

Perimeter Security



NAVFAC Far East
Presented by: John Lynch, P.E.
NAVFAC Atlantic
Capital Improvements Business Line
Engineering Criteria and Programs

September 2019

UFC 4-20-01 Table 3-21 Default Tactics For Buildings



Default Tactics	Applicable Assets				
	People	Equipment	Supplies	Critical Infrastructure	Operations and Activities
Moving Vehicle Bomb	✓				✓
Stationary Vehicle Bomb	✓	✓		✓	✓
Hand Delivered Devices	✓	✓		✓	✓
Indirect Fire Weapons	✓	✓		✓	✓
Direct Fire Weapons	✓	✓		✓	✓
Waterfront Attack	✓	✓		✓	✓
Active Shooter	✓				✓
Airborne Contamination	✓				✓
Waterborne Contamination	✓				✓
Forced Entry	✓	✓	✓	✓	✓
Covert Entry	✓	✓	✓	✓	✓
Visual Surveillance	✓				✓
Acoustic Eavesdropping					✓
Electronic Emanations Eavesdropping					✓

Protective Measures provided by UFC 4-020-01, Security Engineering Facilities Planning Manual (Proposed Revision 2019/2020)

WHAT DO WE REALLY NEED?



WHAT DO WE REALLY NEED?



4

UNCLASSIFIED: Introduction to Perimeter Security

September 2019

WHAT DO WE REALLY NEED?



5

UNCLASSIFIED: Introduction to Perimeter Security

September 2019

WHAT DO WE REALLY NEED?



PORTSMOUTH NAVAL SHIPYARD – KITTERARY, MAINE

WHAT DO WE REALLY NEED?



MAIN GATE – GATE 1



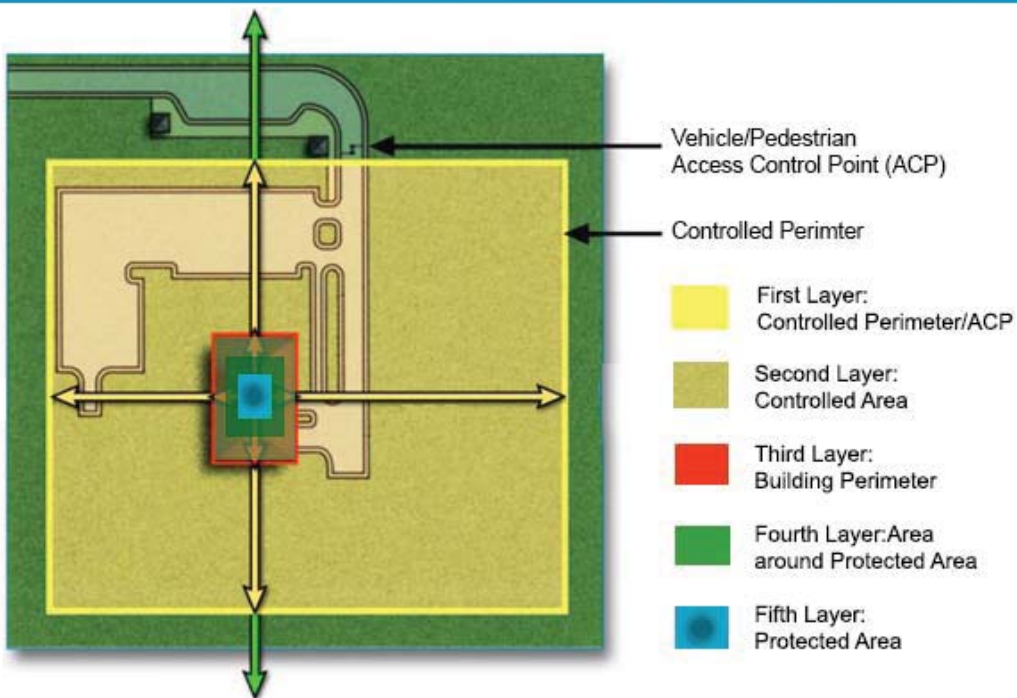
GATE 2

PORTSMOUTH NAVAL SHIPYARD – KITTERARY, MAINE

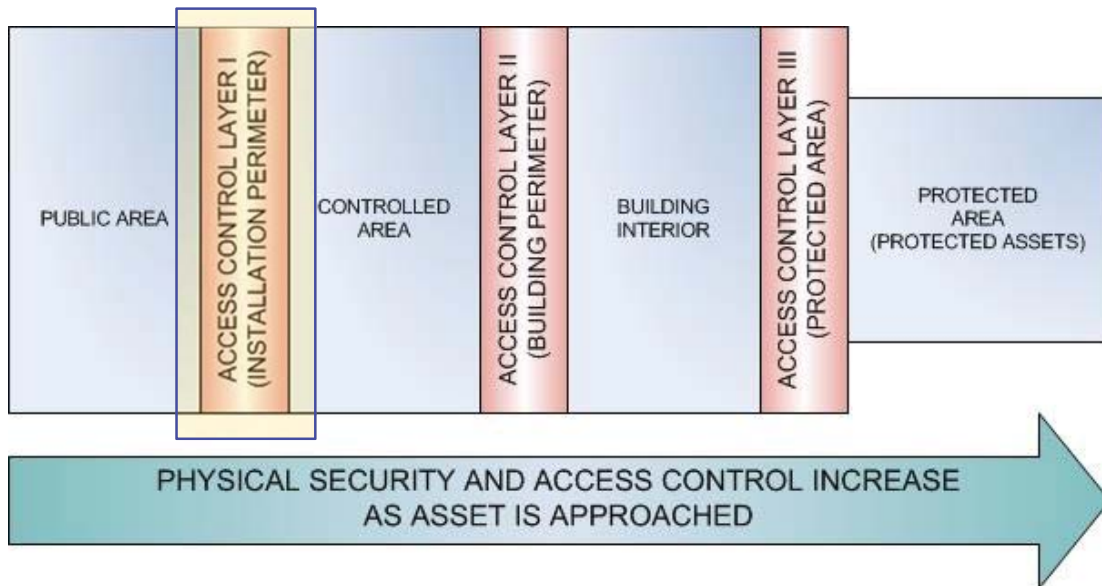
WHAT DO WE REALLY NEED?



Security or Defense-in-Depth



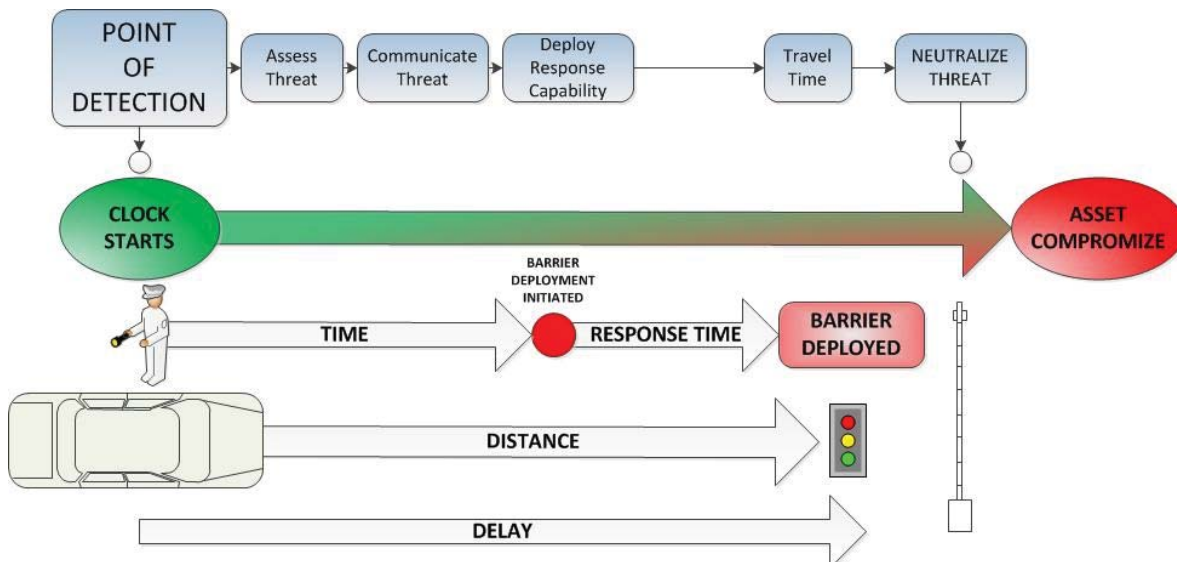
ZONE CONCEPT



Protective System Timeline



To be effective, the system must ensure the time between detection of an intrusion and intervention by the response capability is less than the time it takes to compromise the asset.

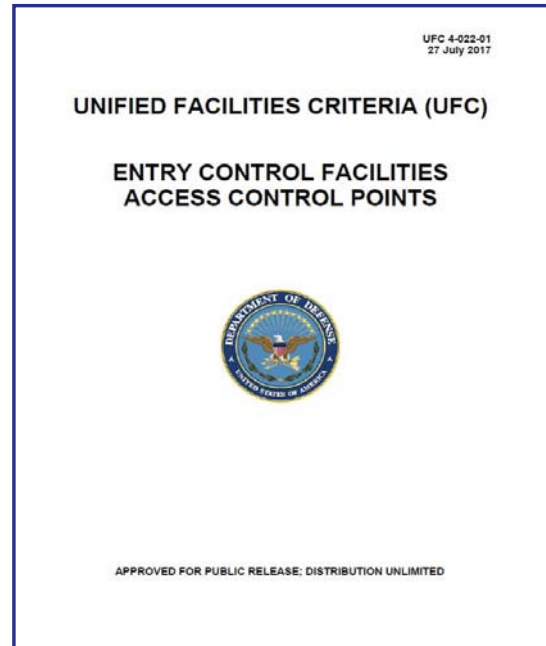


UFC 4-022-01

Entry Control Facilities/Access Control Points



- **Purpose:**
 - Provide criteria to create safe and efficient entry control facilities for the wide variety of DoD Installations.
- **Lead Agency: Navy**
 - Point of contact: John Lynch
 - Primary Author: John Lynch
- **Current Document Status:**
 - First Published in May 2005
 - Complete Revision published July 2017
 - Format
 - Lessons Learned
 - Traffic Safety
 - Technology improvements



UFC 4-022-01 What's In It

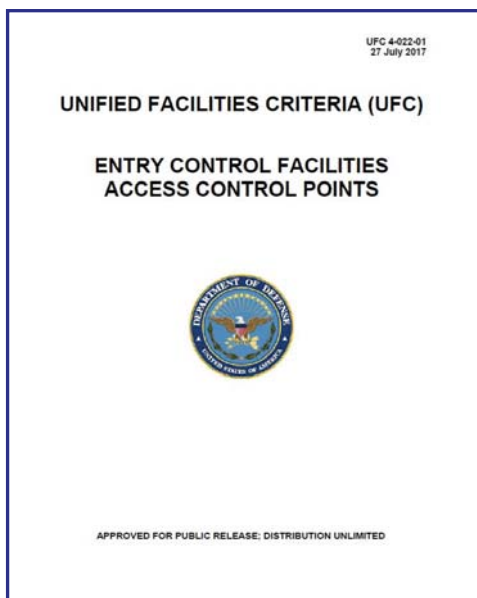
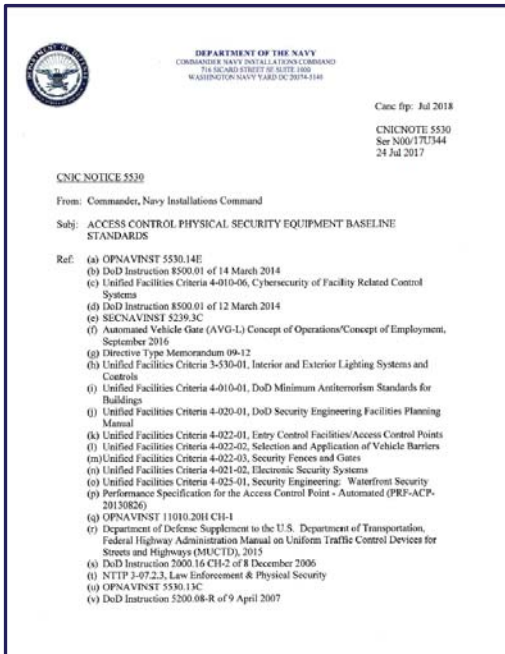


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CNIC NOTICE 5530

Access Control Physical Security Equipment Baseline Standards



- Establish minimum access control point (ACP) baseline definitions and standards.
- Provide a standardized, integrated approach based on validated requirements to procure, install, and sustain access control physical security equipment (AC-PSE) aboard Navy shore installations and sites.
- Delineate authority regarding AC-PSE requirement generation, project prioritization, and achievement of baseline and site-specific standards.
- Cancelled July 2018 – Content will be incorporated into CNICINST 5530.14 'CNIC Ashore Protection Program'

COMMON TERMS / ACRONYMS



- **ACP** Access Control Point
- **ECF** Entry Control Facility
- **AVB** Active Vehicle Barrier
- **SDDCTEA** Surface Deployment and Distribution Command
Transportation Engineering Agency
- **MUTCD** Manual on Uniform Traffic Control Devices
- **AASHTO** American Association of State Highway
and Transportation Officials
- **UFC** Unified Facilities Criteria

UFC IMPROVEMENTS



- Originally published 25 May 2005
- **Presents unified approach to design of Entry Control Facilities (ECF) / Access Control Points (ACP)**
- Ensures proper level of access control for all DoD personnel, visitors, and commercial traffic to installations
- Establishes baseline for ECF/ACP overall layout, organization, infrastructure, and facilities
- Addresses objectives of ECF/ACP
 - Safety
 - Security
 - Capacity
 - Sustainability

UFC IMPROVEMENTS



- Eliminates information that could be referenced from other references
- Improves consistency and uniformity of terminology
- Clarifies recommendations vs. requirements
- Minimizes service-specific items
- Incorporates new and updated standards and requirements and new information based on studies and research

UFC IMPROVEMENTS



- Requires traffic engineering assessment prior to design
- Requires coordination with master plans
- Addresses sustainability
- Discusses automation to minimize personnel requirements and enhance security (Army and Navy)
- Changes many “should” to “musts”

UFC IMPROVEMENTS

Summary of “Musts”



- Overhead Canopy
- Perimeter Gate
- Vehicle Containment
- Certified Vehicle Barriers
- Personnel Protection
- Rejection Capability
- Traffic Control Devices (MUTCD)
- Vehicle Search Areas
- Overwatch
- Baseline Vehicle Characteristics
- Ballistic Protection
- Back Up Power
- Redundant Communications
- Connection To Networks
- CCTV
- Lighting

IMPROVED TRAFFIC



- **Traffic Improvements**

- **Improve throughput**

- Better design of Approach Zone to minimize queueing
 - Support tandem processing
 - Conduct random inspections out of traffic lanes

- **Maximize lanes within constraints**

- **Avoid conditions which inhibit traffic**

- Example: Improper lane transitions

- **Traffic Considerations on surrounding roadways**

- **Speed Management**

- **Traffic Control Devices**

- Signage – size/legibility/reflectivity requirements
 - Speed limit signing
 - Guide signing
 - Pavement Marking and Lighting

IMPROVED SAFETY



- **Safety Improvements**

- **Personnel Safety & Quality of Service**

- Canopy for all inbound lanes and reversible outbound
 - Elevated median/island/platforms for security forces personnel
 - Barriers at median/island/platforms and facilities
 - Prevent accidental or intentional vehicular impact
 - Improved lighting
 - Ballistic resistance provided for all guard facilities

- **Public Safety**

- Improved lighting
 - Improved signage and traffic control

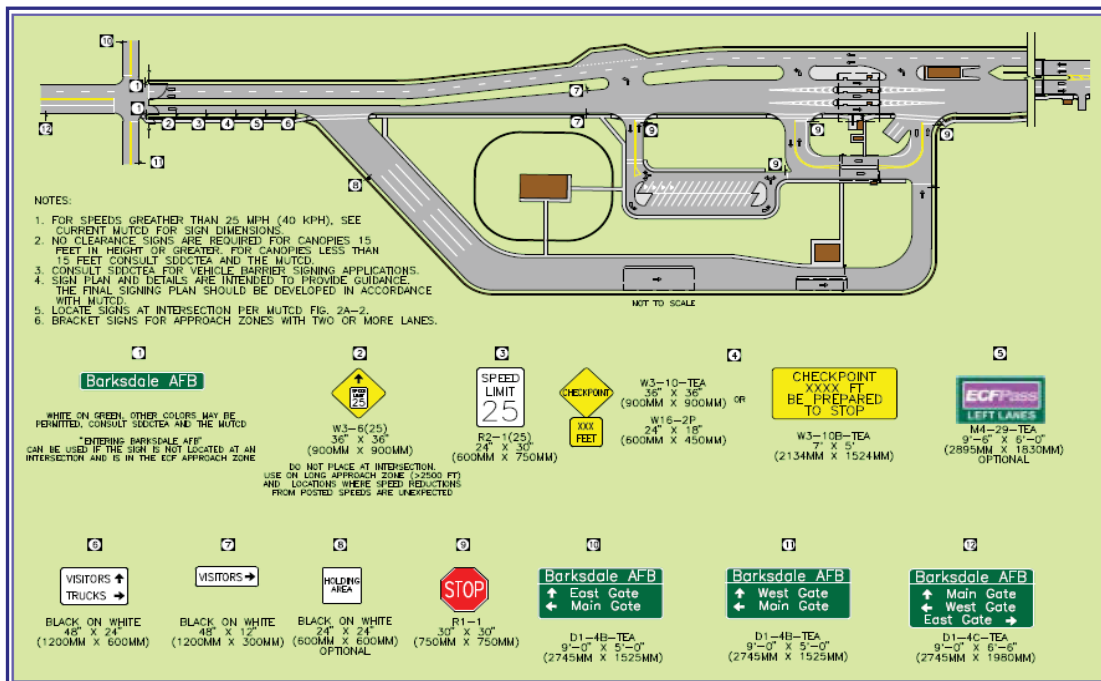
- **Barrier Design and Safety Considerations**

- Delineation of Active Vehicle Barriers (AVB)
 - Options provided for required safety protocols/schemes
 - AVB control requirements (*UFGS – Access Control Point Control System*)
 - Vehicle Detection Systems

IMPROVED SAFETY

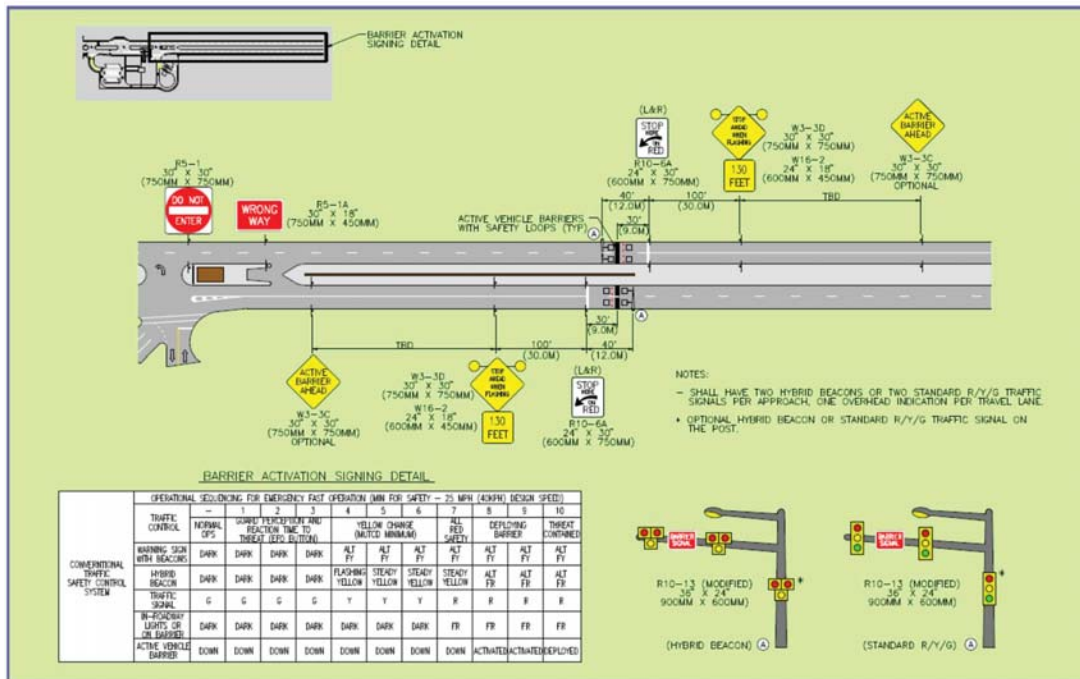


IMPROVED SAFETY SDDCTEA PAMPHLET 55-15 – SAMPLE SIGN LAYOUT



IMPROVED SAFETY - SDDCTEA PAMPHLET 55-15

Conventional Traffic and Safety Control System for AVBs



UFC IMPROVEMENTS



• Appendix D – ECF/ACP Development Checklist

➤ ECF Configuration

- Volume
- Queuing Requirements/Constraints
- Vehicle Requirements (Passenger, Commercial/Large Vehicle, Pedestrian)
- Processing Time
- Design Threat Vehicle (Response Zone, Barrier requirements)
- Future Requirements

