

ATTACHMENT 002

**DETROIT ARSENAL**  
INSTALLATION DESIGN GUIDE  
**IDG**



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**INSTALLATION DESIGN GUIDE**  
**DETROIT ARSENAL, MI**  
APRIL 10, 2006

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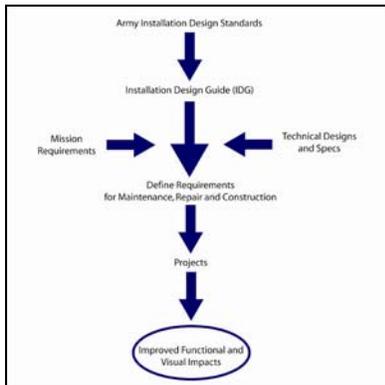
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## ES Executive Summary



**Figure ES - I** The Army Installation Design Guide is a Tool to Implement army Standards

### ES.1 PURPOSE

The purpose of this Army Installation Design Guide is to serve as a tool for implementing the Army Installation Design Standards (Figure ES - I).

- The design standards for site planning, buildings, vehicular and pedestrian circulation, landscaping, site elements (i.e. signage, utilities), force protection, and Sustainable Design Standards are provided for incorporation into each Army installation.
- The framework for implementation is the Army Installation Design Guide (IDG). Each installation will imitate the IDG processes in the Army Installation Design Standards in the development of their installation specific IDG.

The Installation Design Guide is not a technical manual. It is a starting point for the design process to help ensure a certain consistent aesthetic at the Detroit Arsenal. The [Technical Design Guide](#) contains further, more specific information to be used as part of the design process.

The Army Installation Design Standards follows the concept established in the Joint Service Unified Facilities Criteria Installation Design manual.

Research was conducted to incorporate into Army standards the best practices from other organizations such as the Air Force, Navy, AAFES, GSA, National Park Service, Federal Highway Administration, and various city and county governments, and associations.

Existing Army Installation Design Guide were also reviewed for their application of procedures, examples, and benchmarks for IDG implementation Army-wide.

The IDG provides standards and guidelines to installation decision makers, contracted and in-house planning and design professionals, installation maintenance personnel, and others. The IDG sets interior and exterior standards and planning criteria to be integrated into all proposals, design and construction contracts, renovation, maintenance, or repair projects performed on the installation or its properties.

The following paragraphs present an overview of the steps involved in developing an installation specific IDG. The IDG promotes a sense of arrival, functional compatibility, visual order, enhances site assets, relates the natural and man-made environment, and achieves consistent architectural themes throughout the installation and where applicable its sub-installations.

### Step 1: Installation Profile

Initially an installation profile is created in which the installation setting, existing land use, and proposed land use are detailed to include all applicable sub-installations.

### Step 2: Visual Surveys

The Visual Survey establishes the visual zones and themes of the installation and documents the liabilities and assets within each visual zone.

### Step 3: Visual Zones and Themes

Information gathered during the visual survey is recorded and used to delineate visual zones. Zones with similar visual characteristics are grouped together to form a broader category called themes. Visual characteristics are not based on land usage, but are based upon a "look and feel" of an area together with the dominant features that define its image. Typical visual characteristics include unique buildings, vehicular and pedestrian corridors, functional use, natural features, and spatial relationships (Figure ES - 2).

### Step 4: Assets and Liabilities

Each visual zone is then defined for its assets and liabilities. Subsequently, a functional analysis is prepared.

### Step 5: Recommendations

Recommendations are developed to address the liabilities identified and to enhance the assets noted in accordance with Army standards and the IDG goals and objectives. Recommendations are in the form of specific projects that are utilized to prepare a prioritized projects list for approval by the installation Real Property Planning Board.

## ES.2 RESPONSIBILITIES

Assistant Chief of Staff for Installation Management (ACSIM):

- Establish Army facility standards and approve deviations from the standards.
- Approve Army Installation Design Standards Implementation Plan.
- Approve Army Installation Design Standards Investment Strategy.

Director Installation Management Agency (IMA):

- Develop and implement the Army Installation Design Standards Implementation Plan.
- Develop and implement the Army Installation Design Standards Investment Strategy.
- Ensure compliance with the Army Installation Design Standards.
- Maintain electronic newsletter for communicating changes in standards.

Garrison Commander:

- Develop the installation's IDG.
- Chair installation Real Property Planning Board to review and approve projects established on the Prioritized Improvement Projects List to meet Army standards.
- Submit Prioritized Improvement Projects List for approval and funding IAW Director, IMA instructions after review and approval by Senior Mission Commander.
- Enforce IDG standards.



**Figure ES - 2** Example of Visual Zone Map





Senior Mission Commander:

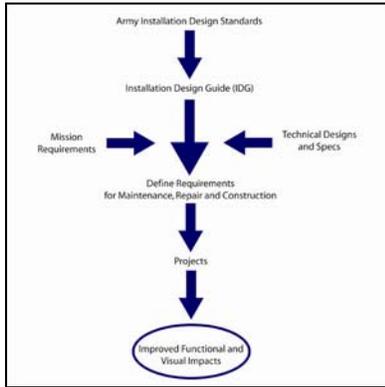
- Review and approve IDG.
- Review and approve RPPB prioritized improvement projects list recommendations to meet Army standards prior to submission to IMA Region Director.

Major Army Command/Tenant:

- Participate in installation Real Property Planning Board.
- Participate in design and planning charrettes.
- Determine project functional requirements.
- Participate in design reviews.
- Participate in development of Prioritization Projects List.

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# Section I Introduction



**Figure I-1** The Army Installation Design Guide is a Tool to Implement Army Standards

## I.1 PURPOSE

A military installation conveys a visual image established by its architectural and historical character, arrangement of facilities, circulation patterns, and features in the landscape. This image can be clear, orderly, logical and attractive; or cluttered, confused, and unattractive.

The purpose of the Army Installation Design Guide (IDG) is to provide design guidance for standardizing and improving the quality of the total environment of the installation. This includes not only the visual impact of features on the installation and but also the impact of projects on the total built and natural environment. The improvement of the quality of visual design and development and use of sustainable design and development practices have a direct and future impact on the quality of life for those who live, work, or visit the installation (Figure I-1).

The IDG includes standards and general guidelines for the design issues of site planning; architectural character, colors and materials; vehicular and pedestrian circulation; and landscape elements, including plant material, seating, signage, lighting, and utilities. The design guidelines incorporate sustainable design, quality of design, anti-terrorism, low maintenance, historical and cultural considerations, durability, safety, and compatibility.

## I.2 GOAL

The goal of the IDG is to provide a clear, comprehensive approach to establish and maintain a positive visual imagery throughout the installation and implement appropriate standards. This is accomplished by providing a systematic development process that is defined through description, analysis, synthesis, and implementation. The IDG is not a technical manual. The [Technical Design Guide](#) (currently being developed) contains further, more detailed information to be used as part of the design process.

