the pedestal scanner or handheld device.

C-1.4 Registration Equipment.

Registration Data Collection interface allows the registrant to provide the data needed to vet the individual for potential registration in the AIE System. The data collection includes driver's license and passport scanner, fingerprint scanner, signature capture, and PIN entry pad.

C-1.5 Registration Data Package.

The Registration Data Package interface utilizes the IP network to send the collected and packaged PIR data from the Entry Point Client to the Entry Point Server.

C-1.6 Database Overview.

The AIE System makes use of several databases that are described below in Figures C-1 and C-2. The databases are all managed by Microsoft (MS) SQL Server, Enterprise Edition. The choice of Microsoft SQL Server was made by the manufacturers of the COTS software – this is the only database management system (DBMS) that is supported by all software component manufacturers.

Figure C-1 AIE Operational View

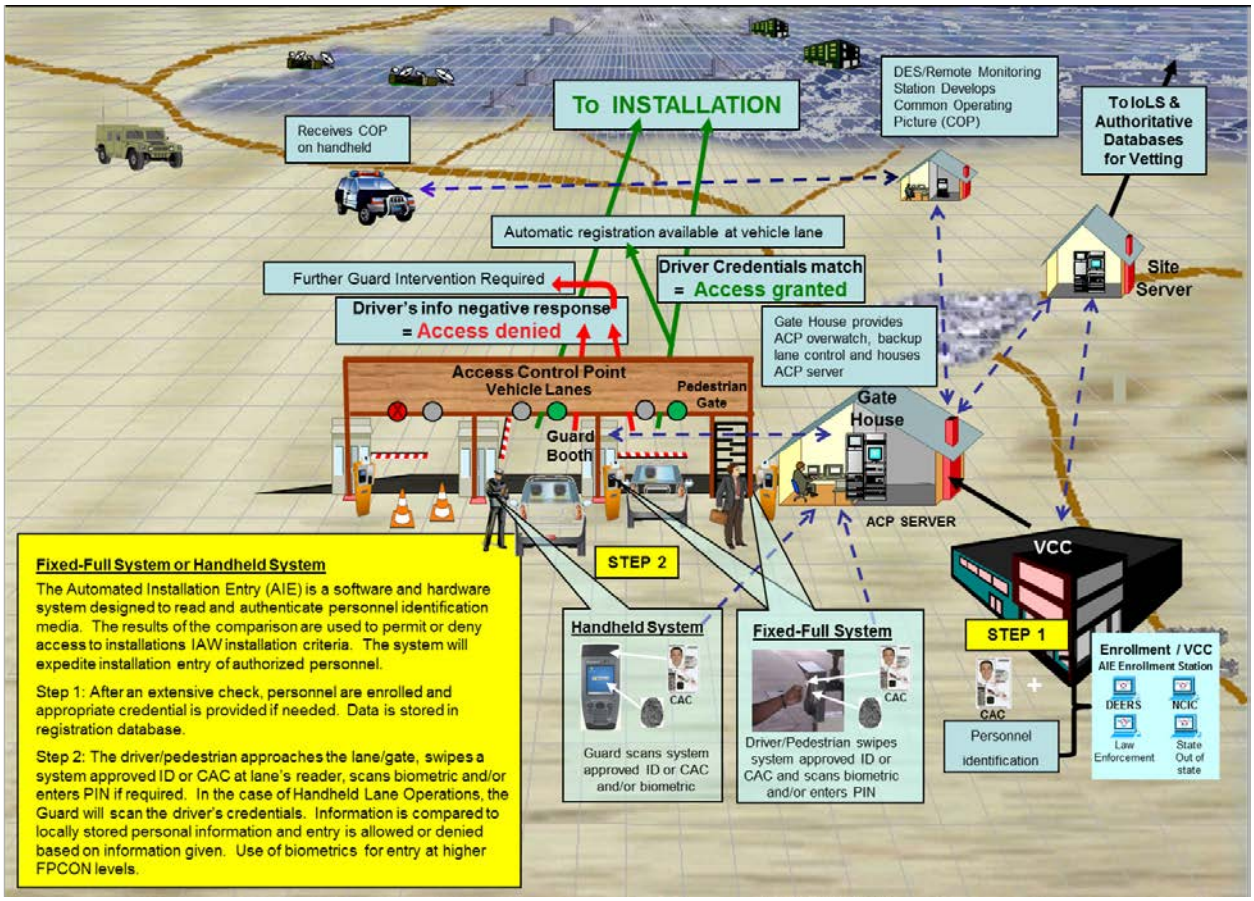
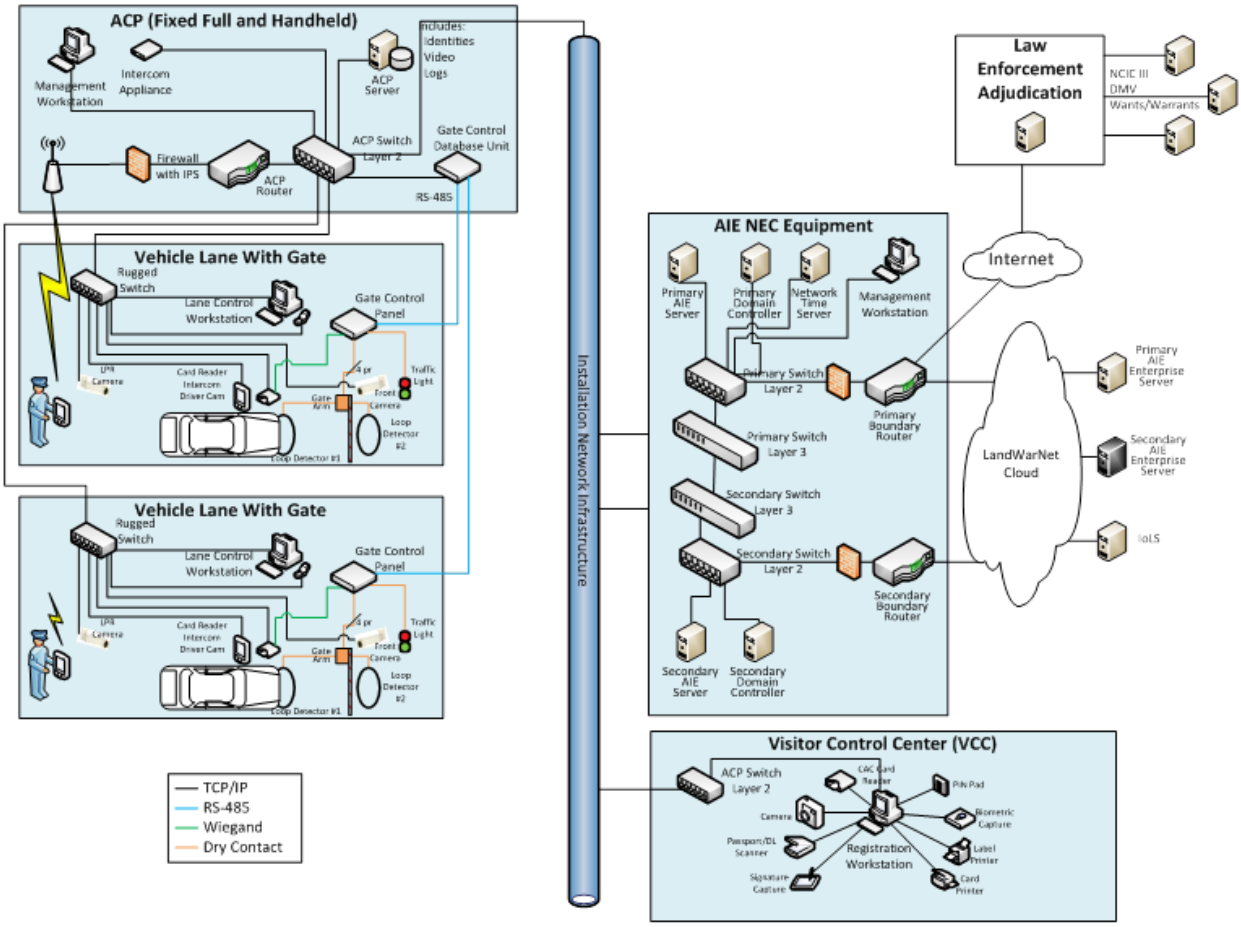


Figure C-2 System Connectivity and Interface Description



APPENDIX D ECF/ACP DEVELOPMENT CHECKLIST

This checklist is provided to assist the planning and design/RFP teams to determine the requirements and major features for an ECF/ACP project. This checklist should be utilized by the planning team, and validated by the RFP/Design team.