➤ Site Selection

- Location and Master Plan Coordination
- Compatible Land Use with surrounding facilities
- Public Road Modification
- Environmental Constraints (wetlands, protected habitats, restorations sites)
- Utilities

ECF/ACP Development Checklist Existing/New ECF/ACP



EXISTING ECF/ACP

- What type of ECF/ACP?
Use/Pedestrian Primary / Secondary / Limited
- What are the ECF/ACP hours of operation? _____
- What are peak times and staffing levels at those times? _____
- What are the staffing levels at off peak times? _____
- How many inbound lanes? _____
- How many outbound Lanes? _____
- How are POV processed? Single / Tandem
- Are there traffic queuing issues? Yes / No
- Does the ECF/ACP traffic affect the local community? Yes / No
- Are current processing times unacceptable? Yes / No
- Is the ECF/ACP a high crash area? Yes / No

ECF/ACP Development Checklist Existing/New ECF/ACP



PLANNING FOR ECF/ACP

- Was a traffic study/analysis done for initial design? Yes / No
- Will a traffic study be required to update/estimate traffic volumes
necessary to validate scope and budget? Yes / No
- Who will coordinate traffic study and when will it be performed? _____
- What are the queuing requirements? POV___ Truck___
- How many vehicles/hour must the ECF/ACP process? _____
- Will future demand fluctuate due to mission changes, joint basing,
or base closure? Yes / No
- Was/Will the ECF/ACP designed for future demand? Yes / No
- Does this ECF/ACP process Commercial/Large Vehicles? Yes / No
- How will Commercial/Large Vehicle be processed?
- Does the ECF/ACP process visitors? Yes / No
- Is the Gatehouse functionally adequate for the ECF/ACP? Yes / No
- Are the Sentry/Guard Booths functionally adequate for the ECF? Yes / No
- Is the Overwatch Position functionally adequate for the ECF/ACP? Yes / No

**SEE UFC 4-022-01 Entry Control Facilities/Access Control Points
Appendix D ECF/ACP Development Checklist for a more thorough list of questions.**

Team Work, Let's Talk



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)

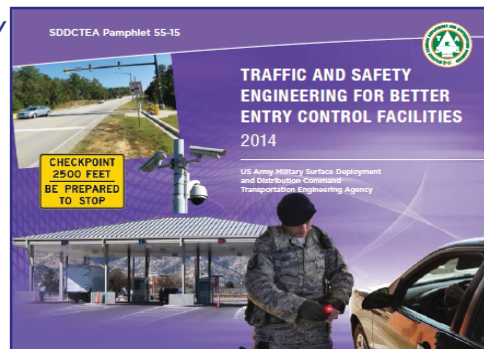
SDDCTEA PAMPHLET 55-15 ...Better Entry Control Facilities



• **SDDCTEA Pamphlet 55-15, Traffic and Safety Engineering for Better Entry Control Facilities**

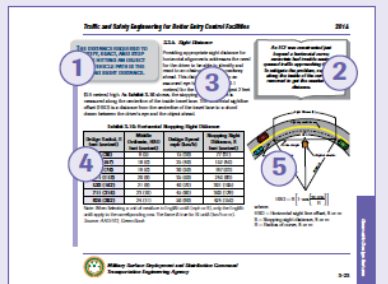
- **Supplement other existing criteria and guidance**
- **Bridge the gap between ECF standards and national engineering standards**
- **Standard**

- Referenced in UFC
- Referenced in Army Standard for Access Control Points and Standard Design



There are several elements associated with each topic contained in this pamphlet:

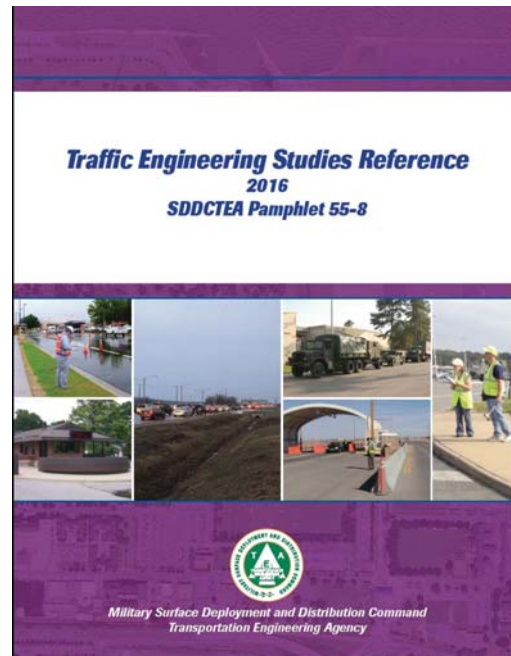
1. **Key Point** – Represents the critical information you should know about a particular topic.
2. **Lesson Learned** – Provides a specific example about the subject matter.
3. **Content** – Provides specific, detailed guidance.
4. **Tables** – Provides easy-to-use, look-up values for a particular subject.
5. **Graphics** – Illustrate the content or represent an applied condition.





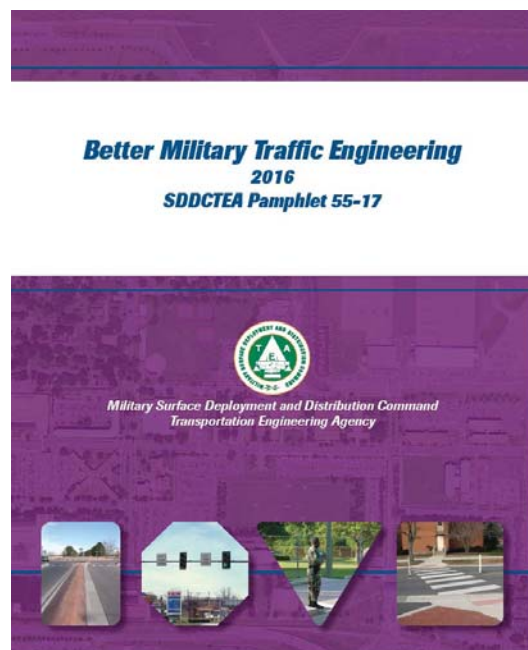
- **SDDCTEA Pamphlet 55-8, Traffic Engineering Studies Reference**

- This pamphlet describes a variety of the most common traffic engineering studies that can provide the objective data and analysis needed to assist in the evaluation of traffic conditions and development of projects to improve the safety and mobility of the installation travel network.
- The studies need to address the range of military installation aspects including, but not limited to, access gates; arterial and minor streets; signalized controlled intersections; and, training and recreation areas. A poorly functioning transportation network on an installation can lead to traffic congestion and delay, safety and security concerns, health risks, and environmental issues. Understanding existing and potential problems relating to the movement of people within the base facility is critical.



- **SDDCTEA Pamphlet 55-17, Better Military Traffic Engineering**

- This version of Pamphlet 55-17 is an update to the 2011 version of SDDCTEA Pamphlet 55-17. This pamphlet also combines content from and supersedes SDDCTEA Pamphlet 55-14 (Signs and Markings) dated 2011. Therefore, previous versions of SDDCTEA Pamphlet 55-17 and all versions of SDDCTEA Pamphlet 55-14 are voided and obsolete with the release of this document.
- This pamphlet addresses the traffic engineering areas of data collection and analysis, traffic operations, and transportation planning as they should be applied on military installations.
- This document was developed using reference sources such as: 2009 *MUTCD* with Revisions 1 and 2; 2011 *AASHTO Green Book*, 2015 DoD Supplement to the *MUTCD*, among others.
- SDDCTEA's DoD Supplement to the *MUTCD* is intended to provide DoD-specific traffic control requirements to include traffic conditions specific to DoD installations.



ACP/ECF SMART Decision Evaluator



- The purpose of the ACP/ECF SMART Decision Evaluator software is to help decide the best configuration for an ACP: to provide different scenarios that help right-sizing the number of ID check lanes, with the optimal number of guards in order to minimize construction and operating costs, minimize risk, minimize environmental effects, obtain an acceptable maximum vehicle queue length, and obtain the greatest reasonable level of service in terms of overall delay to entering vehicles.

Summary Tab (continued)
Methods Applied with Revised Lanes
No. Access Lanes: 0

Total Lanes Needed	Manual Processing		Partial Processing		All Processing	
	Manpower	Cost	Manpower	Cost	Manpower	Cost
1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	3	3	3	3	3	3
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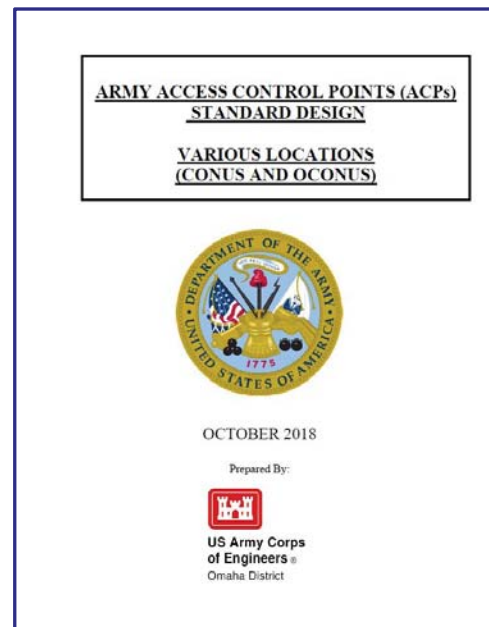
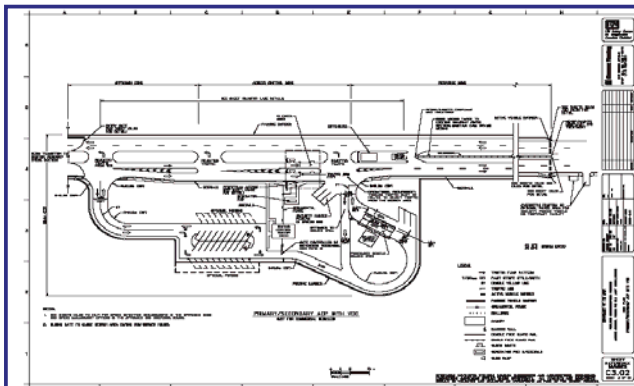
Security	<ul style="list-style-type: none"> What AT measures are required? How do these requirements impact traffic (processing) and will that impact necessitate additional manpower or lanes? Can automation enhance security? Is the system providing positive access control?
Manpower	<ul style="list-style-type: none"> Is manpower utilized efficiently? Would additional lanes allow for more efficient processing thus reducing manpower demands? Will automation help reduce manpower costs?
Automation	<ul style="list-style-type: none"> Will automation provide a manpower cost savings? Will automation provide a security benefit? Will automation be able to achieve comparable processing rates to manual processing? Can the infrastructure (lanes) support automation initiatives? Are there policy decisions that need to be implemented to support efficient automation?
Roads & Lanes	<ul style="list-style-type: none"> Are there sufficient lanes to accommodate manual processing? Are there sufficient lanes to accommodate automation? If additional lanes were constructed, could manpower be reduced?
Traffic & Safety	<ul style="list-style-type: none"> How do security decisions impact processing (traffic)? How do manpower decisions impact processing (traffic)? How do automation decisions impact processing (traffic)?



USACE – ARMY ACCESS CONTROL POINTS STANDARD



- Department of the Army/USACE/PDC
 - Army Access Control Points Standard Design – October 2018
 - Army Standard for ACPs – April 2012
 - Includes standard drawings and supporting appendices
 - Guidance on AVB placement as well as traffic and safety requirements





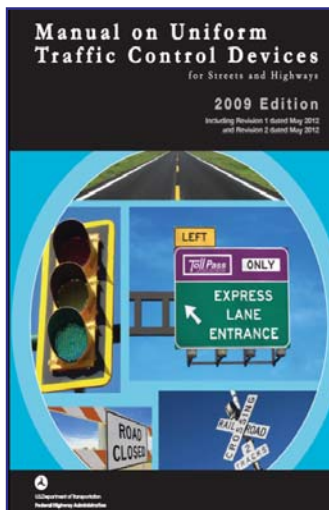
- **FACILITIES DYNAMIC PROTOTYPES DESIGN: ENTRY CONTROL FACILITIES / INSTALLATION ACCESS CONTROL POINTS (ECF/IACP)**
- **1 MARCH 2015**

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U.S. AIR FORCE

NATIONAL STANDARDS



DOCUMENT	CONTENT	WHERE TO FIND
Institute of Traffic Engineering (ITE), <i>Traffic Engineering Handbook</i>	This document provides guidance on traffic engineering practices and principles.	https://www.ite.org/technical-resources/
Institute of Traffic Engineering (ITE), <i>Traffic Calming ePrimer</i>	The ePrimer presents a thorough review of current traffic calming practice and contains the information needed to understand this complex field.	https://safety.fhwa.dot.gov/speedmg/traffic_calm.cfm
Federal Highway Administration (FHWA), <i>Manual on Uniform Traffic Control Devices (MUTCD)</i>	This document provides guidance on the placement of signs, pavement markings, and the rules that govern their placement.	https://mutcd.fhwa.dot.gov/
Federal Highway Administration (FHWA), <i>Standard Highway Signs</i>	This document provides detailed drawings of the standard highway signs prescribed or provided for in the MUTCD	https://mutcd.fhwa.dot.gov/ser-shs_millennium_eng.htm
American Association of State Highway and Transportation Officials (AASHTO), <i>A Policy on Geometric Design of Highways and Streets (The Green Book)</i>	This document provides guidance for the safe and efficient design of geometric components for transportation facilities.	https://www.fhwa.dot.gov/design/standards/151112.cfm
AASHTO, <i>Roadside Design Guide</i>	This document provides guidance on design requirements and treatments outside the travel way, but in close proximity to the roadway.	Available on the Whole Building Design Guide / Non-Government Standards https://www.wbdg.org/ffc/dod/non-government-standards
Transportation Research Board (TRB), <i>Highway Capacity Manual</i>	This document provides guidance on methodologies for estimating capacity and determining level of service for transportation facilities.	http://www.trb.org/Main/Blurbs/175169.aspx
Illuminating Engineering Society of North America (IESNA), <i>IES G-1 - Guide for Security Lighting for People, Property, and Critical Infrastructure</i>	This document is intended to establish guidelines for the design and implementation of security lighting.	Available on the Whole Building Design Guide / Non-Government Standards https://www.wbdg.org/ffc/dod/non-government-standards





DoD Manual 5200.08 VOLUME 3

PHYSICAL SECURITY PROGRAM: ACCESS TO DoD INSTALLATIONS

Originating Component: Office of the Under Secretary of Defense for Intelligence

Effective: January 2, 2019

Releasability: Cleared for public release. Available on the DoD Issuance Website at <http://www.esd.whs.mil/DD>.

Incorporates and Cancels: Directive Type Memorandum 09-012, "Interim Policy Guidance for DoD Physical Access Control," December 8, 2009

Approved by: Joseph D. Kernan, Under Secretary of Defense for Intelligence

Purpose: This manual is composed of several volumes, each containing its own purpose. In accordance with DoD Directive (DoDD) 5143.01 and DoD Instruction (DoDI) 5200.08:

- The manual implements policy, assigns responsibilities, and prescribes procedures for managing and executing the DoD Physical Security Program.
- This volume assigns responsibilities and prescribes procedures for controlling physical access to DoD installations consistent with Section 1069 of Public Law 110-181 and Section 1066 of Public Law 114-92 by establishing:
 - Standards and methods for verifying the identity of and protocols for determining the fitness of individuals entering DoD installations.
 - Three types of access to DoD installations: unescorted, trusted traveler, and escorted.
 - Three types of installations for the purposes of controlling access to DoD installations: electronic physical access control system (ePACS)-enabled DoD installations with Identity

- This manual is composed of several volumes, each containing its own purpose. In accordance with DoD Directive (DoDD) 5143.01 (Defense Intelligence) and DoD Instruction (DoDI) 5200.08 (Installation Security).
- The manual implements policy, assigns responsibilities, and prescribes procedures for managing and executing the DoD Physical Security Program.
- This volume assigns responsibilities and prescribes procedures for controlling physical access to DoD installations

ECF MISSION



- **Secure the installation from unauthorized access and intercept contraband while maximizing traffic flow**
- **Several required components to perform this function**

Security	The first objective of an ECF is to maintain perimeter security and establish the demarcation line between the controlled and uncontrolled perimeter of the installation. An ECF must accommodate RAM and must be able to operate at all FPCONs protecting against illegal entry.
Safety	Safety measures shall be incorporated 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. Safety provisions for Security Forces includes personnel protection against attack and errant drivers as well as considerations for climate, location, and orientation.
Capacity	The ECF needs 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.
Sustainability	The ECF should reduce energy costs, facility maintenance and operations costs through sustainable design where appropriate.

ECF OPERATIONS



- Identification and inspection procedures are the most common operations
- Level of I.D. and inspection varies with Force Protection Condition (FPCON)
- Installation AT Plan will define the operations at an ECF during each FPCON and will include random measures from each FPCON at any time
- Design should consider the operations and anticipated traffic volume during each FPCON (Alpha, Bravo, Charlie, Delta)
- However, some congestion and hardship is expected at higher levels of FPCON
- As a minimum, ECF should support FPCON Bravo operations with no congestion

ECF CLASSIFICATIONS

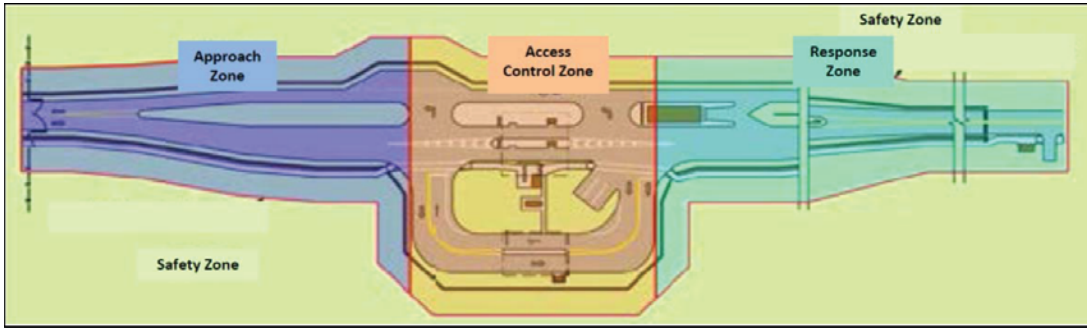


Use Classification	Traffic Volumes	Typical Hours of Operation	Highest FPCON Operation	Services Provided	Visitor Passes	Random Inspection	Authorized Visitors	Truck Processing
Primary	High	24/7 – open continuously	Delta	Optional designation as truck and delivery ECF	✓	✓	✓	✓
Secondary	Moderate	Regular hours, but closed at times	Closed at or above Charlie	Optional designation as truck and delivery ECF		✓	✓	✓
Limited Use	Low	Open for special purposes	NA	Tactical vehicles, HAZMAT, special events, etc				
Pedestrian Access	Varies	Varies	Closed at or above Charlie	Personnel only, could be located near installation housing areas, near schools, or as part of a Main or Primary ECF	✓		✓	

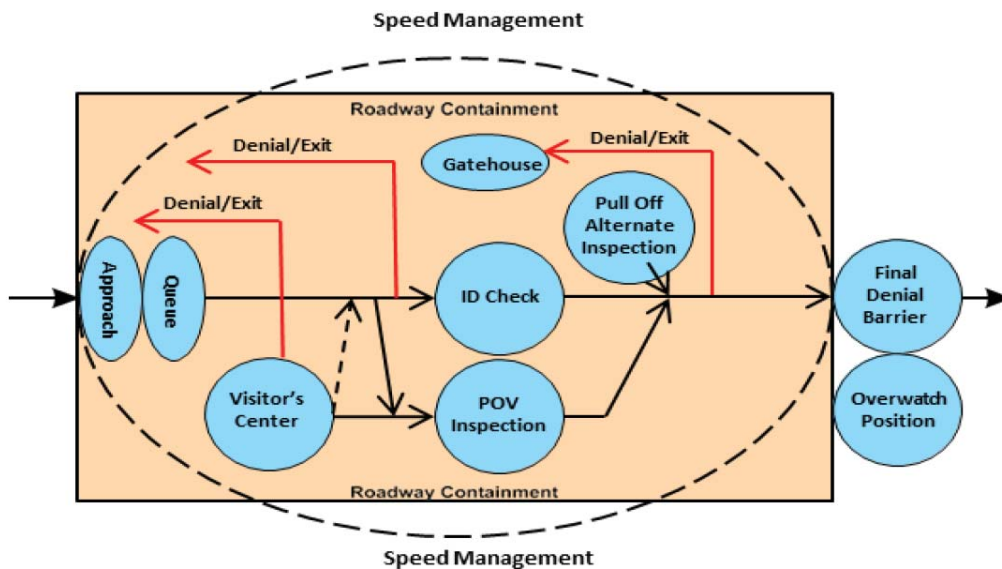
STRUCTURE OF AN ECF



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.