## I.3 OBJECTIVES

The objectives of the IDG are:

To provide a set of general design standards and guidelines that define color, materials, style, signage, and other aspects of design for all visual elements surveyed.

To provide standards and guidelines for the selection of materials for new construction, renovation, maintenance and repair projects.

To provide guidance for accomplishing sustainable development. [See Appendix D.](#)

To provide a structured methodology for establishing projects to improve the visual imagery of the installation.

To provide guidance to integrate AFTP standards.

## I.4 AUDIENCE

The IDG is to be used by all individuals involved in decision-making, design, construction, and maintenance of facilities (Figure I-2). The primary users include the following:

- Senior Mission Commander.
- Garrison Commanders and Staff.
- Installation facility planning and design personnel.
- Installation facility maintenance personnel.
- Installation Management Agency and Region.
- U.S. Army Corps of Engineers project managers, design, and construction staff.
- Consulting Planners, Architects, Engineers, Interior Designers, and Landscape Architects.
- Supporting agencies such as AAFES, DeCA, DoDDS, MEDCOM, tenants, etc.
- National Guard.
- Force Protection Personnel.
- Non-government personnel engaged in design, construction and maintenance of the installation.

The ultimate success of the IDG is dependent upon the commitment of the above individuals and organizations working as a team to apply the Army standards.

## I.5 ORGANIZATION

This Army Installation Design Guide is organized to facilitate the preparation and execution of projects to improve the visual image on the installation and ensure design conforms to Army standards to include sustainability.

Sections 2 and 3 discuss the process, use, and implementation of the IDG.

Section 4 establishes the installation profile. The installation setting, existing land use, and future land use are detailed.

Section 5 addresses the development of installation visual themes and zones. It lists visual themes and zones, specifies assets and liabilities of each zone, and offers recommendations.

Section 6 provides a list of prioritized improvement projects. All projects are addressed in terms of existing conditions, design concept, cost estimate, funding and maintenance impact, and site plan where applicable.

Sections 7 through 12 discuss the six design components that provide the categories used for review and analysis during the visual inventory of the installation. The visual impressions of each zone are categorized according to these six design components.

## I.6 WHEN TO USE THE ARMY INSTALLATION DESIGN GUIDE

This IDG provides installation-specific design data. The general design concepts, recommendations, and standards addressed herein are applicable to all Army installations. This document will be used as a reference to acquire recommendations and Army standards on the design of all facilities, new roads, road widening, parking, sidewalks and other pedestrian paths, bicycle paths, Access Control Points (ACP), site furnishing selection and placement, signage selection and placement, lighting selection and placement, utility corridor selection, and utilities. Clearing of plant materials and planting of new plant materials will be based upon the guidance herein.

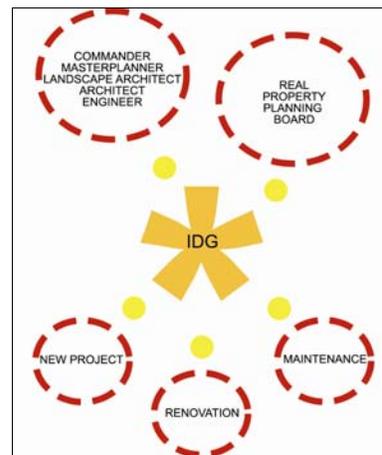


Figure I-2 Design Guide Audience

## **I.7 MAINTAINING THE ARMY INSTALLATION DESIGN GUIDE**

Since the IDG is a "living document", keeping it up-to-date and accurate will ensure its continued usefulness. Therefore, it will become necessary to revise it as mission, budget, standards, and other conditions generate new planning and design requirements and in response to facility user feedback.

In accordance with AR 210-20, Master Planning for Army Installations, the installation Real Property Planning Board (RPPB) is the adjudicating body for the Army Installation Design Guide at the installation level. Violations and variances from standards will be reviewed and adjudicated by the RPPB. The Senior Mission Commander will chair an Installation Planning Board (IPB) to review and approve the RPPB's actions.

## **I.8 RESPONSIBILITIES**

As directed by the Secretary of the Army and the Chief of Staff, Army and approved by the Army Installation Management Board of Directors the following responsibilities are established:

### **I.8.1 Assistant Chief of Staff for Installation Management (ACSIM)**

- Establish Army facility standards and approve deviations from the standards.
- Approve Army Installation Design Standards Implementation Plan.
- Approve Army Installation Design Standards Investment Strategy.

### **I.8.2 Director Installation Management Agency (Dir IMA)**

- Develop and implement the Army Installation Design Standards Implementation Plan.
- Develop and implement the Army Installation Design Standards Investment Strategy.
- Ensure compliance with the Army Installation Design Standards.
- Maintain electronic newsletter for communicating changes in standards.

### **I.8.3 Garrison Commander**

- Develop the installation's IDG.
- Chair Real Property Planning Board (RPPB) to review and approve projects established on the Prioritized Improvement Projects List ([Appendix G](#)) to meet Army standards.
- Submit Prioritized Improvements Projects List for approval and funding IAW Director, IMA instructions after review and approval by Senior Mission Commander.
- Enforce IDG standards.

### **I.8.4 Senior Mission Commander**

- Review and approve IDG.
- Review and approve RPPB prioritized improvement projects list recommendations to meet Army standards prior to submission to IMA Region Director.

### **I.8.5 Major Army Command/Tenant**

- Participate in installation RPPB.
- Participate in design and planning charrettes.
- Determine project functional requirements.
- Participate in design reviews.
- Participate in development of Prioritization Projects List.

## 1.9 SUSTAINABLE DESIGN AND DEVELOPMENT

Practicing the principles of sustainable design in the planning, design, construction, and operation of infrastructure and facilities is a smart business practice. Protecting our natural resources and reducing our impact on the natural environment is achievable when we create, healthy (Figure 1-3), energy efficient (Figure 1-4), high-performance (Figure 1-5) and safe buildings.

### 1.9.1 The Integrated Design Process

Critical to the success of sustainable design and development is the organization and commitment of the team to engage in the Integrated Design Process. To effect change in building design and operation, the project delivery process itself must become a collaborative effort to integrate design strategies among all disciplines and all players in the project delivery process. Integrated design demands a more inclusive team, working closer together than is traditionally the case. Future building users and facility managers must be invited to join architects, engineers, and planners in developing the vision and goals for new facilities.

[Appendix D](#), Sustainable Design, discusses the sustainable design concept and its application to Army projects. [Paragraph D.3](#) discusses the Sustainable Project Rating Tool (SPiRiT) developed by the U.S. Army Corps of Engineers (USACE). Per the [Assistant Secretary of the Army \(Installation & Environment\) Sustainable Design and Development Memorandum](#) and the [Assistant Chief of Staff for Installation Management \(ACSIM\) endorsement of Sustainable Design and Development](#) initiative, the SPiRiT rating system will be used by design professionals in all new construction, additions, or renovation of Army facilities for rating sustainability.