Arrange a stakeholder coordination meeting. If possible, include the following Base personnel and public representatives

Stakeholder	Representative Name	Organization	Title
Base Security			
Base Operations/Facilities			
Base Public Works/Utilties			
Base Enviromental			
Base Planning			
Base Antiterrorism Officer (ATO)			
Base Traffic Engineer			
Base Safety			
ECF EIC/Project Manager			
Local Municipality			
State/Local DOT			

Existing ECF/ACP:

1) What type of ECF/ACP? Primary / Secondary / Limited Use

2) What are the ECF/ACP hours of operation? _____

3) What are peak times and staffing levels at those times? _____

4) What are the staffing levels at off peak times? _____

5) How many inbound lanes? _____

6) How many outbound Lanes? _____

7) How are POVs processed? Single / Tandem

8) Are there traffic queuing issues? Yes / No

9) Does the ECF/ACP traffic affect the local community? Yes / No

10) Are current processing times unacceptable? Yes / No

11) Is the ECF/ACP a high crash area? Yes / No

Planning:

1) Was a traffic study done? *(if Yes, go to #6)* Yes / No

2) Will a traffic study be required to update/estimate traffic volumes necessary to validate scope and budget? Yes / No

3) Who will coordinate traffic study and when will it be performed?

_____/_____

4) What are the queuing requirements? POV _____ Truck _____

5) How many vehicles/hour must the ECF/ACP process? _____

6) Will future demand fluctuate due to mission changes, joint basing, or base closure? Yes / No

7) Will the ECF/ACP need to be designed for future demand? Yes / No

If Yes, please explain future demands:

_____
_____
_____
_____

8) Has a Conceptual Design Workshop been completed? Yes / No

If No, convene conceptual Design Workshop if necessary to establish conceptual design. Workshop may be necessary to confirm budget and scope of project.

9) Are there any site-specific challenges unique to the project such as Historical significance or Installation Appearance Plan (IAP), or current site/area availabilities that may affect budget or design? Yes / No

If Yes, explain site specific challenges:

_____
_____
_____
_____

10) Are there any environmental considerations such as wetlands, protected habitats, or cultural resources? Yes / No

If Yes, explain considerations:

_____
_____
_____
_____

11) May the current ECF/ACP be closed for the duration of construction? Yes / No

12) Will a secondary gate be opened? Yes / No

If Yes, which gate? _____

13) Will a temporary ECF/ACP have to be constructed? Yes / No

14) During ECF construction, will traffic be rerouted? Yes / No

15) What are the contractor's responsibilities in regards to gate closure and traffic rerouting?

_____
_____

_____
_____

16) Will this ECF/ACP process Commercial/Large Vehicles? Yes / No

If NO, go to #22

17) Will Commercial/Large Vehicle Inspections be conducted at the ECF/ACP or at a remote site? Yes / No

18) What is the queuing requirement for the Commercial/Large Vehicle Inspection facilities?

_____
_____
_____
_____

19) Will Large Commercial Vehicle/Truck Inspection Facilities require a canopy?

Yes / No

20) Will Large Commercial Vehicle/Truck Inspection facilities require an inspection office?

Yes / No

21) How will Commercial/Large Vehicles be processed?

_____
_____
_____
_____
_____

22) What commercial vehicle inspection equipment will be incorporated and are the specifications available?

_____
_____
_____
_____

23) Will this ECF/ACP process Buses/other Public Transportation vehicles? Yes / No

If Yes, how will uses be processed?

_____
_____
_____
_____

24) Are bus shelters required for this ECF/ACP? Yes / No

If Yes, list requirements for shelter:

_____
_____

_____
_____

25) Will the ECF/ACP process pedestrians? Yes / No

If Yes, how will pedestrians processed?

_____
_____
_____
_____

26) Will the ECF/ACP process bicycles? Yes / No

If Yes, how will bicycles processed?