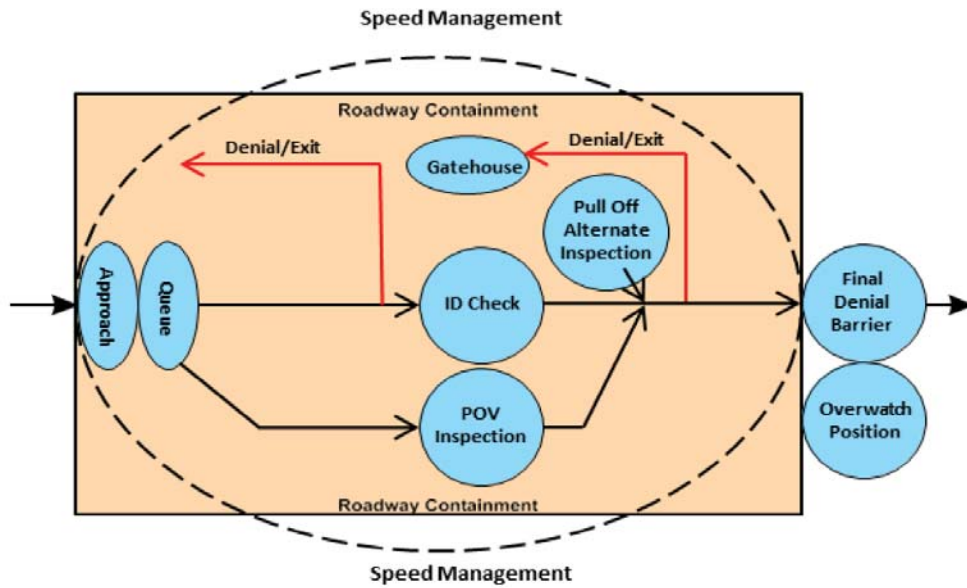


ECF/ACP FUNCTIONAL RELATIONSHIPS



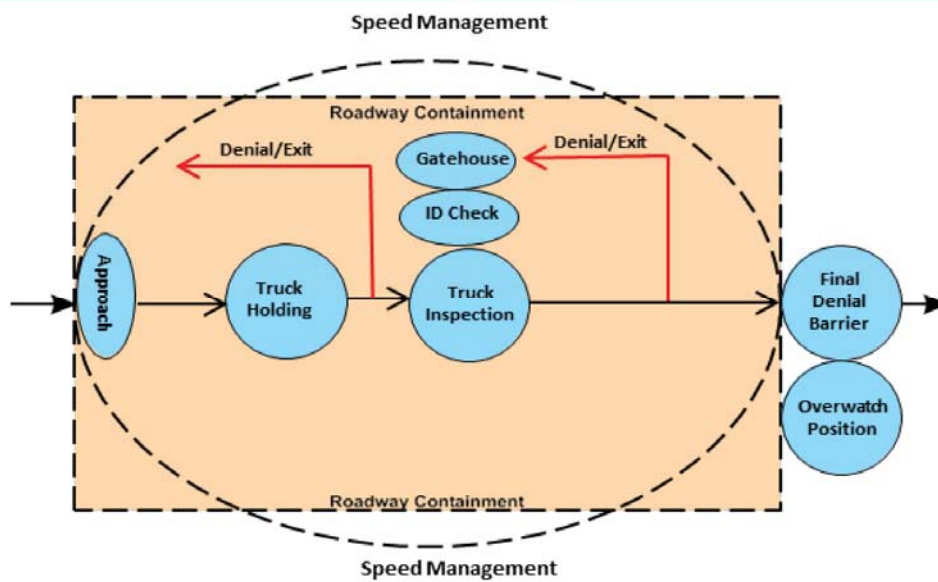
Visitors/DoD Personnel ECF/ACP

ECF/ACP Functional Relationships



DoD Personnel Only ECF/ACP

ECF/ACP Functional Relationships

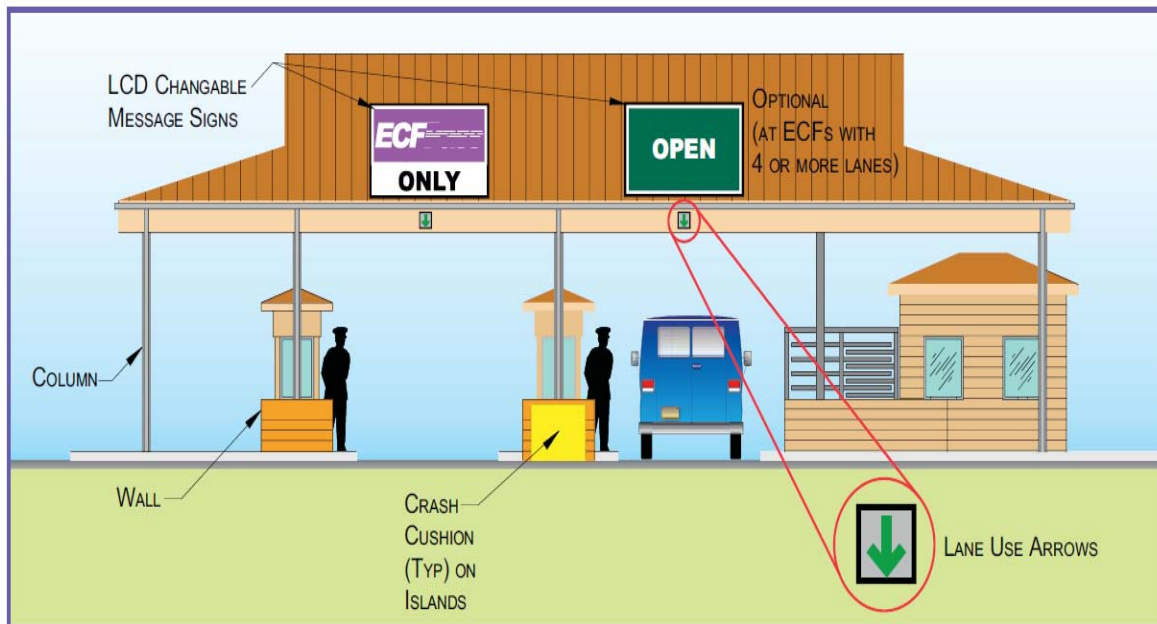


Commercial Vehicle ECF/ACP

APPROACH ZONE



SDDCTEA PAMPHLET 55-15 – LANE ASSIGNMENT GUIDANCE



APPROACH ZONE

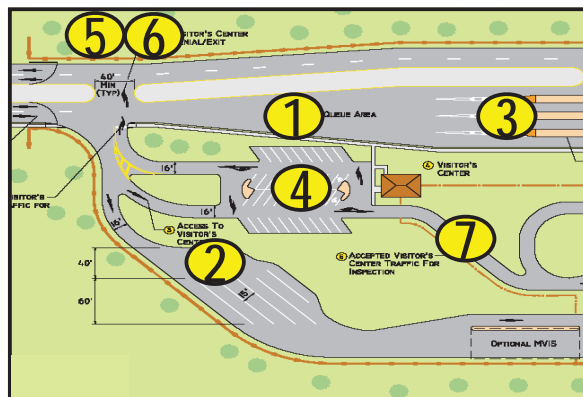


PORTSMOUTH NAVAL SHIPYARD – KITTERARY, MAINE – GATE 2

APPROACH ZONE



- Extends from the installation boundary to the first rejection point
- Functions include
 - Reducing speed of incoming vehicles
 - Performing sorting of traffic by vehicle type
 - Providing adequate stacking/queueing distance
 - Providing first opportunity to identify potential threats
 - Wrong-Way Detection
 - Overspeed Detection



- | | |
|---|---|
| 1. Queuing area for POVs | 5. Visitor control center rejection |
| 2. Holding area for trucks | 6. Rejection for vehicles that entered the ECF errantly |
| 3. Secondary (advanced) islands for future automation | 7. Access to inspection areas |
| 4. Visitor control center | |

ACCESS CONTROL ZONE



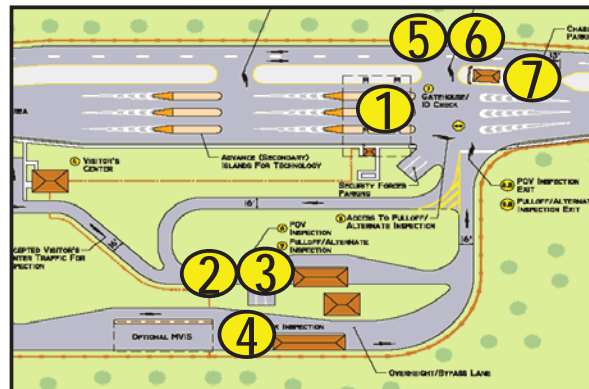
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ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

ACCESS CONTROL ZONE



- Main controlling element of ECF
- Provides access control and inspection capability
- Location of major facilities and control center
- Extends from the end of the approach zone to the end of the last rejection point after the ID Check Area
- Identify vehicles and personnel; provide surveillance, random and post-ID inspection, visitor processing and rejection capabilities



- | | |
|------------------------------------|---|
| 1. Identify Vehicles And Personnel | 5. Post ID Check Rejection |
| 2. Post-ID And Random Inspections | 6. Rejection From Inspection |
| 3. Visitor Processing/Inspection | <ul style="list-style-type: none"> • Operational Procedures |
| 4. Truck Processing And Inspection | 7. Gatehouse |
| | <ul style="list-style-type: none"> • View • Proximity |

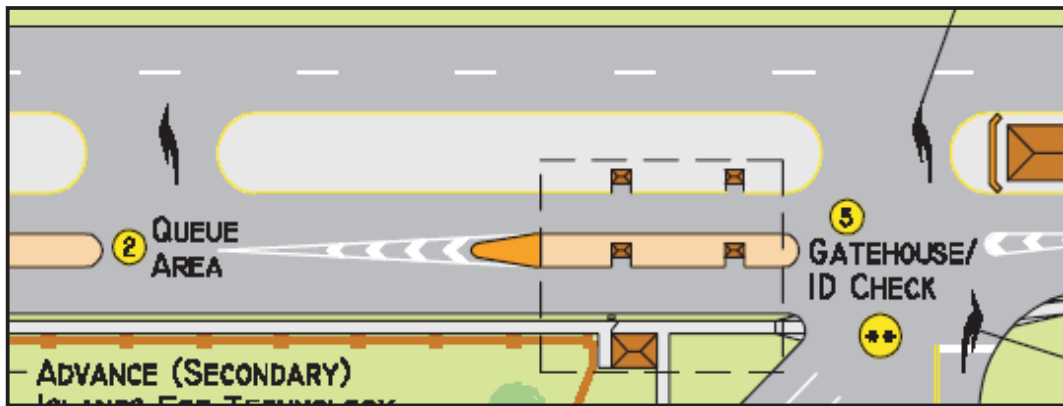
49

ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

ACCESS CONTROL ZONE



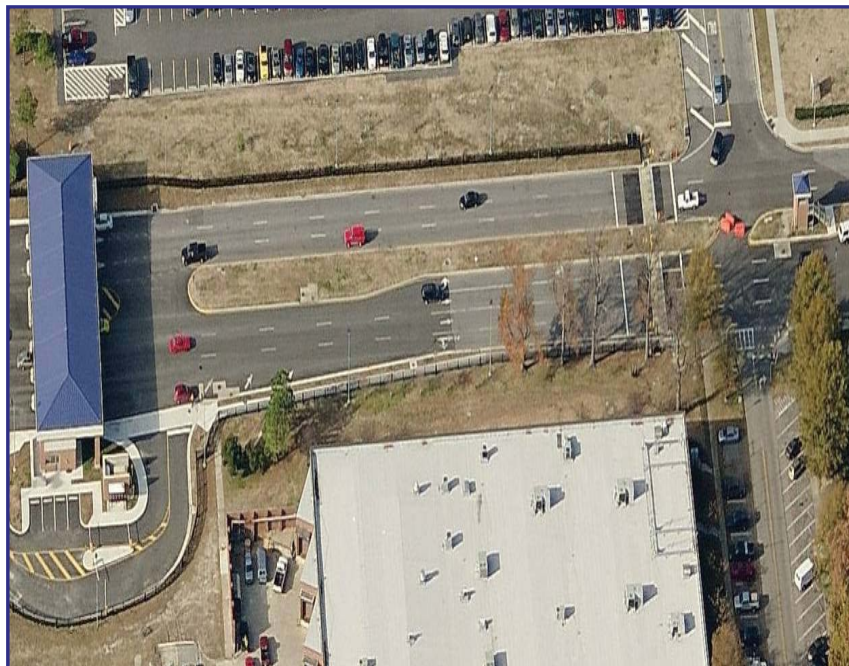
- Where possible provide rejection capabilities at both ends of the access control zone
- A continuous median throughout the ECF is desirable
 - Vehicle containment
 - Room for facilities
 - Width for rejections and vehicle U-turns



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ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

RESPONSE ZONE



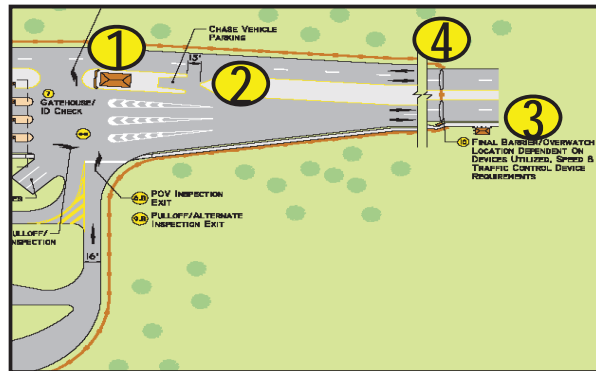
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ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

RESPONSE ZONE

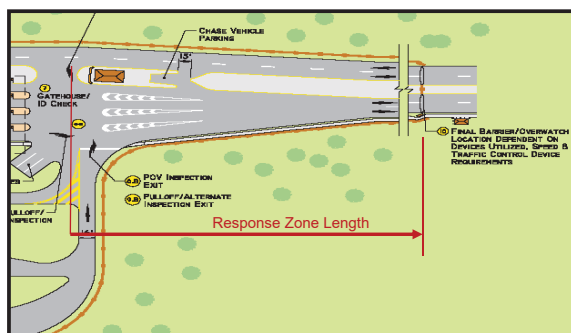


- Extends from end of access control zone to the point of “final denial” – active vehicle barrier.
- Defines the end of the ECF
- Main function is to provide time for security personnel to react to and respond to a threat and close ECF if necessary
- Design with a sufficient length to provide adequate reaction time for security personnel based on **Threat Scenario**.
- “Final Denial” (i.e. barrier) will be provided at the end of the ECF to provide the capability to stop threat vehicles



1. Gatehouse view of rejection
2. Chase vehicle parking
3. Overwatch
4. Active vehicle barriers

RESPONSE ZONE



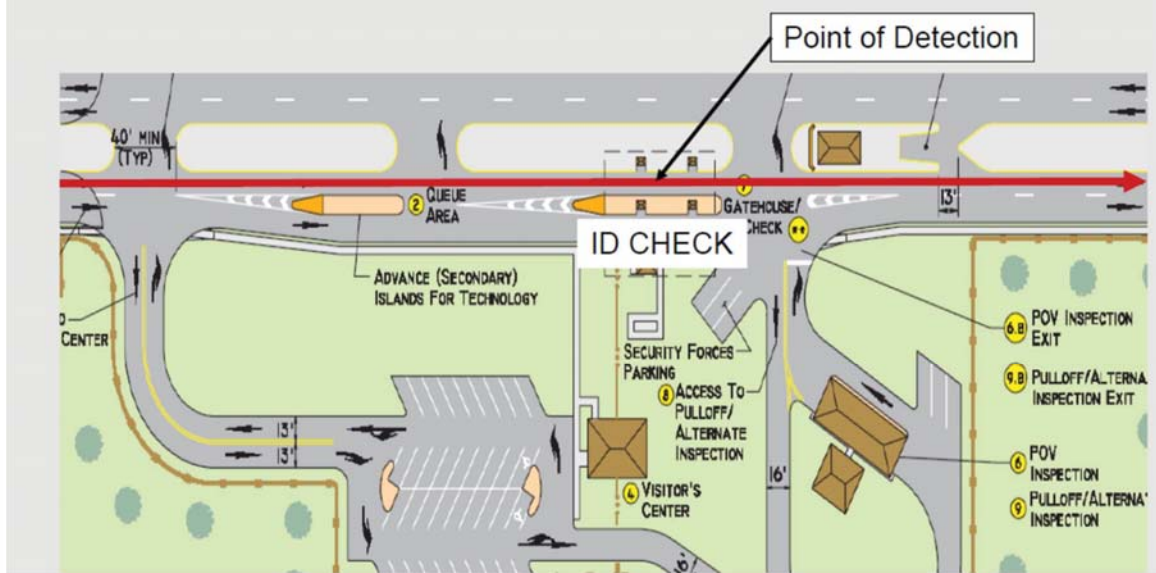
Design with a sufficient length to provide adequate reaction time for security personnel based on **Threat Scenario**.

- There are 4 threat scenarios outlined in the UFC for Entry Control Facilities
- Threat Scenario 1 (High Speed)
 - Vehicle enters ECF at a high rate of speed and constantly accelerates.
- Threat Scenario 2 (High Speed 2)
 - Vehicle enters ECF at a reasonable speed to be undetected (by speed detection) then begins to excel in the approach zone.
- Threat Scenario 3 (Covert 1)
 - Threat begins at ID check island (drives up to guard as if getting ready to be vetted and then accelerates).
- Threat Scenario 4 (Covert 2)
 - Threat begins at post rejection. Threat vehicle appears to drive up to post rejection as if they are going to perform a U-turn but then accelerates towards installation.