- The Spirit Document

The SPiRiT document ([Appendix E](#)) was derived from the U.S. Green Building Council LEED 2.0 (Leadership in Energy and Environmental Design) Green Building Rating System.

- Army Rating Standard

The SPiRiT rating of "Silver" is the standard for all FY06 MILCON vertical construction projects currently under design (as of March 18, 2003). For all other FY06 and future-year MILCON projects, the minimum SPiRiT rating requirement is "Gold". See Assistant Secretary of the Army Memorandum Subject: Sustainable Design and Development Requirements, dated 18 March 2003.

Detroit Arsenal has a repair and maintenance standard of "Bronze".

Further information on sustainable design can be obtained at the following websites:

[Assistant Chief of Staff for Installation Management, Sustainable Design and Development Website](#) This site provides information on the following topics: documentation and references; sustainable process, tools, products and materials; Sustainable Design and Development Training; and links to various sustainable design and development informational website.

U.S Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory (CERL), [Sustainable Design and Development Website](#).

[Whole Building Design Guide](#) (WBDG) This site provides comprehensive and current information on sustainable design strategies and technologies.



**Figure 1-3** Monitors Measure Indoor Air Quality Assisting in Creating a Healthy Environment



**Figure 1-4** Energy Efficient Lighting Contributes to Sustainability

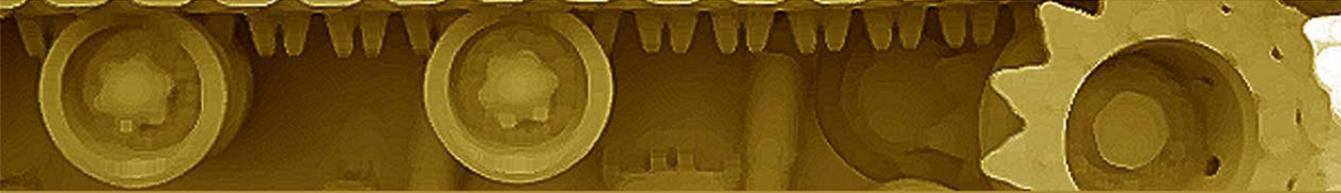


**Figure 1-5** Efficient Water Usage Contributes to High Performance

## **I.10 ARMY STANDARDS**

Army Standards and References are included in the last two paragraphs of the following sections and appendices: [Section 7](#), Site Planning Design Component; [Section 8](#), Buildings Design Component; [Section 9](#), Circulation Design Component; [Section 10](#), Landscape Design Component; [Section 11](#), Site Element Design Component; [Section 12](#), Force Protection Design Component; [Appendix D](#), Sustainable Design; and [Appendix M](#), Historic Preservation Guideline.

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## Section 2 Process and Implementation

### 2.1 INTRODUCTION

The Army Installation Design Guide (IDG) provides direction for achieving a sense of community, order, tradition, and pride on our installations. This section provides a brief overview of the IDG developmental process and methodology detailed in [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design](#).

### 2.2 THE DESIGN GUIDE PROCESS

The IDG includes a process for analysis, planning, design, and implementation. This process includes the following steps:

#### 2.2.1 Setting Goals and Objective

The installation develops a set of goals and objectives that address the visual requirements of the installation. The goals and objectives provide a pre-determined image that helps create a visually pleasing and optimally functional environment.

#### 2.2.2 Conduct Visual and Spatial Surveys

A visual survey is performed in the preparation of the IDG. This survey establishes the visual zones and themes of the installation and documents the assets and liabilities within each visual zone. [Chapter 5 of UFC 2-600-01](#) details the method for conducting the installation visual survey.

#### 2.2.3 Establish Visual Zones and Themes

The information gathered during the visual survey is used to establish the visual zones of the installation. The visual zones are delineated by the visual characteristics of an area defined as the "look and feel" of an area together with the dominant features that help define its image. A functional analysis of each zone organizes the visual impressions and assesses their functional relationships to determine the visual character and unifying motif. Typical visual characteristics include unique buildings, vehicular and pedestrian corridors, functional use, natural features, and spatial relationships.

Visual zones with similar characteristics are then grouped together to form a broader category called themes. For example, Detroit Arsenal has one Theme, Corporate Campus, with three visual zones: Administration, Research and Development (R&D) and Industrial.

#### 2.2.4 Determine Assets and Liabilities

During the visual survey each visual zone is analyzed for specific visual impacts. The objective of the inventory is to define the visual assets and liabilities within the visual zone. Visual assets take into account those things that are visually pleasing but also identify Anti-Terrorism/Force Protection (ATFP) features such as surveillance platforms and natural access control features. It also determines liabilities such as concealment areas for illegal activities, such as large groups of trees set upon a berm near the parking lot, can provide concealment for a sniper.

- Assets

Assets are positive visual elements, design elements, or features that enhance the surroundings, either visually or functionally.

- Liabilities

Liabilities are negative visual elements, design elements, or features that detract from the visual image or functionality of the surroundings. Liabilities should be corrected through appropriate design measures and are the basis for recommendations for improvement.

### 2.2.5 Recommendations and Implementation Plan

The assessment of each visual zone includes recommendations to correct liabilities and where desired to enhance assets. The recommendations are listed within each visual zone and in the form of specific projects which are described in detail in Section 6, Improvement Projects of the IDG.

### 2.2.6 Design Components

The following six design components, described in sections 7 through 12, provide guidelines and standards from which to conduct the visual zone review and analysis.

- Section 7, [Site Planning](#)
- Section 8, [Buildings](#)
- Section 9, [Circulation](#)
- Section 10, [Landscape](#)
- Section 11, [Site Elements](#)
- Section 12, [Force Protection](#)

### 2.2.7 Design Principles

The visual inventory and analysis requires an understanding of basic design and force protection principles. The design principles are discussed in [Section 3, paragraph 3.4](#). The force protection principles are discussed in section 12, paragraph 12.1.

### 2.2.8 Visual Elements

The basic design principles are used to define the visual elements described in [Section 3, paragraph 3.5](#). The assessment and classification of visual elements follows basic design principles describing "good" (positive visual elements) and "not so good" (negative visual elements) design.

## 2.3 USING THE DESIGN GUIDE

Use this IDG in determining the general design and construction considerations inherent in the preparation of project plans. The IDG provides design guidelines and Army-wide design standards intended to be used in all maintenance, repair, renovation, and new construction projects. The IDG applies to all projects, regardless of the funding source.

The following steps illustrate how the design guide is used for the preparation of plans for new construction, renovation, maintenance and repair projects on the installation (Figure 2-1):

- Step 1

Review the Installation Profile information included in this IDG ([Section 4](#)).