_____
_____
_____
_____

27) Will the ECF/ACP process visitors? Yes / No

If Yes, will a visitor's center be required? Yes / No

28) Will the ECF/ACP process any unique vehicles? (Construction/Weight Handling/Wide Load Vehicles) Yes / No

_____
_____
_____

29) What is the design threat vehicle? ____ lb. / kg

30) Will a new Gatehouse be required for the ECF/ACP? Yes / No

31) Will new Guard Booths be required for the ECF? Yes / No

If Yes, how many Guard Booths are required? _____

32) Are prefabricated guard booths/houses acceptable? Yes / No

33) Will an Overwatch Position be required for the ECF/ACP? Yes / No

If Yes, will it be permanent structure or concrete pad? Structure / Pad

34) Will an Overhead Canopy be required for the ECF/ACP? Yes / No

35) Will signal light timing have to be coordinated with off installation systems? Yes / No

36) Will public roadways or signal lights have to be modified to implement new ECF/ACP? Yes / No

If Yes, describe modifications.

_____
_____
_____
_____

37) Will active and passive vehicle barriers be required? Yes / No

If Yes, what type of active barrier does the base have or desire?

Net / Wedge / Bollards

38) What type of fencing will be required to match existing appearance?

Chain-Link / Ornamental / _____

39) Locate utility connection points:

Water:

Connection Point _____Size _____ Distance _____

Sewage:

Connection Point _____Size _____ Distance _____

Storm water:

Connection Point _____Size _____ Distance _____

Electric:

Connection Point _____Size _____ Distance _____

Voice:

Connection Point _____Size _____ Distance _____

Data:

Connection Point _____Size _____ Distance _____

Security (duress, identity management, CCTV monitoring):

Connection Point _____Size _____ Distance _____

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APPENDIX E GLOSSARY

ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ACP	Access Control Point
ABA	Architectural Barriers Act
AFMAN	Air Force Manual
AR	Army Regulation
AT	Antiterrorism
ATO	Antiterrorism Officer
AVB	Active Vehicle Barrier
BIA	Bilateral Infrastructure Agreements
CBR	Chemical, Biological and Radiological
CCR	Criteria Change Request
CCTV	Closed Circuit Television
CFR	Code of Federal Regulations
CONUS	Continental United States (Within the United States and its territories and possessions.)
CRI	Color Rendition Index
DLAR	Defense Logistics Agency Regulation
DoD	Department of Defense
DoS	Department of State
DOT	Department of Transportation
DVR	Digital Video Recorder
ECF	Entry Control Facility
EFO	Emergency Fast Operation

EOC	Emergency Operations Center
FDA	Food and Drug Administration
FHWA	Federal Highway Administration
FP	Force Protection
FPCON	Force Protection Condition
FOUO	For Official Use Only
GCC	Geographic Combatant Command
GFI	Ground Fault Interrupt
HAZMAT	Hazardous Material
HID	High intensity Discharge
HNFA	Host Nation Funded Construction Agreement
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HVAC	Heating Ventilating Air Conditioning
IAW	In Accordance With
ID	Identification
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineers
IEQ	Indoor Environmental Quality
IESNA	Illuminating Engineering Society of North America
ITE	Institute of Transportation Engineers
LEED	Leadership in Energy and Environment Design
LIDAR	Light Detection and Ranging
MCO	Marine Corps Order
MIL-STD	Military Standard
MP	Military Police

mR	milli-Roentgens
MUTCD	Manual on Uniform Traffic Control Devices
NAVFAC	Naval Facilities Engineering Command
NFPA	National Fire Protection Association
OCONUS	Outside the Continental United States (Outside the United States and its territories and possessions.)
OPNAVINST	Chief of Naval Operations Instruction
PDC	Protective Design Center
POV	Privately Owned Vehicle
PROWAG	Public Rights of Way Guidelines
RAM	Random Antiterrorism Measures
SDDCTEA	Surface Deployment and Distribution Command –
SOFA	Status of Forces Agreement
SU	Single Unit (Vehicle)
TCP/IP	Transmission Control Protocol/ Internet Protocol
UFC	Unified Facilities Criteria
UFGS	Unified Facilities Guide Specification
UL	Underwriters Laboratories
UPS	Uninterruptible Power Supply
USACE	U.S. Army Corps of Engineers
USD (AT&L)	Under Secretary of Defense of Acquisition, Technology, and Logistics
UVSS	Under Vehicle Search Systems
WB	Wheel Base
WBDG	Whole Building Design Guide