RESPONSE ZONE – THREAT SCENARIO 1



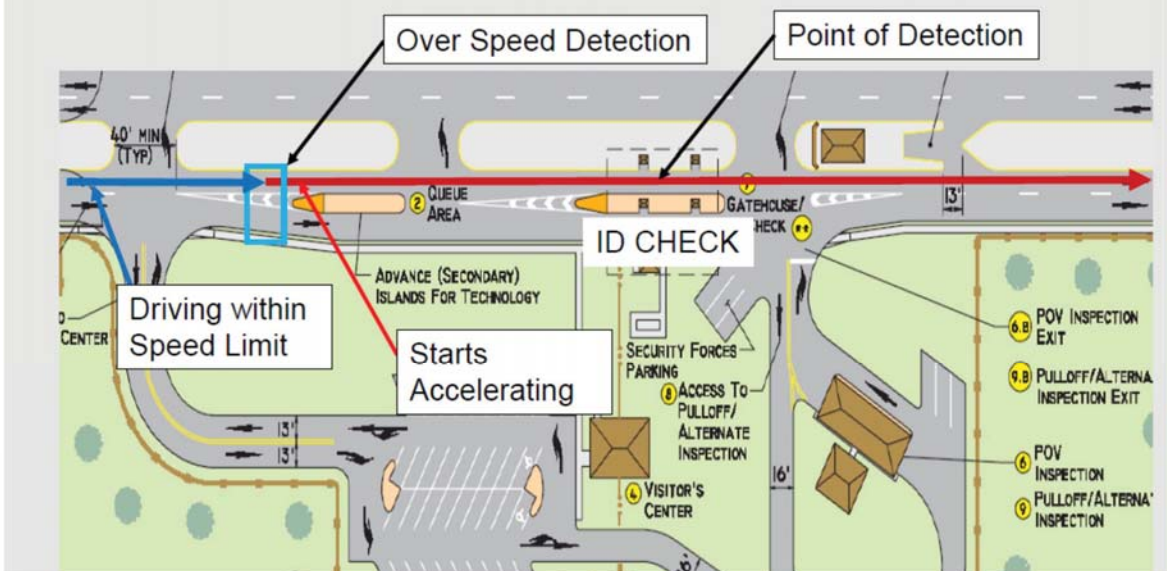
High Speed Entry



RESPONSE ZONE – THREAT SCENARIO 2



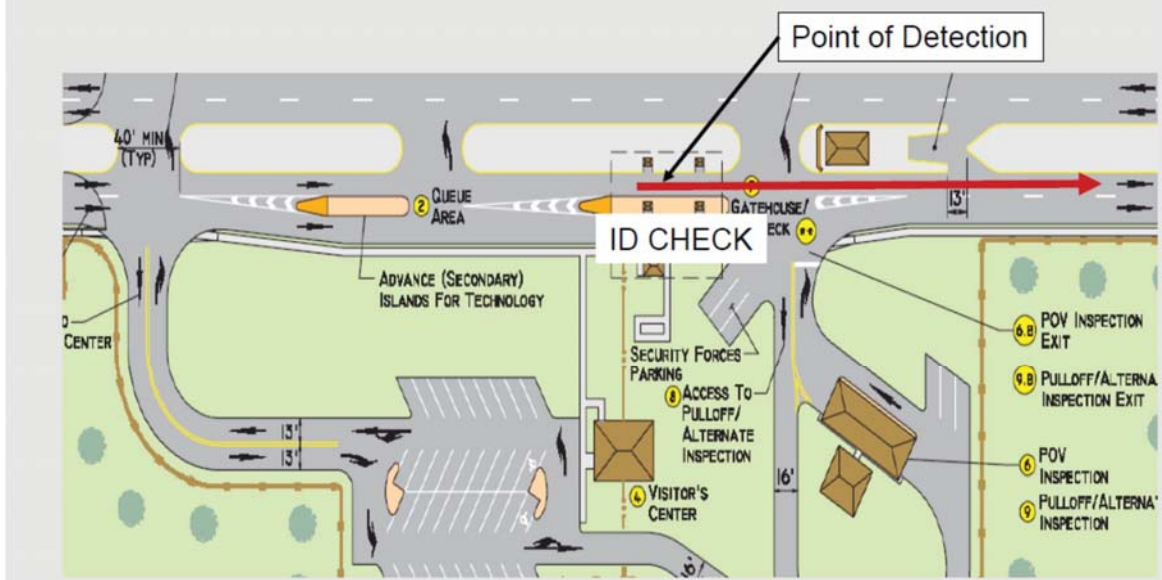
High Speed Entry – Over Speed Detection



RESPONSE ZONE – THREAT SCENARIO 3



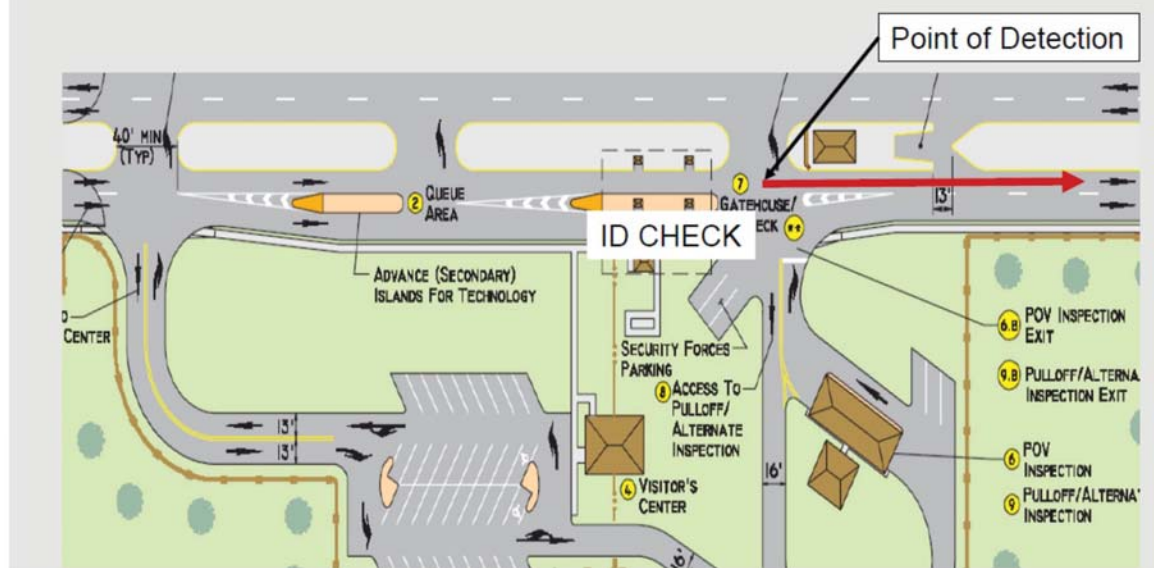
Covert Entry #1 – from ID Check Area



RESPONSE ZONE – THREAT SCENARIO 4



Covert Entry #2 – From Post Rejection



RESPONSE ZONE – BARRIERS

A.K.A. Final Denial Barriers at the end of the Response Zone



- **Passive barrier continues until end of ECF**
- **Active vehicle barrier (AVB) typically used to provide “final denial”**
- **Consider standardization of barrier systems for an installation for ease of maintenance**
- **Consider maximizing active barrier capacity based on available funds**
- **DoD Anti-Ram Vehicle Barrier List (USACE-PDC)**



Markings on both sides must be red and white striping

SAFETY ZONE



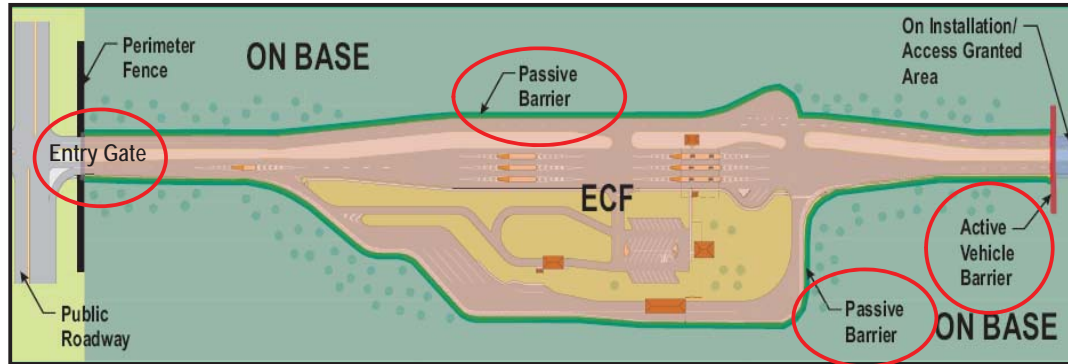
- **Extends from the active and passive barriers surrounding the ECF**
- **Since a threat vehicle may be contained in this area and explode, you must consider the effects of such an explosion on nearby personnel, buildings, or assets in close proximity to the safety zone**
- **An acceptable safety zone would be determined by the expected weight of explosive charge, the facility or asset to be protected, and the required level of protection**
- **See UFC 4-010-01 DoD Minimum AT Standards for Buildings for application guidance on Standoff to ECF/ACP**
- **Should also consider operational hazards associated with potential inspection equipment**
- **If an adequate safety zone cannot be achieved, other alternatives should be considered or a decision made to accept additional risk**



SAFETY ZONE



- Extends from the passive and active vehicle barriers in all directions on post from the ACP
- Protects assets and personnel from explosion
- Full containment



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ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

GUARD FACILITIES



- **Location**
 - ECF/ACP
 - Pier Head/Foot
 - Height (Guard Towers/Overwatch)
- **Site Built/Prefabricated**
- **Size**
 - Personnel
 - Electronic Security Equipment -Systems/Electrical Equipment
 - Communications Equipment and Gate/Barrier Controls
 - Mechanical Equipment
- **Walls/Windows/Doors/Roof Construction requirements (Threat Based - Ballistic)**
- **Utilities – Water, Waste, Electricity**



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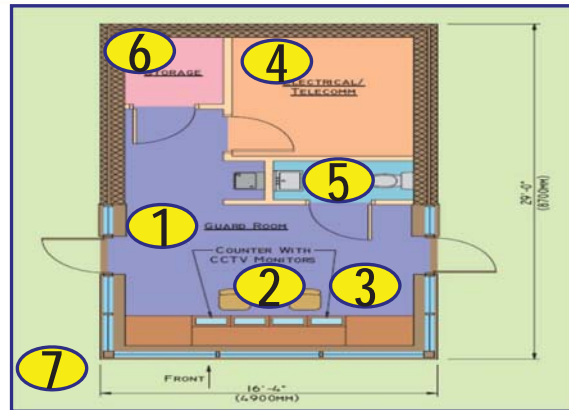
ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

GUARD FACILITIES- GATEHOUSE



“ECF/ACP Control Center”

- The gatehouse is typically located in the median or on the right shoulder
- Some branches of the military collocate the gatehouse with the ID check area for logistical and operational reasons
- Other branches (Army) put the gatehouse immediately after the ID check area and vehicle turnaround so that they can oversee any rejections
- What is in the UFC?
 - UFC allows various locations, all within the access control zone.

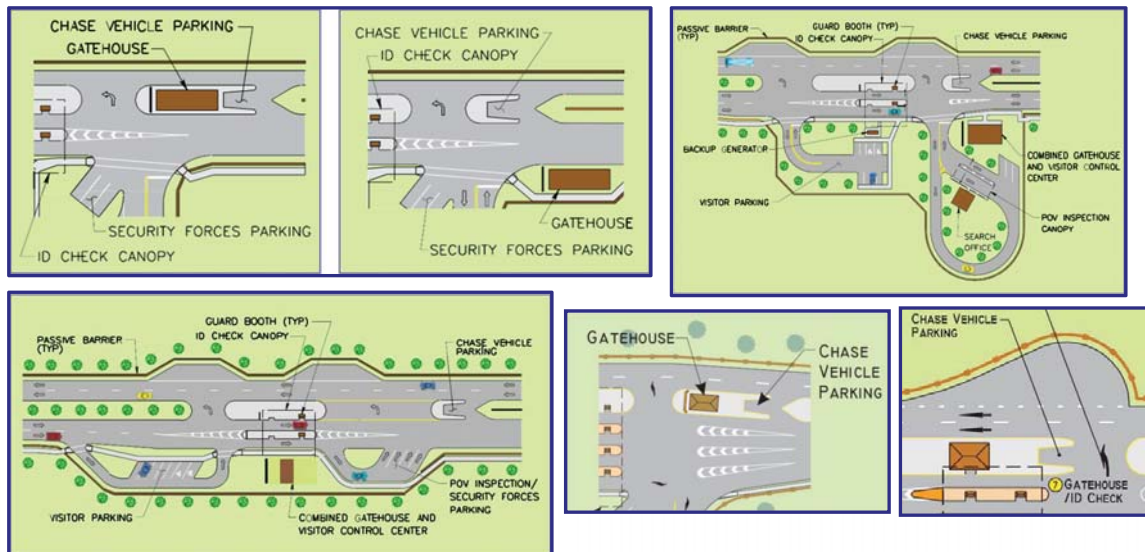


- | | |
|--|---|
| 1. Guard room | 5. Toilet |
| 2. Workstations, communication and system controls | 6. Storage |
| 3. Active vehicle barrier controls | 7. 180-degree view |
| 4. Electrical room | 8. Interior and exterior power and lighting |
| | 9. Heat and air |
| | 10. Ballistics UL 752 Level 3 minimum |

GUARD FACILITIES- GATEHOUSE



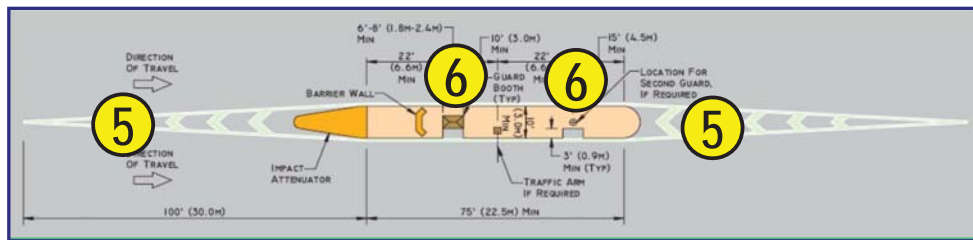
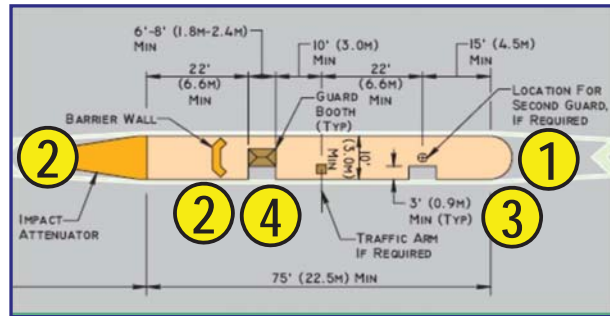
- UFC allows various locations, all within the access control zone.



GUARD FACILITIES- GUARD BOOTH & ID CHECK ISLAND



1. Curbed island
2. Guard protection (barrier wall and optional impact attenuator)
3. 3-foot setback
4. Ramped island for guard comfort
5. Leading and trailing pavement markings
 - Point in direction of travel
6. Tandem processing

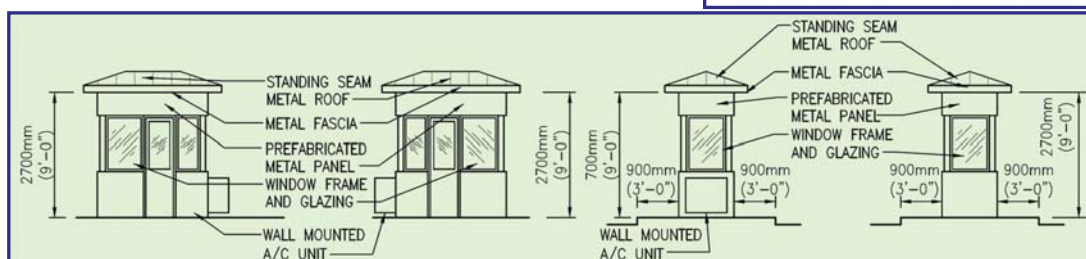
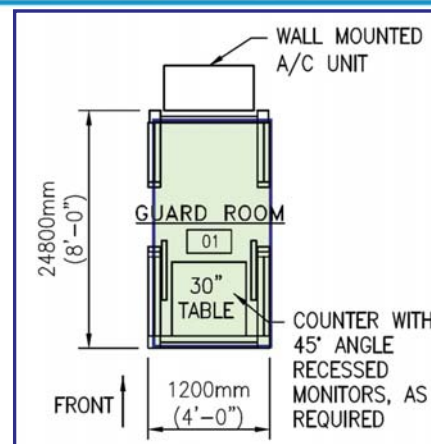


GUARD FACILITIES- GUARD BOOTH



Guard/Sentry Booth

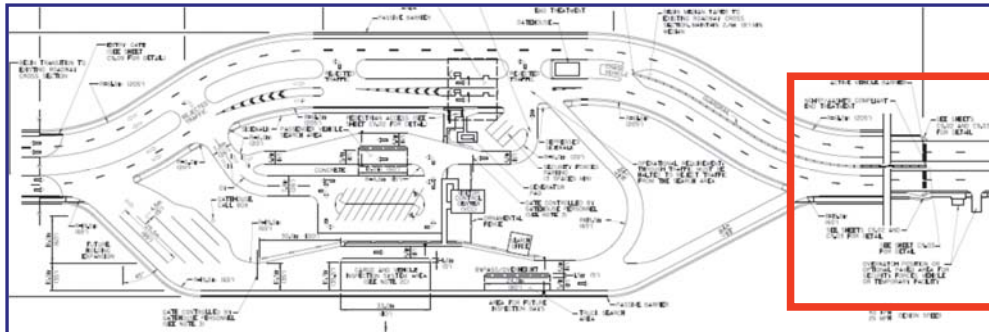
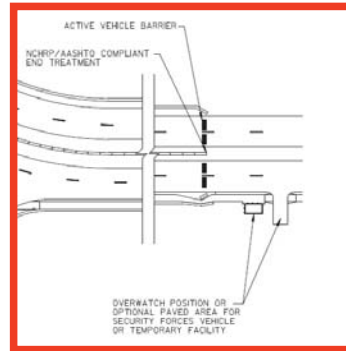
- 360 degree field of view
- Workstation and counter space
- Interior & exterior outlets
- Heat and air
- Ballistics UL 752 Level 3 minimum



OVERWATCH POSITION



- Normally placed in the response zone to facilitate surveillance and armed response.
- Preferably placed near active vehicle barriers.
- Must maximize visibility with 360-degree visibility.
- Must have a direct line of sight to the access control zone of the ECF/ACP including identification and inspection areas.
- Permanent facility or paved pad.