- Step 2

Review the IDG analysis criteria information ([Section 3](#)) including design goals and objectives, visual elements, and design principles.

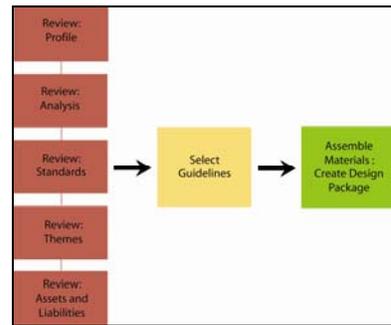


Figure 2-1 Using the Design Guide

- Step 3

Review the applicable references, guidelines, and standards of the design components. These include site planning, buildings, circulation, landscaping, site elements, and force protection and are discussed in Sections 7 through 12 respectively.

- Step 4

Review the information and description of the installation themes in [Section 5, paragraph 5.2](#).

Step 5

Select the zone where the project will be located from [Section 5, Visual Themes and Zones](#). Review the assets, liabilities, and recommendations for that zone.

- Step 6

Select the appropriate guidelines or standards from the design components addressed in Sections 7 through 12.

- Step 7

Assemble all materials gathered in steps 1 through 6 above.

## 2.4 IMPLEMENTATION

### 2.4.1 Compliance

For the IDG to work optimally as a management tool, it is essential that the Master Planner establish an understanding of the IDG among the parties concerned with its use. This can best be established at the RPPB level where all installation principles are represented. The Directorate of Public Works (DPW) staff Master Planner shall insure that the guidelines and requirements of the IDG are readily available to, and understood by, all parties involved in the design of new facilities, design of additions or alterations to existing facilities, or maintenance.

The Master Planner, acting in support of the RPPB, is the first level reviewer of projects (SRM, MCA, and NAF to include Design Build) and other requests for actions that involve compliance with IDG guidelines and standards.

The Garrison Commander, supported and advised by the RPPB, is the final authority in enforcement of the IDG guidelines and standards.

The Installation Planning Board chaired by the Senior Mission Commander, will monitor development of the installation planning process and provide guidance to other installation boards and the Garrison Command for areas such as:

- Strategic Planning,
- Real Property Planning,
- Range Planning, and
- Communications Planning.

### 2.4.2 Project Approval

Project requests to include a Facilities Engineering Work Request (DA FORM 4283) shall be submitted to the DPW or equivalent and will include the required Design Team IDG Checklist discussed below.

#### Design Team IDG Checklist

The Design Team IDG Checklist is to be completed by the design team to assure the guidelines and standards have been considered in the design process. The Design Team IDG Checklist is provided in [Appendix A](#).

The Designer of Record or Design Agent shall provide a copy of the completed checklist to the Master Planner, together with a signed certification statement with each design submittal. The checklist along with concept site plans and elevations for each design submittal shall be provided to the Master Planner for review. If the Master Planner or designated representative concurs, the plan and the signed checklist are forwarded to the RPPB for final approval.

The accepted checklist shall become a part of the project record files.

### **2.4.3 Self-help Projects and Occupant Purchased and Installed Site Furnishings and Features Projects**

Not Applicable to Detroit Arsenal

### **2.4.4 Request for Waiver**

A request of waiver form can be found in the Design Guide Checklist ([Appendix A](#)). It shall be submitted to the DPW Director for approval by the RPPB.

A request for waiver from the Army standards shall be submitted to the Assistant Chief of Staff for Installation Management for approval.

### **2.4.5 Checklists (optional)**

#### Projects Requirements Checklist (Optional)

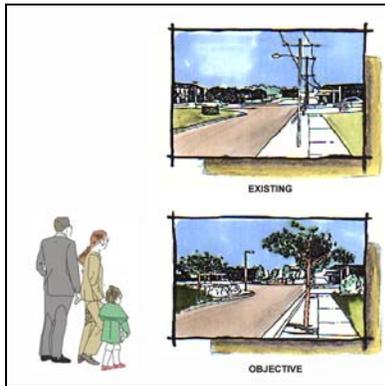
It is recommended that this checklist be used as a pre-design planning tool for initiating projects and to present a functional description of the project at MILCON [Planning Charrettes](#) and [Design Charrettes](#). The checklist can assist participants of the charrettes in project formulation and documentation. By the nature of the planning process all the data on the forms will not be completed, however, the form should be completed to the greatest extent possible prior to the charrettes. The checklist can also be used to document the results of the planning or design charrettes. The Projects Requirement Checklist is provided at [Appendix B](#).

#### Interior Design Review Checklist (Optional)

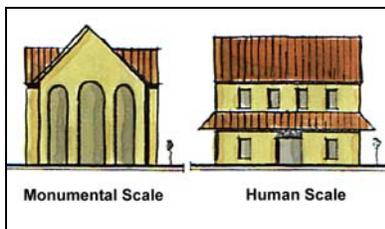
It is recommended that the Interior Design Review Checklist be used during review of a Request for Proposal (RFP) submission or an AE or in-house design prior to solicitations. The Interior Design Review Checklist is provided at [Appendix C](#).

The requirement to use the IDG as a design tool in all facility planning, design, and construction should be included in the Request for Proposals on new projects, Scopes of Work for new projects, and maintenance agreements.

## Section 3 Design Guide Analysis Criteria



**Figure 3-1** Include Positive Visual Elements



**Figure 3-2** Monumental and Human Scale

### 3.1 INTRODUCTION

The Army Installation Design Guide process depends upon the development of visual goals and objectives that support the mission and the identification of visual elements. Goals and objectives provide the desired visual context of the installation.

Basic design principles are used to assess, define, and classify visual elements. This assessment becomes the design criteria used to determine the visual character of the installation. These design criteria are used for design decisions in the review of existing visual context and determination of project recommendation.

### 3.2 GOALS, OBJECTIVES AND RECOMMENDATIONS

[Chapter 4](#) of the UFC 2-600-01 discusses the goals, objectives, and recommendations process and gives examples (Figure 3-1).

### 3.3 IDENTIFICATION AND CLASSIFICATION OF VISUAL ELEMENTS

Basic design principles define visual elements and assess their character. When combined with ATFP principles, we ensure the visual elements also support the mission, safety and security of the site and those that use it.

The assessment and classification of visual elements follows basic design principles describing "good" and "not so good" design. Their assessment becomes the design criteria used to determine the visual character of the installation.

### 3.4 DESIGN PRINCIPLES

The visual inventory and analysis requires an understanding of basic design principles. The primary principles are:

- **Scale**

The proportional relationship of humans to their spatial environment. The scale should result in a comfortable relationship for the user and will vary as space, size and activities vary (Figure 3-2).

- **Form**

The size and shape of mass. Individual forms should be designed to complement one another and the environment.

- **Function**

The use of a space or an area. Function is gauged by the degree to which the space works for its intended purpose.