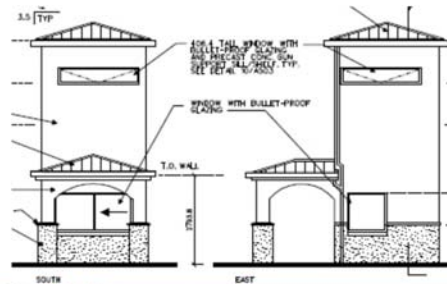


OVERWATCH POSITION



Building

- Fighting position for one guard
- Ballistics Level 3 minimum
- Heating and/or air
- Interior outlets
- Active Vehicle Barrier control console
- 360 degree field of view
- Operable windows/Portal for firing from

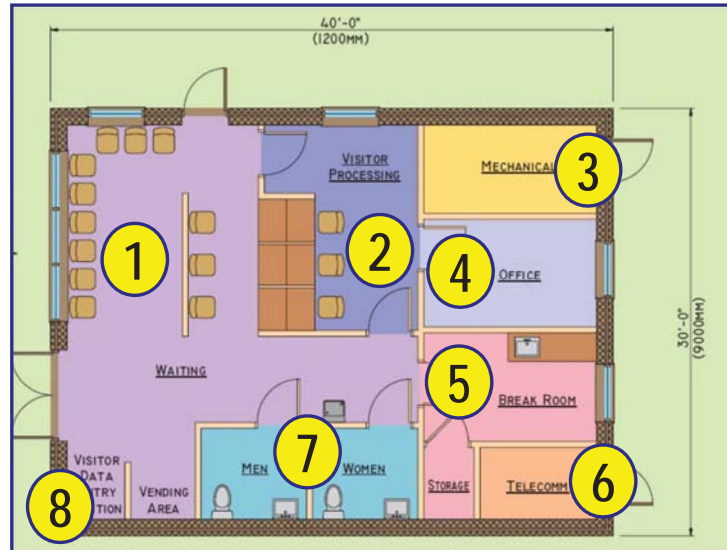


VISITOR'S CENTER



One per Installation

1. Waiting area
2. Visitor processing
3. Mechanical room
4. Administration office
5. Break room
6. Telecom room
7. Rest rooms
8. Kiosks



VISITOR'S CENTER



- Assume 12-20 customers per hour minimum
 - Demand based on traffic engineering study
 - Consider special demands
- Angled parking is more desirable for high turnover facilities
- Pedestrian paths should run parallel to aisle to reduce conflicts
- Rejected and accepted capabilities
- Direct access to inspection area
- ABA compliant



INSPECTION AND SEARCH AREA



- What types of inspections are performed?
 - Random inspections
 - Select inspection based on guard concern
 - In some cases, mandatory inspection of all vehicles (FPCON level specific)
 - Truck inspections
- Some services conduct random inspections prior to ID check while other branches initiate random inspections at the ID check – consult with service policies
- The ability to conduct post ID check inspection is required by all service branches
- Inspected vehicles may bypass the ID check upon inspection

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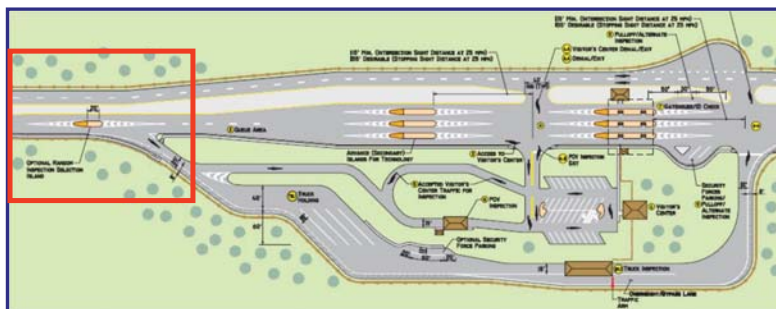
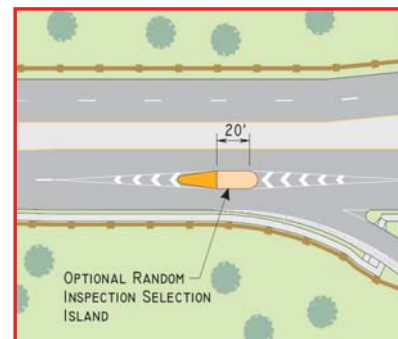
ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

INSPECTION AND SEARCH AREA



Random inspection selection islands

- For service branches that initiate random inspections in the approach zone, advance random inspection islands provide visibility and protection of guards selecting vehicles for inspection



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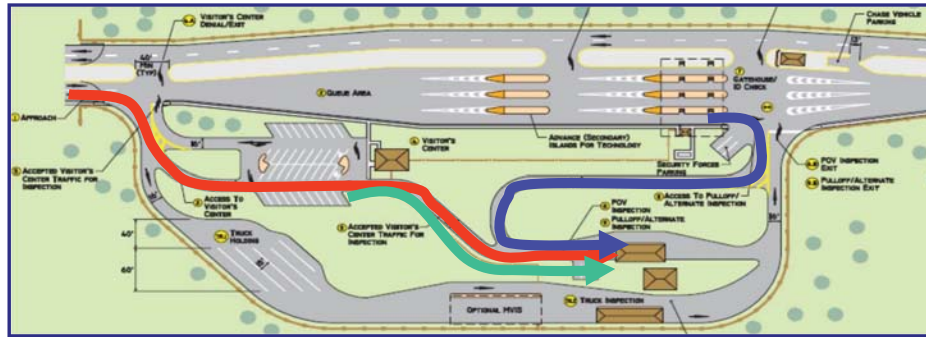
ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

INSPECTION AND SEARCH AREA

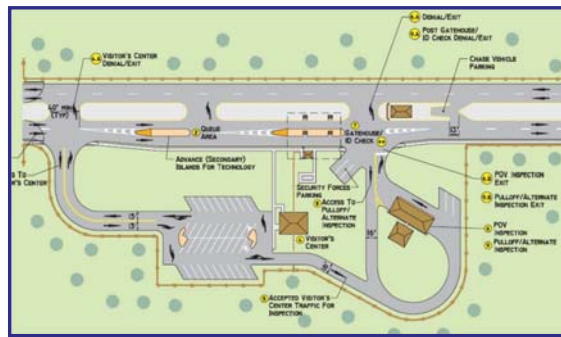
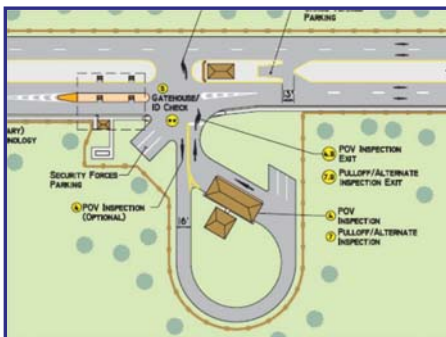
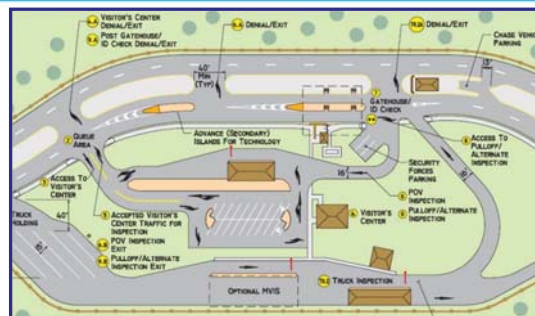
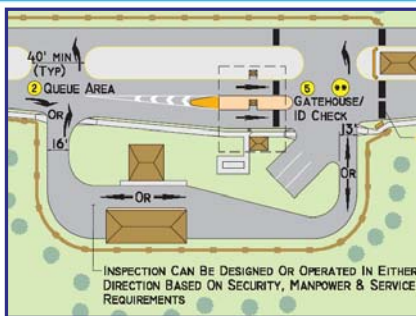


POV INSPECTION AREA

- Capable of receiving advance random inspections
- Capable of receiving post ID inspections
- Capable of receiving visitors center customers who require inspection
- Accessible from ID check
- Shielded from casual view
- Sized for at least two vehicles
- Ideally collocated near truck inspection to maximize resources



INSPECTION AND SEARCH AREA - POV

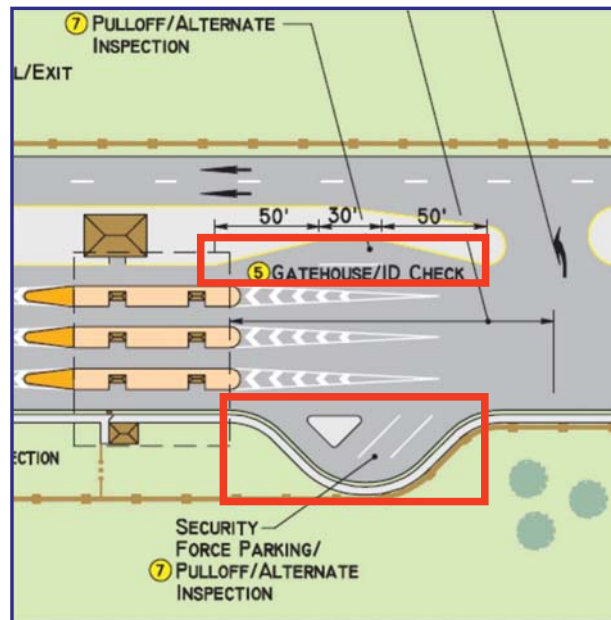


INSPECTION AND SEARCH AREA



Supplemental post ID check inspection

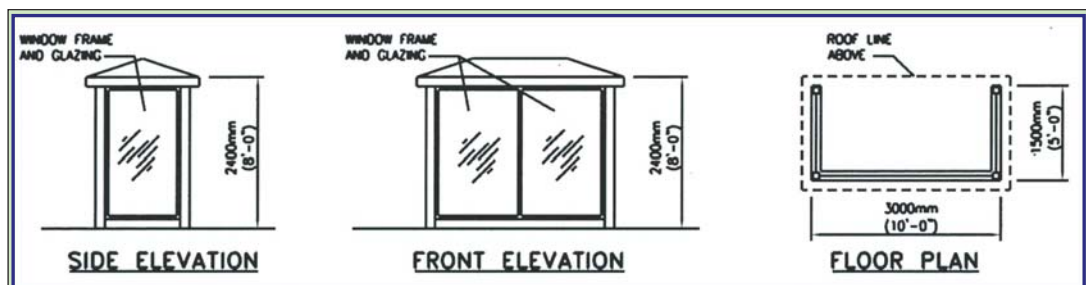
- Service branches that conduct advance random inspection and cannot collocate inspection operations due to geometry or logistics



INSPECTION AND SEARCH AREA



- Shelter vehicle occupants and store search equipment
- Simple as a bus shelter (at lower volume facilities)
- Due to funding, the facilities can lag behind the transportation infrastructure



INSPECTION AND SEARCH AREA



Complex has an office with passenger search and screening areas



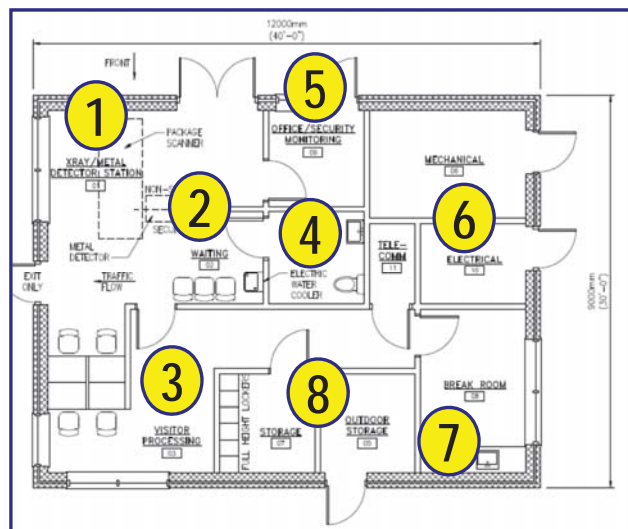
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ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

INSPECTION AND SEARCH AREA



1. Space for metal detector and/or x-ray scanner
2. Waiting area
3. Processing and kiosks (trucks)
4. Rest room
5. Secure/non-secure areas
6. Mechanical and electrical
7. Break room
8. Storage and lockers



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ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

INSPECTION AND SEARCH AREA – TRUCK/COMMERCIAL VEHICLES (CVIS)



- May be at its own ECF
- If collocated at a POV ECF, segregate truck inspection from ID checks and POV inspections
- Can share a search office and sometimes manpower with POV inspection
- Shield from casual observation
- Truck holding area for early arrivals and peak demands
 - Highly variable
- Consider the space required for mobile vehicle and cargo inspection systems
- Sized for minimum WB-67 truck, preferred

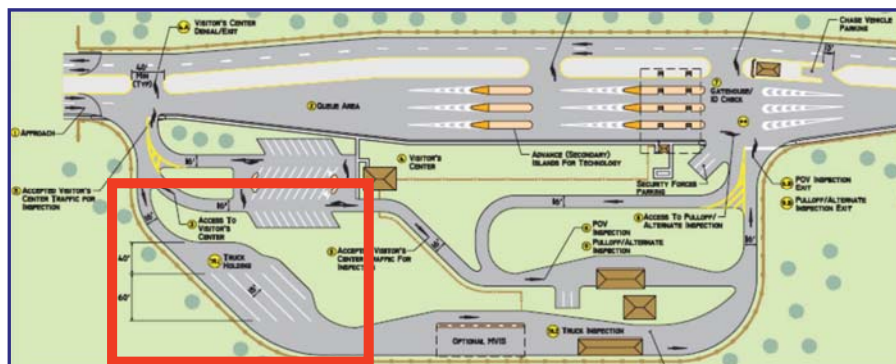
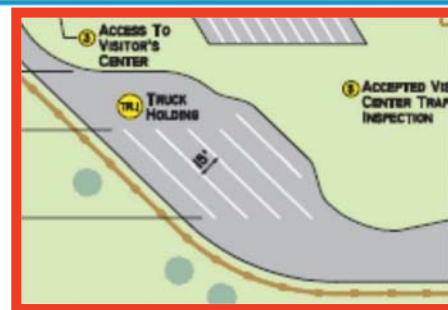
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ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

INSPECTION AND SEARCH AREA – TRUCK/COMMERCIAL VEHICLES (CVIS)



- Truck holding
 - Size to accommodate peak period queuing and early arrivals
 - Number of spaces highly variable: anywhere from 2 to 70+
 - Spaces should be 15' wide by 60' long



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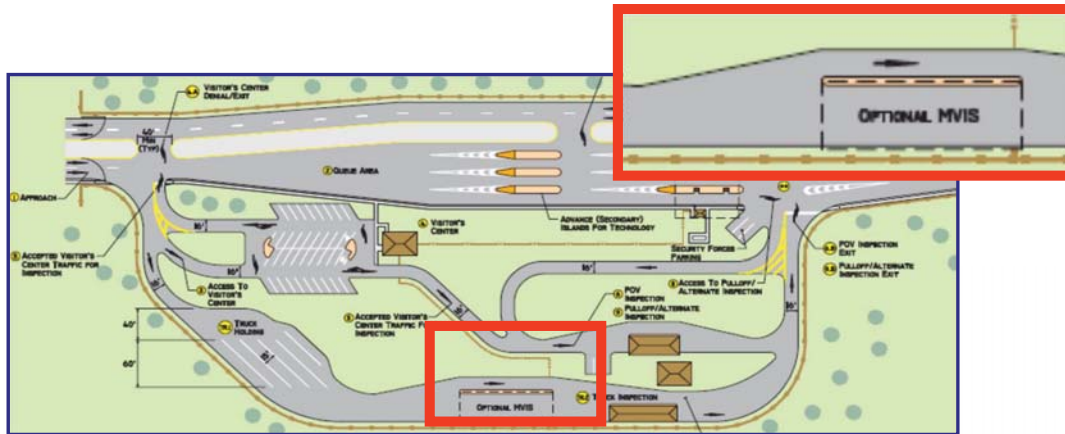
ENTRY CONTROL FACILITIES/ACCESS CONTROL POINTS

INSPECTION AND SEARCH AREA – TRUCK/COMMERCIAL VEHICLES (CVIS)



MVACIS

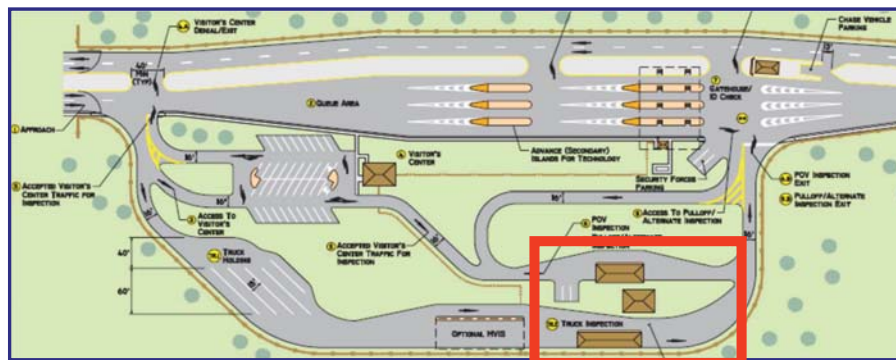
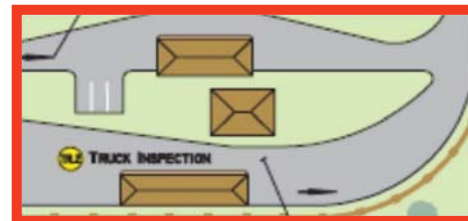
- A mobile vehicle and cargo inspection system (MVACIS) area should be provided prior to the truck canopy
- Provide a bypass lane for the MVACIS and truck canopy



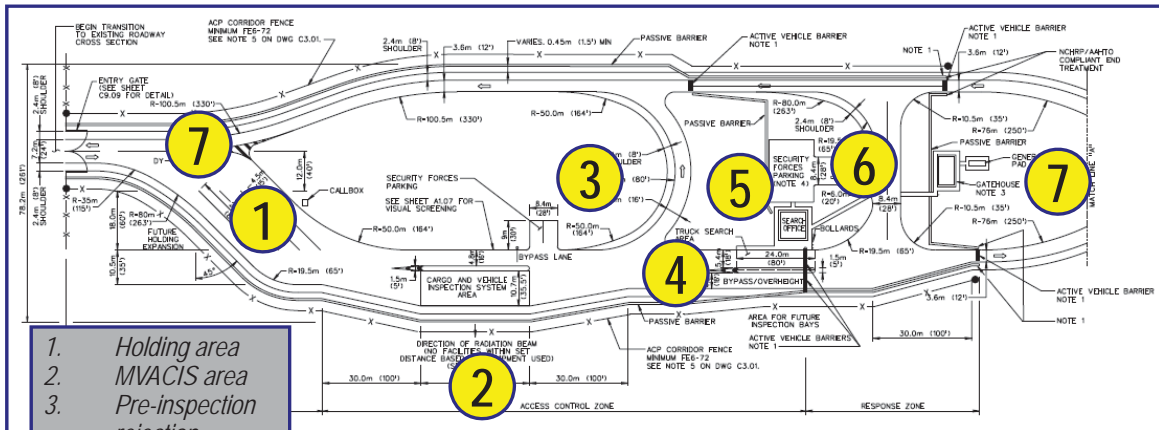
INSPECTION AND SEARCH AREA – TRUCK/COMMERCIAL VEHICLES



- Truck inspection
 - Covered
 - Ideally, shared search office
 - Bypass lane



TRUCK ONLY ECF



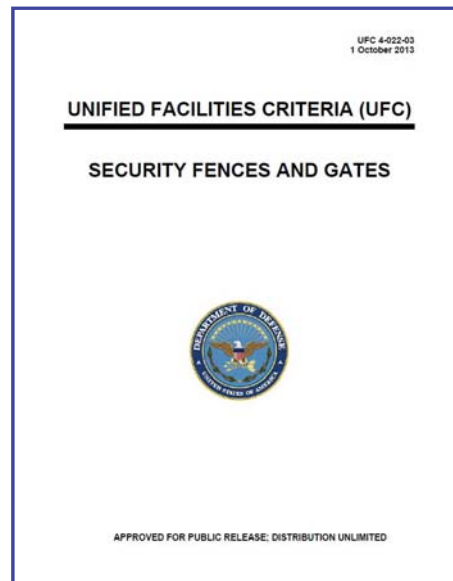
1. Holding area
2. MVACIS area
3. Pre-inspection rejection
4. Inspection and bypass
5. Search office
6. Post-inspection
7. Geometry design to control speed

- Could run barriers open with longer response
- Or barriers closed with reduced response zone

UFC 4-022-03 SECURITY FENCES AND GATES



- **Purpose:**
 - This document is to provide a unified approach for the design, selection, and installation of security fences and gates, associated with Department of Defense (DoD) facilities.
- **Lead Agency: Naval Facilities Engineering Command – NAVFAC Atlantic**
 - Mr. John Lynch
- **Current Document Status:**
 - Published October 2013



CONTENTS OVERVIEW

UFC 4-022-03 SECURITY FENCES AND GATES



- **Contents:**

- **Fencing**

- Function
- Chain Link
- Ornamental
- Welded Wire Mesh Fabric
- Expanded Metal
- Farm-Style
- Expeditionary Perimeter Fencing
- Taut Wire



- **Gates**

- **Personnel**

- Swing
- Turnstile

- **Vehicular**

- Swing
- Sliding
- Overhead Sliding
- Vertical Lift



CONTENTS OVERVIEW (CONTINUED)

UFC 4-022-03 SECURITY FENCES AND GATES



- **Appendix A – References**
- **Appendix B – Glossary**
- **Appendix C – Fence and Gate Design Details**



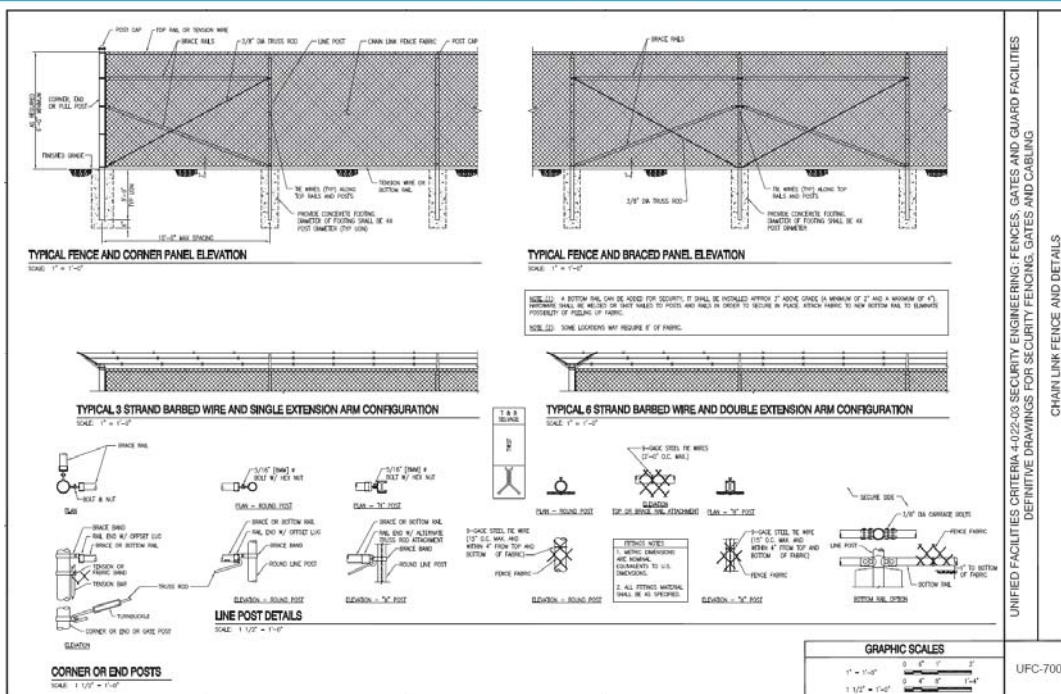
FENCES



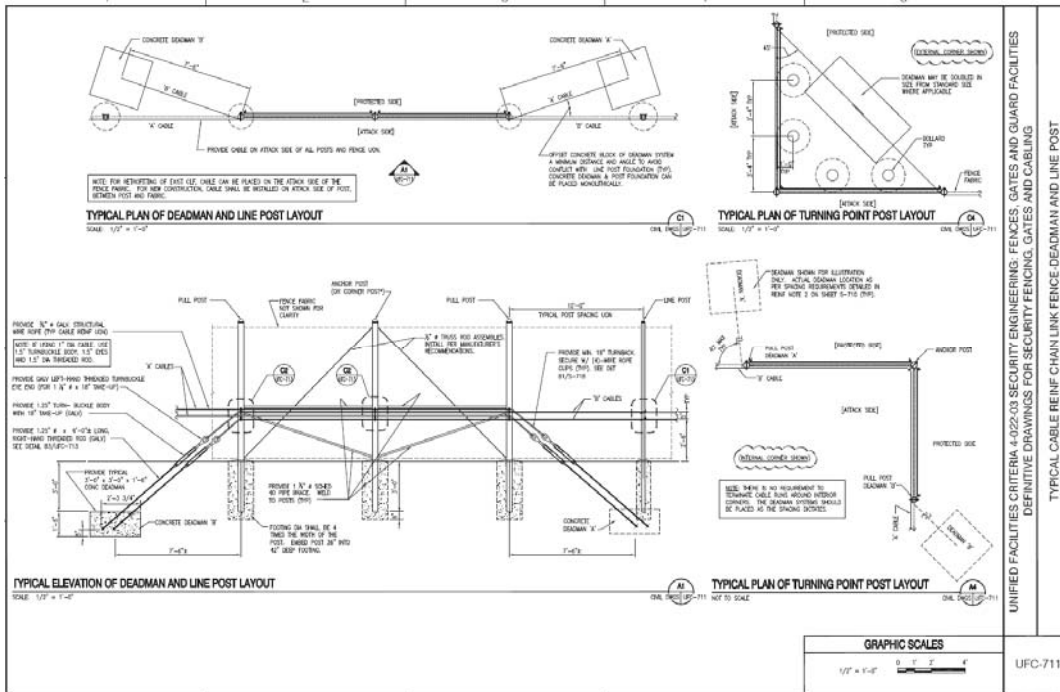
- What is the “asset” to be secured?
 - Arms, Ammunition, Explosives, Ships/Vessels, Aircraft, Nuclear, Information, Utilities,
 - Enclave (Special Training, Waterfront, Air Field, CIA, Weapons Development)
 - Installation Perimeter
- Fencing Fabric or Material
 - Height (7-foot minimum)
 - Chain Link
 - Ornamental
 - Expanded Steel
- Posts, Rails, Bracing, Tension Wires
- Fittings and Accessories
 - Top Guards – Outriggers, Flat Wrap Coil, Razor Mesh, Barbed Wire, Barbed Tape, Concertina
- Grounding
- Reinforcement
 - Cable size and number
 - Deadman Anchor

See UFC 4-022-02 Vehicle Barriers and DoD Anti-Ram Vehicle Barrier List

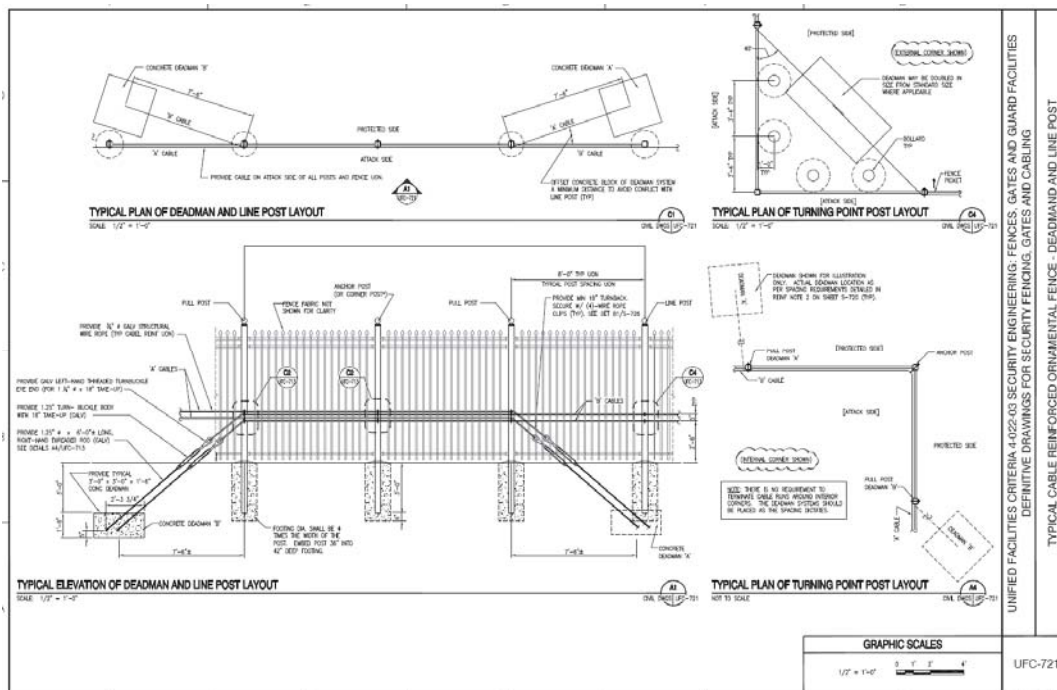
CHAIN LINK FENCE



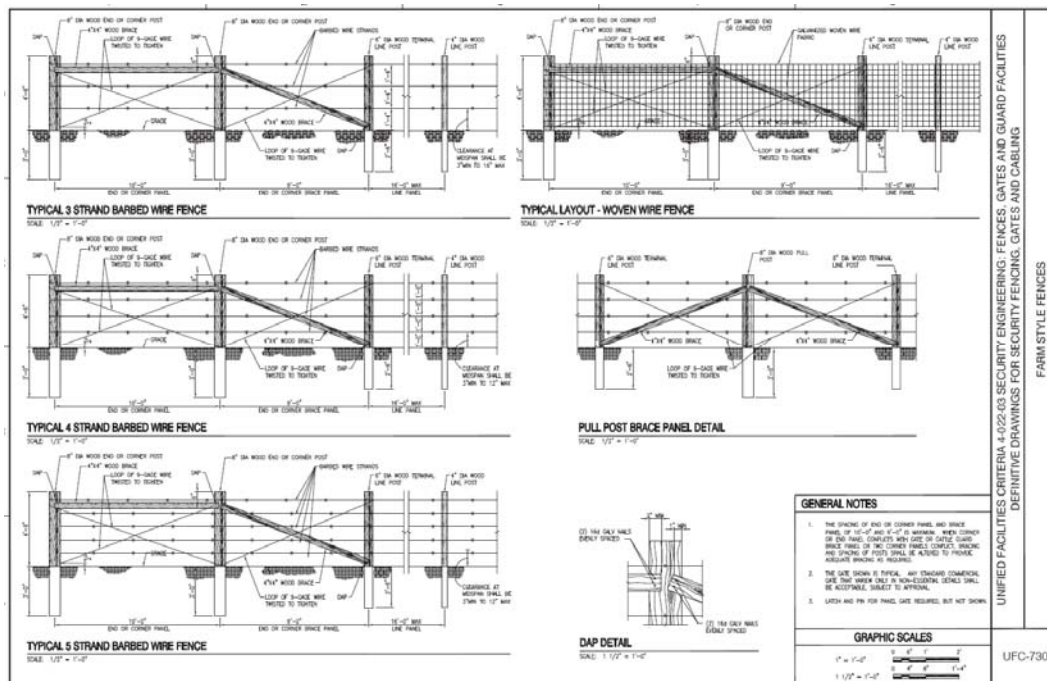
CHAIN LINK REINFORCING



ORNAMENTAL FENCE REINFORCING



FENCES – FARM STYLE



UNIFIED FACILITIES CRITERIA 4-022-03 SECURITY ENGINEERING: FENCES, GATES AND GUARD FACILITIES
DEFINITIVE DRAWINGS FOR SECURITY FENCING, GATES AND CABLING
FARM STYLE FENCES

UFC-730

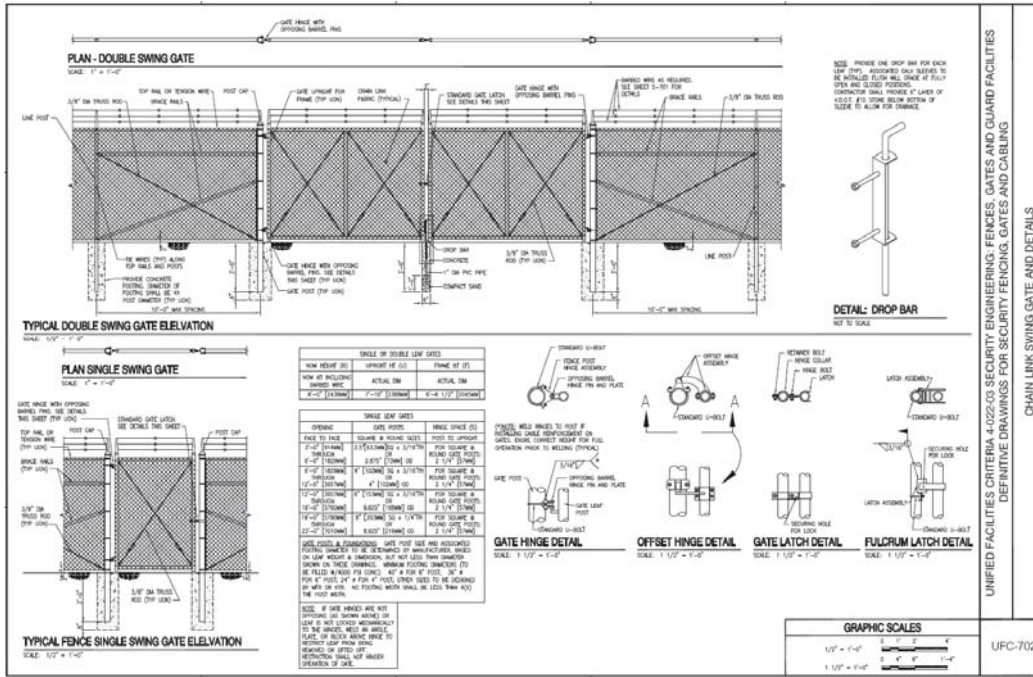
GATES



- Personnel Gates
 - Single Swing
 - Turnstile/Rotational Gates
- Vehicular Gates
 - Sliding
 - Single Cantilevered
 - Double Cantilevered
 - Single Wheel-Supported (V-groove) Sliding Gates
 - Double Swing
 - Overhead – single/double
- Gate Reinforcement
 - Cable size and number
 - Anchor system
- Latches, Hinges, Stops
- Locking System
- Gate Power - Operators

See UFC 4-022-02 Vehicle Barriers and DoD Anti-Ram Vehicle Barrier List

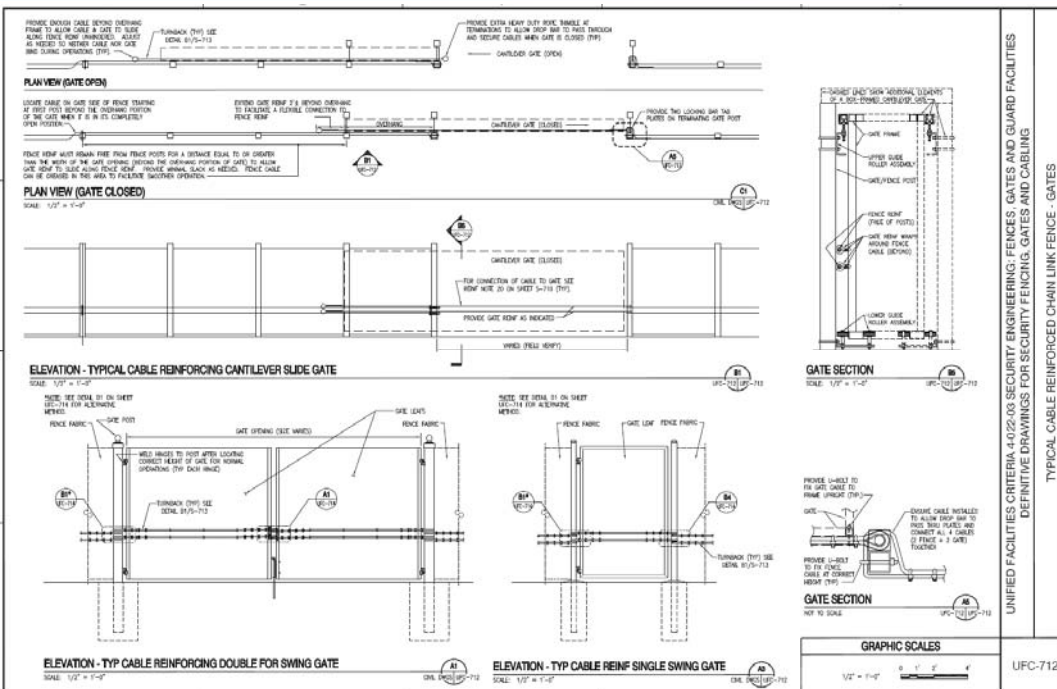
CHAIN LINK GATES



UNIFIED FACILITIES CRITERIA 4-022-03 SECURITY ENGINEERING: FENCES, GATES AND GUARD FACILITIES
DEFINITIVE DRAWINGS FOR SECURITY FENCING, GATES AND CABLING

CHAIN LINK SWING GATE AND DETAILS

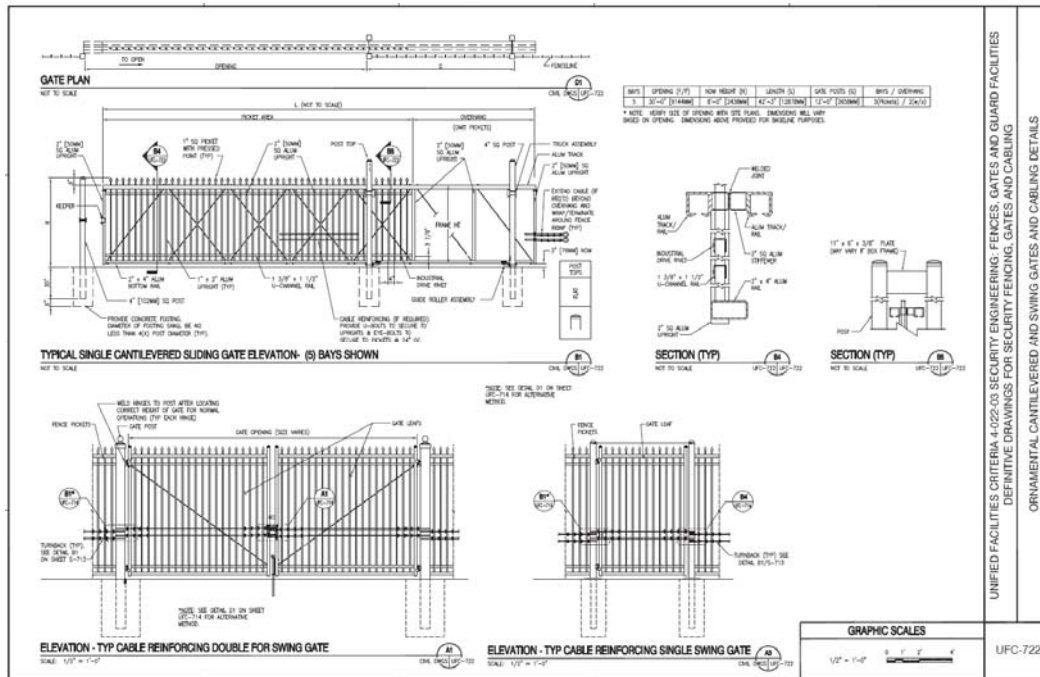
REINFORCED CHAIN LINK GATES



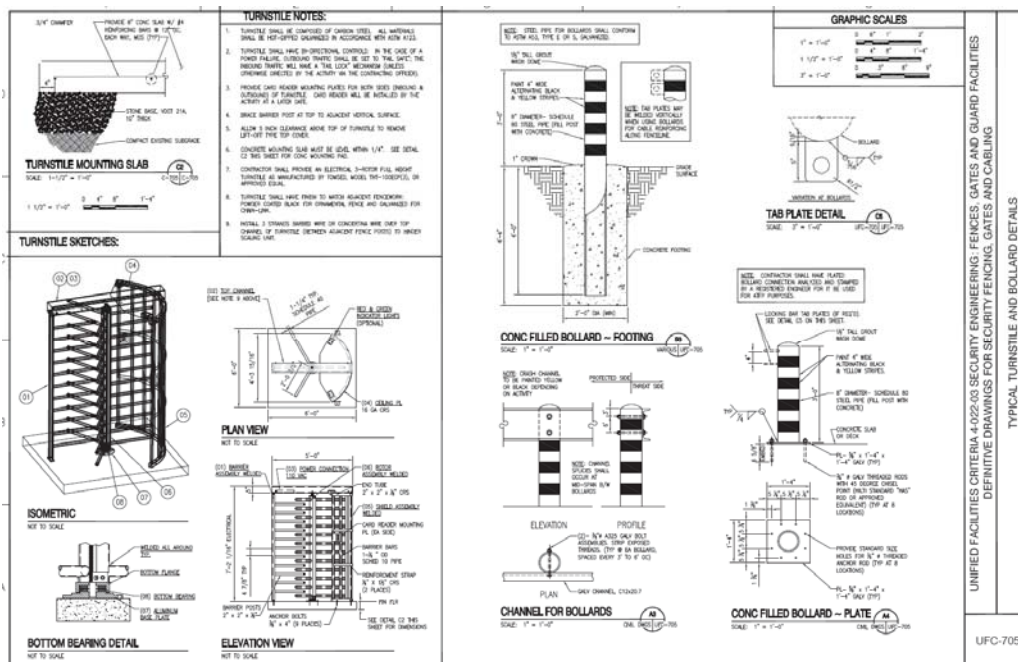
UNIFIED FACILITIES CRITERIA 4-022-03 SECURITY ENGINEERING: FENCES, GATES AND GUARD FACILITIES
DEFINITIVE DRAWINGS FOR SECURITY FENCING, GATES AND CABLING