- **Color**

All elements of the visual environment have color. The use and arrangement of colors greatly determine the visual impact of all elements. Color also serves to generate territoriality and helps make those items that do not belong, stand out. Color is an important ATFP concept.

- **Texture**

All elements of the visual environment have texture. The use and blending of textures greatly impact the visual environment.

- **Unity**

All elements of the visual environment should blend to complement one another. Repetition of scale, form, color, and texture results in a unified visual impression.

- **Framing**

All views include a ground plane, side planes, and overhead plane. The relationship of planes changes as the individual moves through the environment.

- **Axis**

An axis is a linear progression of space connecting two or more dominant features (Figure 3-3).

- **Terminus**

A terminus is the end of an axis and is typically defined by a dominant feature such as a building.

- **Balance**

Visual elements are composed to be symmetrical or asymmetrical. In either case, visual elements should be sized and located to provide visual balance (Figure 3-4).

- **Sustainability**

Practicing the principles of sustainable design in the planning, design, construction, and operation of infrastructure and facilities is a smart business practice ([See Appendix D](#)).

### 3.5 VISUAL ELEMENTS

The visual elements, described below, elements include manmade and natural features and their inter-relationship. This Army Installation Design Guide provides guidance on how to recognize the visual impacts of the installation and how to improve upon them if warranted.

- **Natural Characteristics**

Regional and site characteristics that have been preserved and enhanced as a part of the installation.

- **Edges and Boundaries**

Linear elements such as walls, fences, or trees create separation of use activities and expectations of behavior.

- **Buildings and Structures**

Typically the most dominant features of an installation (Figure 3-5). Their location and design characteristics determine the primary visual image.



**Figure 3-3** Axis



**Figure 3-4** Symmetrical Elements



**Figure 3-5** Buildings Are Typically the Dominant Feature on an Installation



**Figure 3-6** Landmarks Provide Orientation of Place



**Figure 3-7** Street Trees Improve the Overall Quality of the Installation



**Figure 3-8** Open Space

- **Activity Nodes**

Centers of activity that attract people on a daily basis.

- **Landmarks**

Visually or historically prominent features such as towers, statues, static displays, or buildings that provide identity and orientation of place (Figure 3-6).

- **Entrances and Gates**

Provide the first and last impression of the installation, as well as an access control point (if utilized) and provides the opportunity to express the expected behaviors while on the site.

- **Circulation System**

Includes streets, railroad tracks, trails, sidewalks, parking lots, driveways, delivery areas, and bicycle paths. The circulation system utilizes a large amount of space and creates significant visual impact. Circulation systems also provide surveillance opportunities so that the desired users can watch over the adjacent areas of the system.

- **Trees and Other Vegetation**

Trees and other vegetation: provide guidance, define space, can provide a physical barrier, frame views, and provide visual screens, shade, color, and interest in the installation. Trees and vegetation should not hinder desired lines of sight or illumination or provide climbing aids or areas of concealment.

- **Street Trees**

Street trees soften, complement, and define the road hierarchy, and improve the overall visual quality of the installation, while increasing site territoriality and access control (if utilized) (Figure 3-7).

- **Views and Vistas**

Scenic and attractive views and vistas should be enhanced. Unattractive views should be improved or screened and provided an alternate means of surveillance so that inappropriate activities cannot easily take place at these locations.

- **Open Spaces**

Open space areas create visual impact and can be designed to either separate or integrate adjacent uses (Figure 3-8). Open spaces can also be utilized to create “time over distance”. Time over distance is the space used to respond appropriately to an approaching damage or concern.

- **Signage**

A coordinated installation signage plan, addressing both exterior and interior signage, should be developed to facilitate circulation and provide useful information. Signage supports access control, surveillance and territoriality by providing direction, expected and applicable behaviors and pride of organization.

- **Utility Corridors**

Utilities should be in corridors and unsightly above ground utilities minimized. Provide alternative means of surveillance for utilities (if screened from view) so that they cannot be tampered with unseen.

- **Other Elements**

Visual elements other than those above may occur within an installation and should be noted.

## Section 4 Installation Profile

### 4.1 SETTING



#### 4.1.1 Regional Setting

The Detroit Arsenal is located in the City of Warren, Michigan (Michigan's third largest city), in Macomb County (Michigan's fastest growing county). The City of Warren is located in the southeast corner of the state approximately 7.5 miles west of Lake St. Clair and approximately 12 miles north of downtown Detroit. Both the population and the economy of Warren and its surrounding area are closely tied to the domestic automotive industry.

#### 4.1.2 History of the Installation

From the start of World War II through the Gulf War, Detroit Arsenal has played a vital role in this country's defense. In times of war and peace, prosperity and uncertainty, this installation has rallied to meet the nation's needs. More than sixty years ago, the first tank rolled off the assembly line at the tank plant. Over 59,460 tanks were built in the facility that became synonymous with the "Arsenal of Democracy".



When World War II erupted in Europe, and Germany began using tanks in its Blitzkrieg offensives, the United States did not have a tank production program. The Detroit Arsenal and the tank plant within its boundaries were born on August 15, 1940 when the U.S. Army signed a contract with Chrysler Corporation to build a \$20 million plant. To do this, Chrysler purchased 113 acres of agricultural land in what is now the City of Warren. The plant sprang up seemingly over night. Plant construction began on September 11, 1940. Its architect, Detroit's own Albert Kahn, proudly noted that the plant was "the largest of its type in the world". This mammoth building of more than 1.1 million square feet is a one-story structure measuring 1,832 feet long and 602 feet wide. It's impressive even by today's standards. The tank arsenal was the first plant ever built for mass production of American tanks. Chrysler, serving as both owner and operator, producing one-fourth of all American tanks made during the war between 1940 and 1945. The plant built approximately one-fourth of all American tanks made during WWII.



The Army terminated Chrysler's contract in early 1945. At the same time, the Office Chief of Ordnance (OCOD), Detroit moved from the Union Guardian Building, Detroit, Michigan, to the arsenal. From 1945 through 1952, the Army used the tank plant build developmental tanks as well as rebuilding all varieties of existing models. At the beginning of the Korean War, tank production the Army rehired Chrysler to operate the production plant. Concurrently, the Arsenal's expanded OCOD, renaming it the Ordnance Tank Automotive Center (OTAC). OTAC moved to the Detrola Building, Detroit Michigan, due to a lack of space on the Arsenal to house logistics and administrative personnel.

Additional tracts of land were acquired between 1940 and 1954, bringing the total Arsenal acreage to 342 acres in size. The natural dividing line between the production side (east) and the research and development side (west) has always been the railroad tracks. The division of functions and the construction of research laboratories, experimental shops, engineering facilities, and administrative offices on the western side of the installation reflected the Army's decision to conduct a sustained and permanent Research and Development (R&D) program for tanks and military vehicles. By 1960, all OTAC missions had been moved to Detroit Arsenal.

New tank production at the Detroit Arsenal ceased in 1955, but Chrysler continued to use the facility to machine tank component parts for their Newark, Delaware, plant. Full tank production resumed at the Detroit Arsenal Tank Plant when the first Detroit-built M60 tank was delivered in November 1960. In October 1981 a second tank production line was added at Detroit Arsenal to build M1 Abrams Tanks. Facing financial difficulties, Chrysler sold its tank-manufacturing division to General Dynamics Land Systems Division. Detroit Arsenal produced M1-series vehicles until 1991, when lowered demand for the Abrams tanks forced the Army to close one of the tank plants. The U.S. Army TACOM halted production of complete tanks in 1991 and idled or laid away those areas of DATP that performed final M-1 tank assembly.

The Detroit Arsenal has undergone considerable building and expansion as the focus of Army peacetime R&D. The U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC), has seen its role expand throughout the 1980s and early 1990s. Buildings have been added, remodeled, and expanded as requirements changed and new research tasks were added. Activities at the Arsenal have steadily increased while production rates and volumes at DATP fluctuated in response to the Army's need for tanks.

In 1980 a Congressional Act was passed authorizing the transfer of government facilities at the Michigan Army Missile Plant, located 5 miles north of Detroit Arsenal, to the Michigan Job Development Authority in exchange for construction of two buildings at Detroit Arsenal. As a result of this, Detroit Arsenal received two new buildings (Bldg 229 and Bldg 231), providing almost 200,000 square feet each, on either side of the Headquarters building (Bldg 230).

In 1985, the facilities on the east side of the railroad tracks which were related to tank production were separated from the Detroit Arsenal inventory and formed a new Army installation designated as the Detroit Army Tank Plant (DATP). The facilities west of the railroad tracks along, along with those facilities on the east side which were not directly related to tank production, remained as the Detroit Arsenal.

The 1993 Defense Base Realignment and Closure (BRAC) Commission realigned functions from the Fort Belvoir Research, Development and Engineering Center (BRDEC) to Detroit Arsenal. BRDEC missions relocated to Detroit Arsenal included bridging, supply, water, fuels/lubricants, fuel handling and counter-mine. The realignment of these functions to Detroit Arsenal resulted in the BRAC financed construction of a 38,302 square foot laboratory facility.

The 1995 BRAC Commission recommended the closure and disposal of the Detroit Army Tank Plant (DATP). BRAC 95 disposals were eventually completed in 2000 and total property transferred to the City of Warren under BRAC 95 consisted of 172.21 acres of land and included all facilities associated with DATP and all Detroit Arsenal facilities on the east side of the railroad tracks, with the exception of buildings 7 and 8. Building 7 contains research and development laboratories. These facilities are substandard; however they

are still needed by the Army until new laboratory facilities can be constructed on the west side of the Arsenal. Building 8 is no longer used and is scheduled for demolition. All of the utilities on the east side of the railroad tracks were also transferred to the City of Warren, with the Army maintaining easements for those which support building 7, building 8 and the remaining Detroit Arsenal facilities on the west side of the tracks. The electrical substation and switchgear which continue to support the majority of the remaining Detroit Arsenal facilities were among the facilities transferred. Detroit Arsenal continues to operate and maintain these utilities under an easement. Detroit Arsenal also disposed of the Central Steam Plant (Bldg 5) and now purchases steam from a privately owned steam production facility which is located northeast of the installation. BRAC 95 realignment resulted in the Army retaining all 170 acres and facilities located west of the railroad tracks as the current footprint of Detroit Arsenal. Additional Detroit Arsenal construction resulting from BRAC 95 included a new 50,000 square foot warehouse facility; a new entomology facility; and a new compressor facility on the remaining Detroit Arsenal footprint west of the railroad tracks

#### BRAC 2005

In its 2005 BRAC recommendation, Department of Defense (DoD) recommended to realign Detroit Arsenal, MI, by relocating the supply contracting function for tires to the Inventory Control Point at Defense Supply Center Columbus, OH, and disestablishing all other supply functions for tires. Assuming no economic recovery, this recommendation could result in the maximum potential job reductions of 49 total jobs (30 direct and 19 indirect) in the Detroit- Livonia-Dearborn, MI, Metropolitan Division over the 2006-2011 time period (less than 0.1 percent).

In another BRAC 2005 action, the joint robotics program development and acquisition activities will relocate from Redstone Arsenal, Huntsville, Alabama to Detroit Arsenal and consolidate them with the Program Executive Office Ground Combat Systems, Program Executive Office Combat Support and Combat Service Support and TARDEC. DoD also recommended to realign the USMC Direct Reporting Program Manager Advanced Amphibious Assault (DRPM AAA) facilities in Woodbridge, VA, by relocating the Ground Forces initiative Development and Acquisition (D&A) activities to Detroit Arsenal. This recommendation would consolidate those USMC and Army facilities that were primarily focused on ground vehicle activities in D&A at Detroit Arsenal in Warren, MI, to increase joint activity in ground vehicle development and acquisition.

The Joint Center for Ground Vehicle D&A located at Detroit Arsenal will be the Department of Defense's premier facility for ground vehicle D&A. Detroit Arsenal is ideally located in southeastern Michigan near the Research and Development headquarters for General Motors, Ford, Chrysler, General Dynamics Land Systems, Toyota-North America, Nissan-North America, Hino, Hyundai, Suzuki, Visteon, Delphi, Johnson Controls, Dana, and many others. The end state of this realignment would be to consolidate Department of Defense expertise in Ground Vehicle D&A activities at Detroit Arsenal. It will promote support of joint operations, enable technical synergy, and position the Department of Defense to exploit a center-of-mass of scientific, technical, and acquisition expertise with the personnel involved in ground vehicle RD&A that currently resides at Detroit Arsenal.

In another recommendation, DoD recommended to relocate the Sea Vehicle Development and Acquisition from Detroit Arsenal to the Naval Surface Warfare Center Carderock Division, Bethesda, MD, and relocate the Program Management and Direction of Sea Vehicle Development and Acquisition to Naval Sea Systems Command, Washington Navy Yard, located in Washington, DC. Assuming no economic recovery, this recommendation could result in a maximum potential reduction of 57 jobs (36 direct jobs and 21 indirect jobs)

over the 2006-2011 period in the Detroit Metropolitan area (less than 0.1 percent).

### Summary

Detroit Arsenal continues to be a vital presence in the area, providing home to the US Army Tank-Automotive and Armaments Command; TARDEC; and numerous Program Executive Offices. It provides facilities for the Army's Centers for Excellence for ground mobility, lethality, survivability, sustainment, and for research, development, acquisition, equipment recapitalization and logistics for ground systems.