TYPICAL CABLE REINFORCED CHAIN LINK FENCE - GATES

ORNAMENTAL GATE REINFORCING



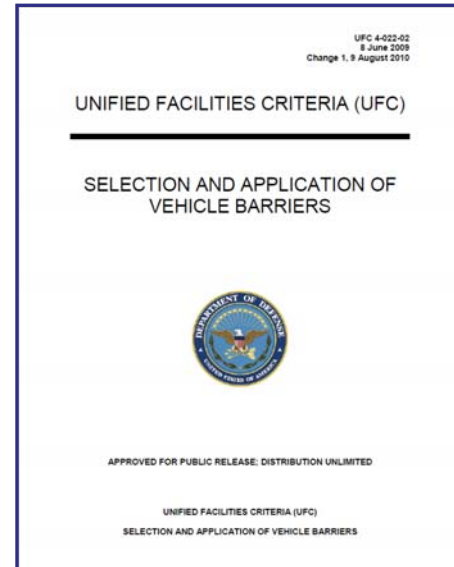
TURNSTILE AND BOLLARDS



UFC 4-022-02 SELECTION AND APPLICATION OF VEHICLE BARRIERS



- **Purpose:**
 - Provides the design requirements necessary to plan, design, construct, and maintain vehicle counter mobility barriers used within Entry Control Facilities (ECFs) or as perimeter protection.
- **Lead Agency: Naval Facilities Engineering Command – NAVFAC Atlantic**
 - Mr. John Lynch
- **Current Document Status:**
 - Published June 2009 with Change 1 August 2010



CONTENTS OVERVIEW UFC 4-022-02 SELECTION AND APPLICATION OF VEHICLE BARRIERS

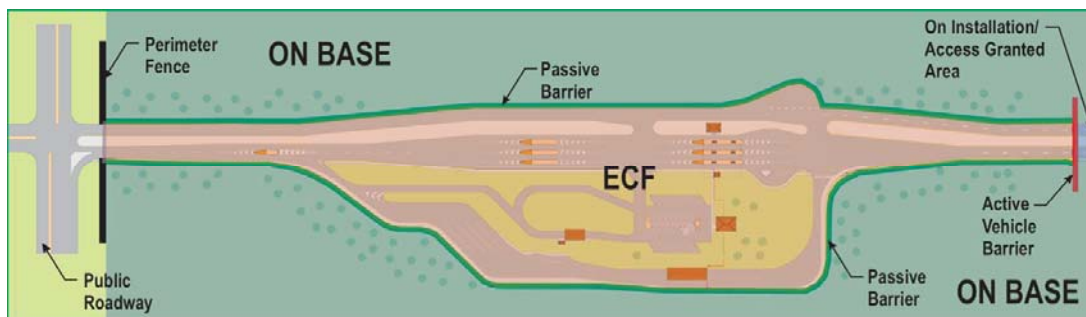


- **Contents:**
 - **Existing Requirements and Technical Guidance**
 - **Vehicle Barrier Design Parameters**
 - **Vehicle Barrier Selection, Design and Installation**
 - Vehicle Barrier Types
 - Barrier Capability
 - Vehicle Barrier Certification
 - **Active and Passive Barriers**
 - Surface Mounted
 - Wedge Type
 - Bollard System
 - Crash Beam
 - Crash Gate
 - Ground Retractable Automobile Barrier (GRAB)
 - Concrete Bollard
 - Concrete Median
 - Concrete Planter
 - Guardrail
 - Appendix A – References
 - Appendix B – Barrier Cost Data
 - Appendix C – Performance Data for Passive Vehicle Barriers
 - Appendix D – Examples For Protection Against Terrorist Vehicle Bombs
 - Appendix E – Vehicle Debris Minimization Effects on Counter-Mobility

VEHICLE BARRIERS



- **Passive Barriers**
 - Bulk, mass and position
- **Active Vehicle Barriers (AVBs)**
 - Requires action by personnel or equipment
- **Passive and Active vehicle barriers, together must create a contiguous perimeter and provide full containment**



VEHICLE BARRIER SELECTION CHECKLIST



1. What is the weight of the threat vehicle?
2. What is the expected speed of the vehicle?
3. Can the speed of the vehicle be reduced? (In the Approach Zone and/or the Response Zone)
4. What is the calculated kinetic energy developed by the moving vehicle?
5. Have all impact points along the perimeter been identified?
6. Have the number of access points requiring vehicle barrier installation been minimized?
7. What is the most cost-effective active barrier available that will absorb the kinetic energy developed by the threat vehicle?
8. How many barriers are required at each entry point to meet throughput requirements?
9. What is the most cost-effective passive barrier that will absorb the kinetic energy developed by the threat vehicle?
10. Is penetration into the site a factor?
11. If penetration into the site is a factor, is the standoff distance adequate after impact? (Safety Zone)
12. Will traffic flow be affected by the barrier's normal cycle rate? (Open vs. Closed)
13. Will the active barrier need to be activated at a rate higher than the normal rate? (Emergency Fast Operation (EFO))
14. Will the barrier be required to be normally open (allow traffic to pass) or normally closed (stop traffic flow)?
15. If normally open (allowing traffic flow), is adequate distance available between the guard post and the barrier to allow activation and operation of the barrier? (Response Zone)
16. Will the barrier be subject to severe environmental conditions?
17. Do passive barriers installed along the perimeter provide equivalent protection to the active barriers?

VEHICLE BARRIER SELECTION CHECKLIST




18. In case of power failure, will the barrier fail open or closed?
19. Is this a temporary or permanent installation?
20. **Are appropriate safety features being considered?**
21. Will there be sufficient lighting at the active barrier location?
22. Will electronic access control (card reader) be included? (Automated Installation Entry (AIE))
23. If so, are procedures in place to prevent tailgating?
24. Will the active barrier require backup power?
25. What is the available power source?
26. Is training available from the manufacturer?
27. **Will the active barrier be electrically or hydraulically powered? (Electro-Mechanical)**
28. How will the barrier be controlled? (Access Control Point Control System)
29. Is the selected barrier designed to resist corrosion or other environmental effects?
30. Will the active barrier function adequately within the temperature extremes present at the selected site?
31. Are optional heaters and coolers available to compensate for temperature extremes?
32. Is the active barrier capable of manual operation in case of power failure?
33. **Is the active or passive barrier the most cost-effective option available?**

VEHICLE BARRIER SELECTION, DESIGN AND INSTALLATION




- Vehicle Barrier Types
 - Active
 - Passive
 - Portable/Movable
- Design Considerations
 - Threat Vehicle Size
 - Threat Vehicle Speed
 - Penetration
 - Traffic
 - Operating Protocols
 - DoD/DoS Crash Rating
 - Aesthetics
 - Safety
 - Security
 - Reliability
 - Maintainability
 - Cost
 - Facility Compatibility
 - Training



DEPARTMENT OF DEFENSE
US ARMY CORPS OF ENGINEERS
PROTECTIVE DESIGN CENTER
1616 Capitol Avenue, Suite 9000
OMAHA, NEBRASKA 68102-4901

DoD ANTI-RAM VEHICLE BARRIER
LIST

List Date: May 2019



The Department of Defense's physical security concept is to create a layered or "tiered" defensive system which consists of both active and passive perimeter barriers to delay intruders. The Department employs an ASTM International performance standard and testing procedure for both active entrance barriers and passive perimeter barriers designated as "vehicle-impact rated barriers," or "anti-ram barriers." The current standard is ASTM F2656-07, Standard Test Method for Vehicle Crash Testing of Perimeter Barriers.

The ASTM F2656-07 test standard rates barriers in twelve impact categories, with three predetermined impact velocities for each category and four potential penetration ratings for each impact rating. These penetration ratings are: P1 - < 3.3 ft, P2 - 3.31 to 23.0 ft, P3 - 23.1 to 98.4 ft, and P4 - > 98 ft. Of the four penetration ratings, barriers with a penetration rating of P4 will not be included in the DoD Anti-Ram Vehicle Barriers list.

The following list of barriers includes active barriers for use at entrances, and passive or fixed barriers for other perimeter applications. This list will be updated quarterly in January, April, July and October. A request must be received one month prior to the list being published to be included on the next quarterly list.

Note: This list supersedes all previous copies. Please refer to the date above to ensure you have the most up to date list. This list does not represent an overall endorsement of any product or design or address its operational suitability or maintainability. The list merely verifies that particular vehicle barriers have been certified in accordance with the performance standards in ASTM F2656-07, or previously tested to the U.S. Department of State SD-STD-02-01 standard, and that the appropriate test reports have been submitted to, and validated by, the Protective Design Center. Each vehicle barrier system has its own distinct characteristics that must be considered and weighed against the needs and conditions of the individual installation. Some barrier characteristics are associated with vulnerabilities. These vulnerabilities may not be readily apparent to the end users. Careful consideration should be given to clearances and geometric characteristics when utilizing barrier systems of varying widths. The PDC is available to discuss barrier characteristics, and any other barrier issues or questions. A few characteristics to consider are listed below:

<ul style="list-style-type: none">• Impact speed at barrier (low speed impact): The use of some vehicle barriers presented in this list exhibit vulnerabilities when impacted at speeds other than those associated with the ASTM and DoS test impact velocities.• Design Basis Three (DBT) vehicle, other vehicle weights and speeds: The barriers presented in this list have been subjected to impacts under the specific conditions prescribed by the test designation. If the installation's DBT includes vehicles significantly different than the test vehicle, performance of the system may differ from what may be expected.• Deployment mechanism: The mechanisms used to deploy vehicle barriers vary (pneumatic, hydraulic, electro-mechanical, manual). The various mechanisms should be investigated and the choice should be based on the best fit for the installation.	<ul style="list-style-type: none">• Environmental conditions at barrier: Environmental conditions can vary greatly from location to location. Conditions such as rain, snow, ice, sand, gravel, dirt, and cold need to be considered when selecting a barrier for a specific location.• Operations and Maintenance (O&M) requirements: Each barrier comes with its own operational and maintenance requirements. The O&M requirements vary in the amount and intensity from barrier to barrier. O&M needs to be figured into the overall life cycle cost of the barrier.• After impact barrier gaps: Post impact gaps may be an inherent characteristic of the barrier system. The barrier system's post-impact condition should be carefully evaluated for its capabilities in relation to defeat of the installation's Design Basis Three (DBT).
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BARRIER CERTIFICATION

- **ASTM F2656-18 – Standard Test Method for Vehicle Crash Testing of Perimeter Barriers**
- **DOS SD-STD-02.1, REV A, March 2003 – Test Method for Vehicle Crash Testing of Perimeter Barriers and Gates**

VEHICLE BARRIER SELECTION, DESIGN AND INSTALLATION



BARRIER CERTIFICATION

- ASTM F2656-18 – Standard Test Method for Vehicle Crash Testing of Perimeter Barriers
- DOS SD-STD-02.1, REV A, March 2003 – Test Method for Vehicle Crash Testing of Perimeter Barriers and Gates



This international standard was developed in accordance with internationally recognized principles on standardization established in the Declaration on Principles for the Development of International Standards, Codes and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: F2656/F2656M - 18a

Standard Test Method for Crash Testing of Vehicle Security Barriers¹

This standard is issued under the fixed designation F2656/F2656M, the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last approval. A superscript symbol (1) indicates an editorial change since the last revision or approval.

INTRODUCTION

Original perimeter barrier test methods were first published in 1985 by the Bureau of Diplomatic Security to assess the crash performance of perimeter barriers and gates. Since that time, the frequency and scale of attacks using vehicles with or without an explosive payload have increased both internationally and domestically. Therefore, there is a need to address a broad spectrum of possible incident conditions such as credible threat vehicle types for the locale, attack velocities of the different vehicles, and different acceptable penetration limitations. Also, there are different evaluation criteria for different agencies that fulfill their unique access control operations, aesthetics, and other organizational requirements. This test method was originally developed to expand the previous Department of State, Bureau of Diplomatic Security's crash testing standard to meet the broader needs of multiple organizations responsible for the protection of U.S. assets domestically and abroad.

Published test standards for vehicle perimeter security devices have previously been maintained by the U.S. State Department, Bureau of Diplomatic Security. The Specification for Vehicle Crash Test of Perimeter Barriers and Gates was first published in 1985 as SD-STD-02.01. In that standard, the test vehicle was specified as a medium-duty truck weighing 6800 kg [15 000 lb]. The payload was to be securely attached to the frame and nominal impact velocities were 50, 65, and 80 km/h [30, 40, and 50 mph]. Penetration limits were 1, 6, and 15 m [3, 20, and 50 ft] and were measured from the attack face of the perimeter security device to the final resting position of the front of the frame rails of the test vehicle.

In 2003, the U.S. State Department, Bureau of Diplomatic Security issued an updated standard (SD-STD-02.01, Revision A) for the testing of perimeter barriers. This update was done for several reasons. The foremost reason for change was limited setback distances precluded the use of any devices at their facilities or compounds that did not meet the highest test level, that is, those allowing more than 1-m [3-ft] penetration distance. Therefore, the revised standard only uses a 1-m [3-ft] penetration distance. Secondly, the method of rigid attachment of the balist to the test vehicle was not simulating likely payload configurations and was altering the structural integrity of the test vehicle. Consequently, the updated standard requires a payload consisting of 208-L [55-gal] steel drums strapped together that have been filled with soil. This assembly is then strapped to the vehicle load platform. The third reason for change was based on the observation that the cargo bed of trucks could effectively penetrate certain types of barriers. Accordingly, the penetration distance is now measured from the inside face or non-impact surface of the barrier to the front of the cargo bed when the vehicle has reached its final position. Lastly, it was determined that the trucks used different platforms within a given class affecting result consistency. The revised test standard required the use of very specific diesel-powered medium-duty trucks.

In 2007, ASTM first published Test Method F2656 for Vehicle Crash Testing of Perimeter Barriers. It included the same test vehicle as specified in the 2003 SD-STD-02.01, Revision A, but additional test vehicles were added. They were the small passenger car, a 1/2-ton regular cab pickup, and a tandem axle dump truck. In addition, penetration ratings were established and included the highest rating established by the 2003 SD-STD-02.01. Occupant risk values as established in NCHRP Report 350 were also added.

VEHICLE BARRIER SELECTION, DESIGN AND INSTALLATION



BARRIER CERTIFICATION

ASTM F2656-18 – Standard Test Method for Vehicle Crash Testing of Perimeter Barriers

TABLE 1 Impact Condition Designations

Test Vehicle/Minimum Test Inertial Vehicle, kg [lbm]	Nominal Minimum Test Velocity, km/h [mph]	Permissible Speed Range, km/h [mph]	Kinetic Energy, KJ [ft-kips]	Condition Designation
Small passenger car (SC) 1100 [2430] 1100 + 25 [2420 + 55]	50 [30]	45.0-60.0 [28.0-37.9]	106 [78]	SC30
	65 [40]	60.1-75.0 [38.0-46.9]	179 [131]	SC40
	80 [50]	75.1-90.0 [47.0-56.9]	271 [205]	SC50
	100 [60]	90.1-above [57.0-above]	424 [295]	SC60
Full-size Sedan (FS) 2100 [4630] 2100 + 50 [4630 + 110]	50 [30]	45.0-60.0 [28.0-37.9]	203 [37]	FS30
	65 [40]	60.1-75.0 [38.0-46.9]	342 [247]	FS40
	80 [50]	75.1-90.0 [47.0-56.9]	519 [387]	FS50
	100 [60]	90.1-above [57.0-above]	810 [557]	FS60
Pickup truck (PU) 2300 [5070]	50 [30]	45.0-60.0 [28.0-37.9]	222 [164]	PU30
	65 [40]	60.1-75.0 [38.0-46.9]	375 [273]	PU40
	80 [50]	75.1-90.0 [47.0-56.9]	568 [426]	PU50
	100 [60]	90.1-above [57.0-above]	887 [613]	PU60
Standard Test Truck (M) 6800 [15 000] 11 800-14 970 [26 000-33 000]	50 [30]	45.0-60.0 [28.0-37.9]	656 [451]	M30
	65 [40]	60.1-75.0 [38.0-46.9]	1110 [802]	M40
	80 [50]	75.1-above [47.0-above]	1680 [1250]	M50
	100 [60]	90.1-above [57.0-above]	2650 [1950]	M60
Class 7 Cabover (C7) 7200 [15873] 11 800-14 970 [26 000-33 000]	50 [30]	45.0-60.0 [28.0-37.9]	673 [497]	C730
	65 [40]	60.1-75.0 [38.0-46.9]	1199 [884]	C740
	80 [50]	75.1-above [47.0-above]	1872 [1381]	C750
	100 [60]	90.1-above [57.0-above]	2850 [1950]	H30
Heavy goods vehicle (H) 29 000 [65 000] 27 000 [60 000]	50 [30]	45.0-60.0 [28.0-37.9]	4810 [3470]	H40
	65 [40]	60.1-75.0 [38.0-46.9]	7280 [5430]	H50
	80 [50]	75.1-above [47.0-above]		
	100 [60]	90.1-above [57.0-above]		

TABLE 2 Penetration Ratings

Designation	Dynamic Penetration Rating
P1	≤1 m [3.3 ft]
P2	1.01 to 7 m [3.31 to 23.0 ft]
P3	7.01 to 30 m [23.1 to 98.4 ft]



BARRIER CERTIFICATION

DOS SD-STD-2.01, April 1985 - Specification For Vehicle Crash Test Of Perimeter Barriers and Gates

DOS SD-STD-02.01, REV A, March 2003 – Test Method for Vehicle Crash Testing of Perimeter Barriers and Gates

Table 1. Impact condition designations for a gross vehicle weight (GVW) of 6,800 kg (15,000 lbs)

Nominal impact speed	Permissible impact speed range	Kinetic energy	Designation
80 kph 50 mph	75.0-above kph 47.0-56.9 mph	1,695,000 J 1,250,000 ft-lb	K12
65 kph 40 mph	60.1-75.0 kph 38.0-46.9 mph	1,085,000 J 800,000 ft-lb	K8
50 kph 30 mph	45.0-60.0 kph 28.0-37.9 mph	610,000 J 450,000 ft-lb	K4

**TABLE TS-4
ASSESSMENT CRITERIA**

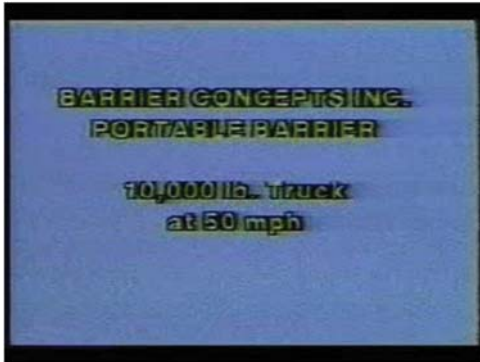
Performance Level	Crash Test Assessment
L3	Vehicle and cargo are to be stopped although vehicle partial penetration and/or barrier deflection of up to 3 feet are permitted.
L2	Vehicle and cargo are to be stopped although vehicle partial penetration and/or barrier deflection of up to 20 feet are permitted.
L1	Vehicle is disabled and does not travel more than 50 feet after impact.