### **4.1.3 Environmental Setting**

#### Topography

Detroit Arsenal is located in the southeast part of the state of Michigan. The topography of the site is relatively flat. The total relief variation is less than five feet. Bear Creek, located adjacent to the western boundary of the Arsenal is the predominant topographic feature in the area. Natural surface water drainage has been altered by an extensive storm drainage system. Storm water runoff from the western portion of the Arsenal flows directly to Bear Creek. Runoff on the eastern portion of the Arsenal is drained by a storm drainage system that flows to the City of Warren sewage treatment facility.

#### Geology

Detroit Arsenal is located in the southeast part of Michigan's Lower Peninsula and lies within the lake section of the central lowlands physiographic province. A broad, flat to very gently sloping glacial lake plain, characterizes this area resulting from extensive glaciations.

The underlying shallow stratigraphy at the former plant site is composed of an upper glacial lacustrine deposit composed of brown silty/sandy clay, which overlies a lower glacial lacustrine deposit composed of gray silty clay.

The glacial lacustrine deposits are part of glacial drift material that may be up to 200 feet thick at the Arsenal. This drift material overlays bedrock composed of Mississippian and Devonian sedimentary deposits.

#### Soils

The U.S. Department of Agriculture has classified the soil types of the Arsenal as Lenawee Clay Loam, Toledo Silty Clay Loam, Urban Land and Selfridge Fine Sand. Lenawee Clay Loam developed from lacustrine deposits on lake plains and is very dark brown in color. Small sand inclusions may be present. Runoff tends to be very slow and the permeability is moderately low. Bedrock is estimated at 150 feet below the surface. Due to its low permeability, the soil tends to prohibit the downward migration of contamination. However, an area with sand increases in permeability.

The soil classification of Urban Land includes those areas occupied by cities and towns, and is characterized as soil that has been modified or filled by construction activities. Secondary pathway features, such as water lines, increases permeability. Pathways for migration are created along man-made construction trenches.

#### Climate

Located at a Latitude of 42.2°N and a Longitude of 83.0°W, Detroit is sandwiched between Lakes Michigan, Erie and Huron at an elevation of 619 feet. Located on the border between the temperate and cold climate zones, the city has an average yearly temperature of 49.9°F, with an average high of 58.1°F and an average low of 41.8°F.



**Figure 4-1** Topographical Map of Detroit Arsenal

### Hydrology

Shallow groundwater at the Arsenal is typically encountered at depths ranging from twenty five to thirty feet from ground surface with the water table being found within the upper glacial lacustrine deposits. Groundwater flow is in a north-northwest direction.

### Vegetation

Detroit Arsenal is a highly urbanized installation surrounded by the City of Warren. There is little vegetation capable of supporting wildlife. Grassy areas are covered by Kentucky Bluegrass, Fine Fescue and Rye. The predominant species of trees are maple and oak, while a limited number of other trees and shrubs exist.

### Wildlife

The urban nature of the Arsenal inhibits the development of natural animal habitats. Waterfowl comprise the majority of wildlife, including ducks and geese. Other wildlife species found on the installation include sea gulls, cottontail rabbits, and ring-necked pheasants.

Due to its urban setting, there are no identified threatened and endangered species at the Arsenal. Based on the Department of the Army standards, Detroit Arsenal, as a facility of fewer than 500 acres, is not required to maintain an Integrated Natural Resources Management Plan (INRMP). As such, no study has been completed or planned.

### Man-Made Environment

The Detroit Arsenal is managed by the United States Army Garrison-Michigan (USAG-M) which follows under the North West Regional Office of the Installation Management Activity. There are four major tenants located on the facility: Tank-Automotive and armaments Command (TACOM); Tank Automotive Research, Development and Engineering Center (TARDEC); Program Executive Office, Ground Combat Systems (PEO GCS) and Program Executive Office, Combat Support and Combat Service Support (PEO CS & CSS)

The primary mission of TACOM, PEO GCS and PEO CS & CSS is to manage and procure all tracked and wheeled systems and the associated support. The primary missions of TARDEC are to conduct research for track and wheeled systems, develop new technology and provided engineering support for track and wheeled systems.

### Hazardous Materials

All hazardous materials entering the Detroit Arsenal, including material used by contractors in performance of their contract, are processed through the HAZMART located in Building 203. The HAZMART provides all the data to prepare the Tier II report and Form R required under EO 12856. Non-DoD material.

### Hazardous Waste

All hazardous material generated on the Detroit Arsenal is disposed of through the HAZMART. The Detroit Arsenal is a Large Quantity Generator. The installation has a Hazardous Waste Management Plan that is required to be followed by all Garrison Personnel, tenants and contractors.

### Storage Tanks

The Detroit Arsenal has 3 underground storage tanks supporting TARDEC east of Building 212. There is also an abandoned UST south of building 215. There are also a number of Above Ground Storage tanks on the installation. The installation has a Storage Tank Management plan to assist in maintaining compliance with all environmental laws.

Solid Waste Management

The Detroit Arsenal has a goal to divert 40% of all solid waste from landfills. All contractors should strive to recycle waste to the maximum extent possible. All contractors shall provide the weight of waste and recycle material at the end of their contract.

Air Quality

Southeast Michigan is designated by the EPA as a non-attainment area for ozone and Particulate Matter (PM) 2.5. The installation also has an Air Permit from the State of Michigan. This is currently a synthetic minor permit, but is being re-evaluated and may be changed to a Title V permit. There are certain reporting requirements for all emissions on the installation. Also a "Permit-to-Install" may be required certain emission sources. Contact the Environmental Office for specific requirements.

Ozone Depleting Chemicals (Substances)

No equipment using Class I ODC will be installed on the Detroit Arsenal. The EPA has issued a phase out schedule for hydrochlorofluorocarbons (HCFC). The use of HCFC equipment should be reviewed to determine the phase out schedule and manufacturing schedule to determine the use of HCFC in installed equipment. Every effort should be made to use equipment that does not use HCFCs. All recovered ODC must be turned into the HAZMART for disposal or reuse. All mechanics working on systems with ODCs must be properly licensed, have a it on their person at all times and provide a copy to the Environmental Management Division. In addition all equipment must be properly certified.