DOS SD-STD-2.01, April 1985

DOS SD-STD-02.01, REV A, March 2003





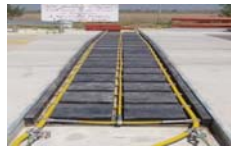


Vehicle Barriers



- **High Security Barriers**
- **Bollard Systems**
- **Cable Beam Barriers**
- **Sliding Gates**
- **High Security Surface Mounted Barriers**
- **Portable Barriers**

High Security Barriers



- Ratings: Wedge Type PU40/P3 to M50/P1, C730/P1; K4/L3 to K12/L3 ; Net type barriers - M40/P1 to M50/P3
- Installed range of 6.5 to 80 feet clear opening with interpretation between acceptable ranges as noted
- Manual, Hydraulic and Electromechanical Normal Operation: 2 to 15 seconds
- Emergency Cycle: 1-2 seconds
- Nets -Less severe than other types

Bollard Type Barriers



- Ratings: M30/P1 to M50/P3, C750/P2; K4/L2 to K12/L3
- Installed as single bollard or 3-bollard array
- Manual, Hydraulic and Electromechanical Normal Operation: 2 to 15 seconds
- Emergency Cycle: 1-2 seconds

Post and Beam



- Ratings: M50/P1; K4/L3 and K12/L3
- Installed range of 12 feet to 33.33 feet clear opening
- Manual, Hydraulic and Electromechanical Normal Operation: 2 to 15 seconds
- Emergency Cycle: 1-2 seconds



Drop-Arm Beam Barriers



- Ratings: M30/P1 to M50/P3; K4/L2 to K12/L3
- Installed range of 11.5 to 40.83 feet clear opening with interpretation between acceptable ranges as noted
- Manual, Hydraulic and Electromechanical Normal Operation: 2 to 15 seconds
- Emergency Cycle: 1-2 seconds

Sliding Gates



- Ratings: M30/P1 to M50/P2; K4/L2 to K12/L3
- Installed range of 12 to 50 feet clear opening
- Manual, Hydraulic and Electric Normal Operation: 2 to 15 seconds
- Emergency Cycle: 1-2 seconds
- Nets -Less severe than other types
- Penetration

High Security Surface Mounted Barriers



- Ratings: Wedge Type PU40/P3 to M50/P1, C730/P1; K4/L3 to K12/L3 ; Net type barriers - M40/P1 to M50/P3
- Installed range of 6.5 to 80 feet clear opening with interpretation between acceptable ranges as noted
- Manual, Hydraulic and Electromechanical Normal Operation: 2 to 15 seconds
- Emergency Cycle: 1-2 seconds
- Nets -Less severe than other types

Portable Barriers



- Ratings: M30/P1 to M50/P3; K4/L2 to K12/L3
- Installed range of approximately 12 feet clear opening Manual, Hydraulic and Electromechanical Normal Operation: 2 to 15 seconds
- Emergency Cycle: 1-2 seconds



Passive Barriers



- Placed longitudinally or at an angle that encourages deflection back onto the roadway
- When selecting a passive barrier, consider the potential debris hazard that may be caused due to an explosion
- Design passive barriers to be consistent with base exterior architecture
- Always install passive barriers outside of the roadway clear zone



THREAT DEFEATED



Final Denial



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September 2019

Take Away



- We have unified criteria that provides the ECF designer the tools they need to provide a safe, secure ECF with the proper Traffic Control Devices
 - Signage – size/legibility/reflectivity requirements
 - Speed limit signing
 - Guide/Direction signing
 - Signals
 - Pavement Marking
 - Lighting
 - Fences and Gates
 - Vehicle Barriers: Active and Passive
- Each Entry Control Facility is different:
 - Classification
 - Capabilities
 - Constraints
 - Site
 - Manpower/Operations

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September 2019

Questions?



John Lynch, PE
john.j.lynch@navy.mil
(757) 322-4207



ENTRY CONTROL FACILITIES ACCESS CONTROL POINTS



**WHAT DOES AN ENTRY CONTROL
FACILITY LOOK LIKE?**

NOTIONAL AND REAL EXAMPLES

WHAT DOES AN ENTRY CONTROL FACILITY LOOK LIKE?



ECF/ACP Prototype

GOALS OF ECF PROJECTS



↑
BEFORE

AFTER



GOALS OF ECF PROJECTS

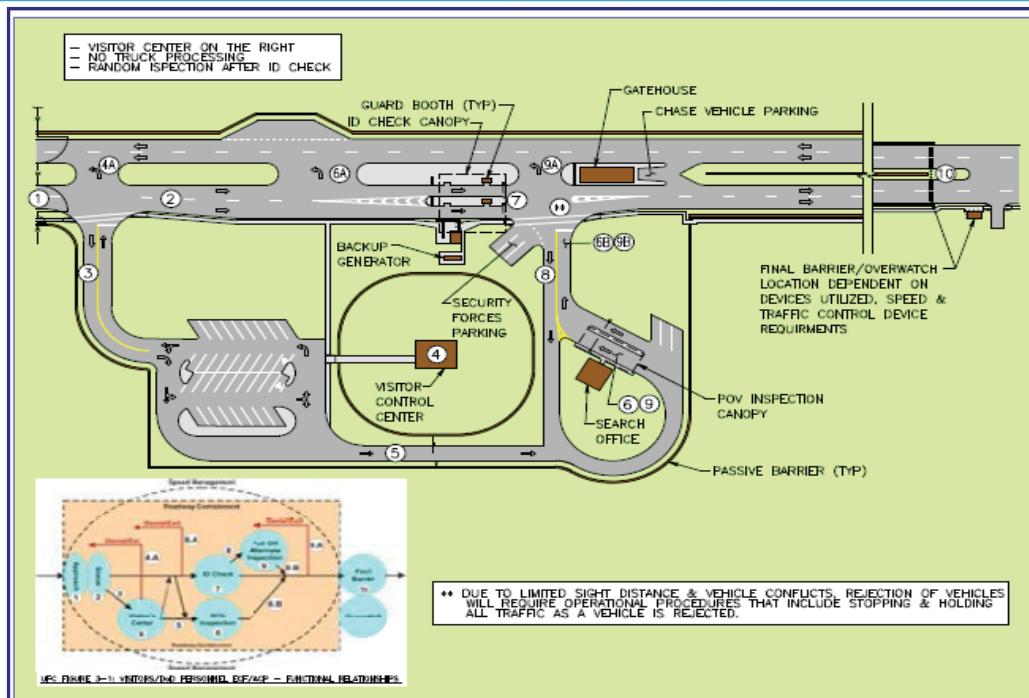


BEFORE

AFTER



PRIMARY ECF



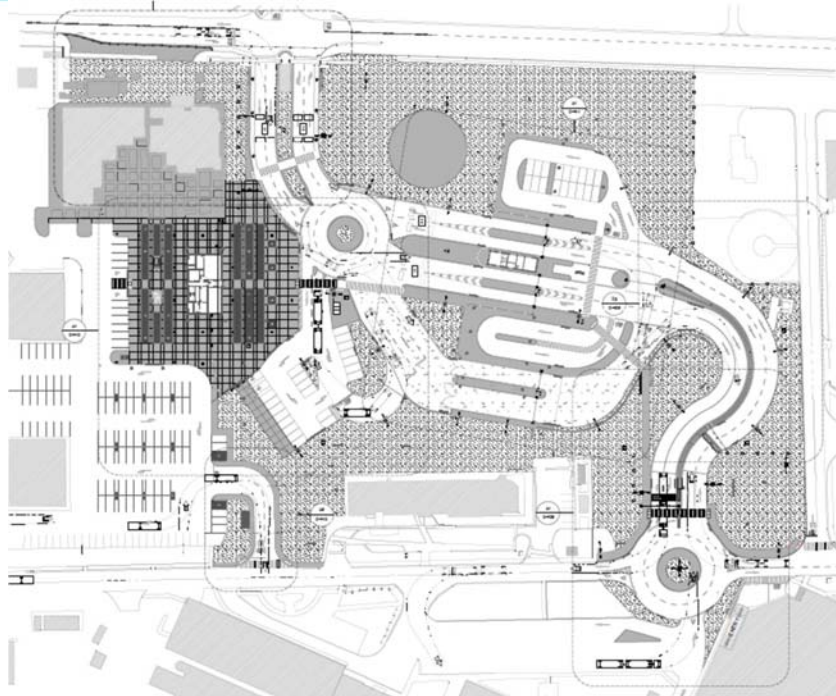
PRIMARY ECF



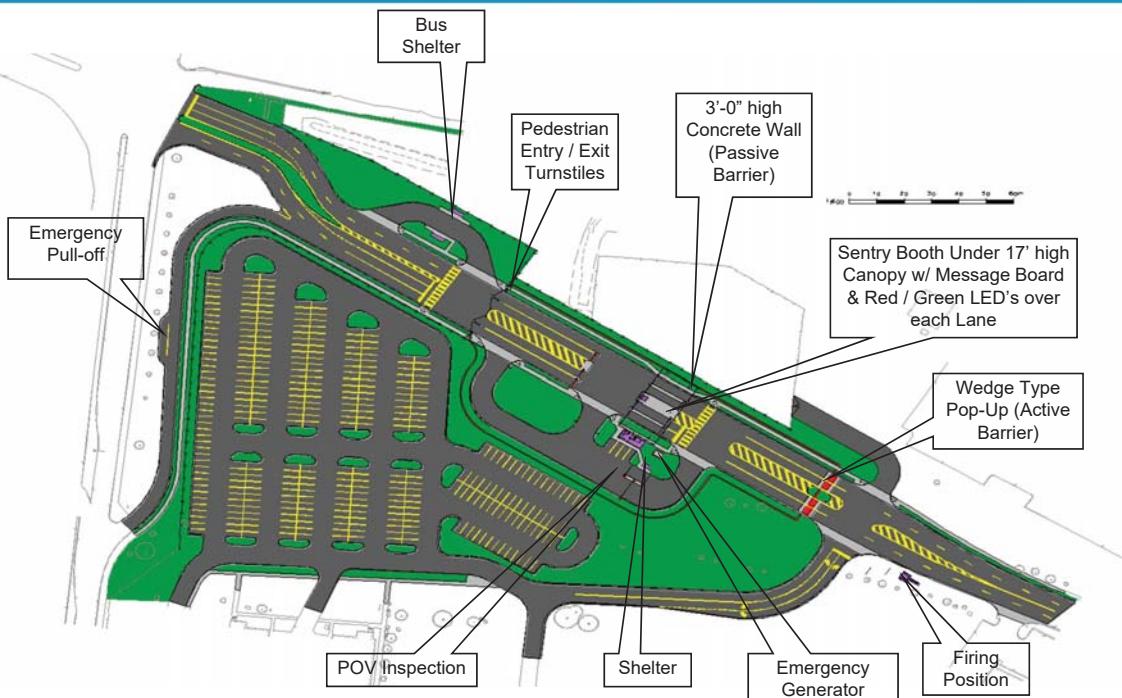
PRIMARY ECF



PRIMARY ECF



HIGH VOLUME ECF

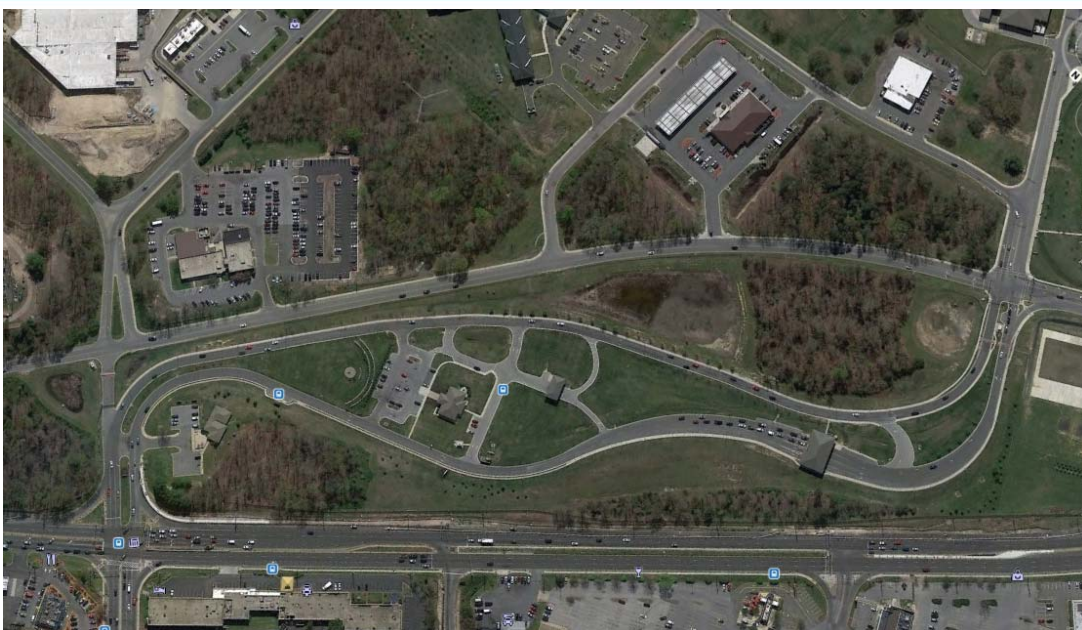


HIGH VOLUME ECF



**JOINT EXPEDITIONARY
BASE LITTLE CREEK**

PRIMARY HIGH VOLUME ECF



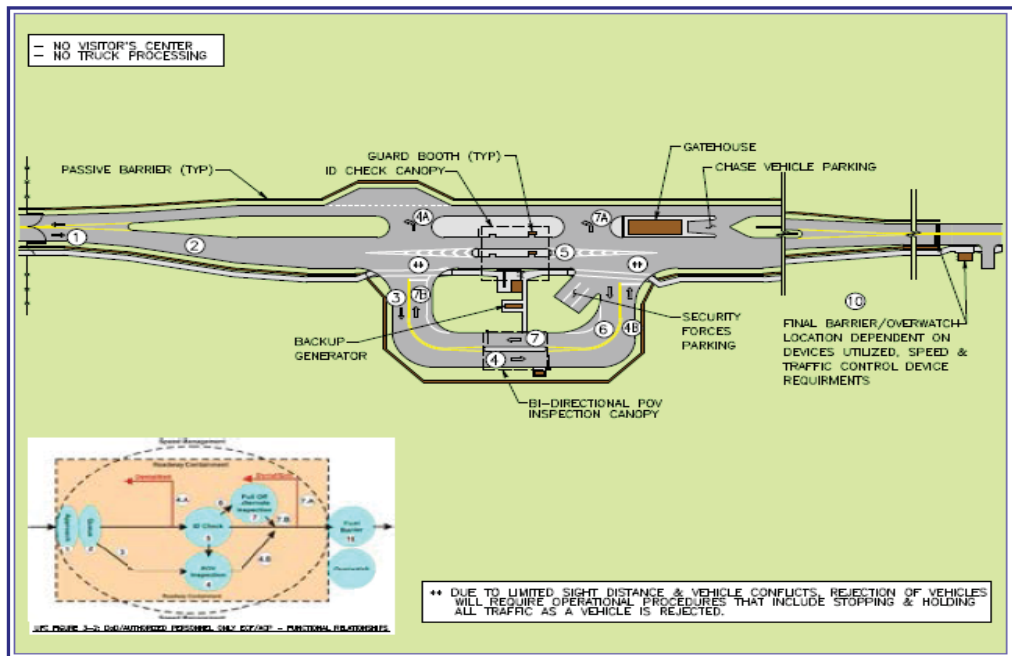
JOINT BASE ANDREWS – MAIN GATE

PRIMARY HIGH VOLUME ECF

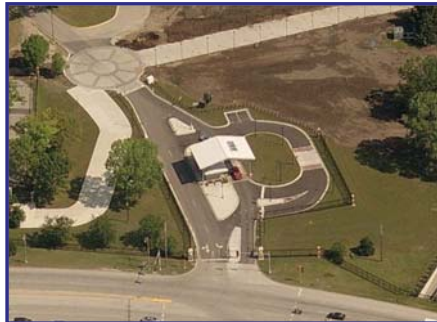


USMCB CAMP LEJEUNE- WILSON BLVD GATE

LOW VOLUME ECF

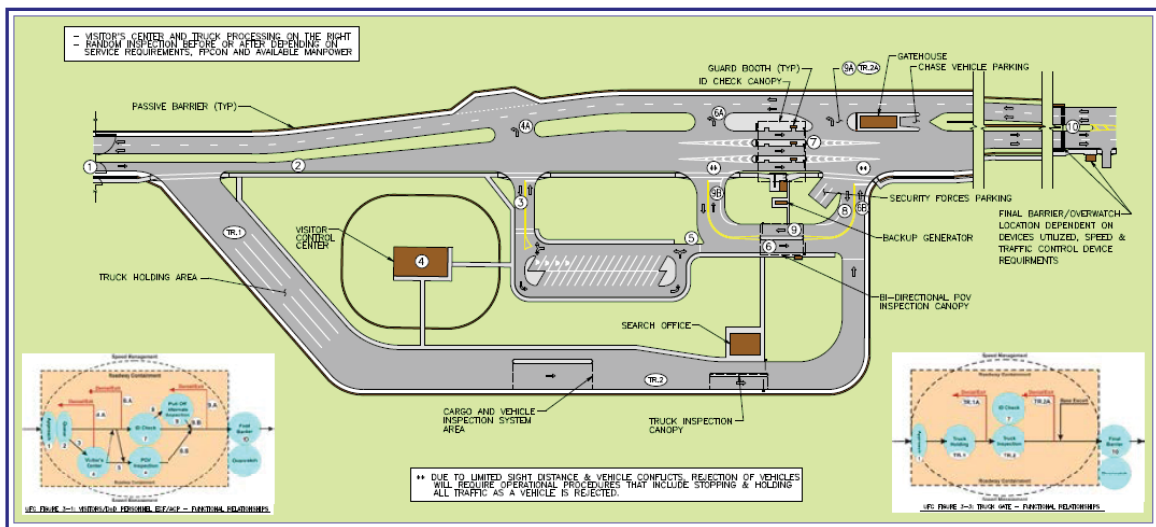


LOW VOLUME ECF



NAVAL STATION GREAT LAKES

PRIMARY ECF WITH VISITOR CENTER POV/TRUCK INSPECTION

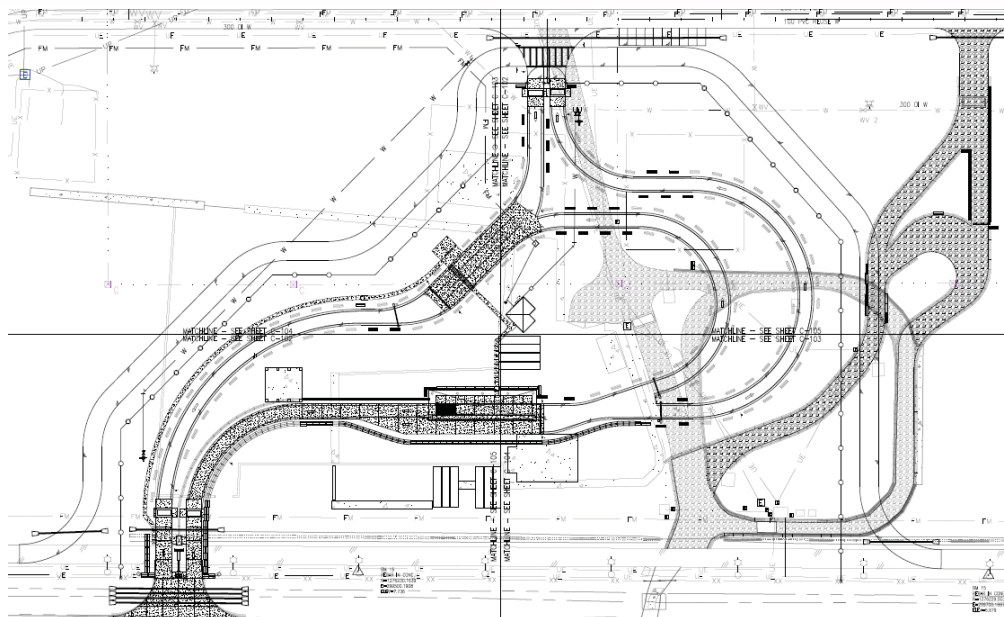


PRIMARY ECF WITH TRUCK INSPECTION AND VISITOR CENTER



**JOINT EXPEDITIONARY
BASE LITTLE CREEK**

LARGE/COMMERCIAL VEHICLE ECF



CLDJ CVIS

LARGE/COMMERCIAL VEHICLE ECF



CLDJ CVIS