Currently the Detroit Arsenal has the following ODC systems:

Halon 1301		
Building Location	Charge in LBS	Year Installed
200D/Protoype Development	1720	1980
215/Supercomputer	1068	1980
215/Vehicle-Compnent Testing	1896	1980
200C/Computer Room	2400	1980
<b>Total</b>	<b>7084</b>	

CFC-11 (R-11)		
Building Location	Charge in LBS	Year Installed
229	800	1995
231	850	1985
215	600	1984
230	600	1985
230	600	1986
230	600	1971
Reserve	300	
<b>Total</b>	<b>4350</b>	

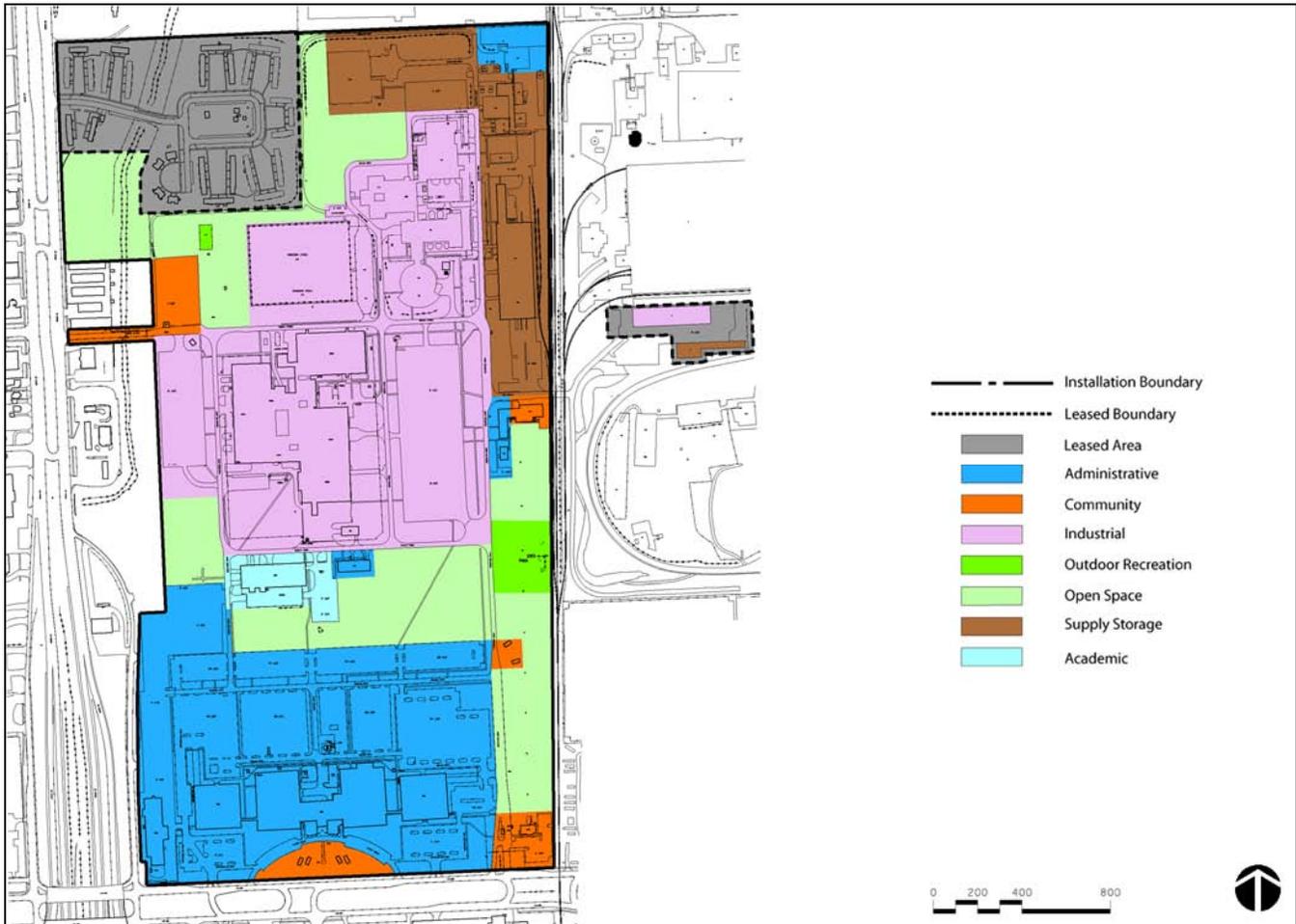


Figure 4-2 Existing Land Use Map (2005)

## 4.2 EXISTING LAND USE

The existing land use plan outlined in the 1995 Detroit Arsenal Master Plan is shown in Figure 4-2 above.

Land use criteria and preferred facility location, as well as the optimal location of each unit in relation to other land uses and functional areas on the installation are included. The existing land use at Detroit Arsenal is described in the following paragraphs.

### 4.2.1 Administration Buildings

Buildings 229, 230, 231, 233, and 252 form the largest concentration of administrative land use on the installation. These facilities contain the headquarters and staff elements for the Installation Management Agency, tenant units, project and product managers, and other support services.

The DPW (Building 205), the U.S. Army Corps of Engineers Building (south of Building 205), and Building 201 comprise the remaining administrative land use.

### 4.2.2 Industrial Buildings

Buildings 200A, 200B, 200C, 200D, 210, 212, and 215 are utilized by TARDEC and are the primary facilities for Research and Development. Research and Development involves new product, equipment and process development and may involve concept generation and testing as well as initial production.

#### 4.2.3 Supply/Storage

Supply/Storage facilities are located in the northeastern sector of the Arsenal. They include warehouses 203 and 249 and temporary storage buildings.

#### 4.2.4 Training

Building 219 is an applied instruction facility.

#### 4.2.5 Community Facilities

These facilities are limited on the installation, including a fire station, access control points, monuments, and cafeterias located in Building 229, 200B and 230. Also in Building 230 are a physical fitness area, religious education facility, and a health clinic.

#### 4.2.6 Historical Buildings

There are three historical buildings on the Detroit Arsenal: Buildings 7, 8 and 212. No work can proceed on these buildings without approval of the State of Michigan Historical Preservation Officer (SHPO). All designs and changes to these buildings must be coordinated with the Environmental Management Office.

#### 4.2.7 Open Space

Included in this category are all undeveloped areas not used for training or outdoor recreation. Open space at Detroit Arsenal is used primarily as a buffer between land uses maintained as green space, or as an indicator of unusable space.

Land Use	Approximate Acreage
Industrial	53
Administrative	43
Open Space	31
Leased Area	18
Supply Storage	15
Community Facilities	6
Outdoor Recreation	2
Academic	2
<b>Total</b>	<b>170</b>

Detroit Arsenal occupies 170 acres of land and includes approximately 55 government-owned buildings located within the City of Warren, Michigan. It is 7.5 miles west of Lake St. Clair and 12 miles north of Detroit. The Detroit Arsenal's major tenants include US Army TACOM and US Army TARDEC.

On the southern boundary of the installation lie buildings 229, 230, and 231 that are purely administrative in design and function. TACOM Headquarters is located in Building 230. In the center of the Arsenal is the Building 200 complex that houses a large research, development, and engineering facility as well as Building 212, home to the propulsion laboratory and dynamometer test facility. Building 215 contains various offices, warehousing space, and storage areas. The cooling pond to the northwest provides non-contact cooling water for the dynamometer lab. A vehicle fording pit lies between the cooling pond and Building 212.

Detroit Arsenal owns 4.5 acres of green space along Mound Road north of Gate 36.

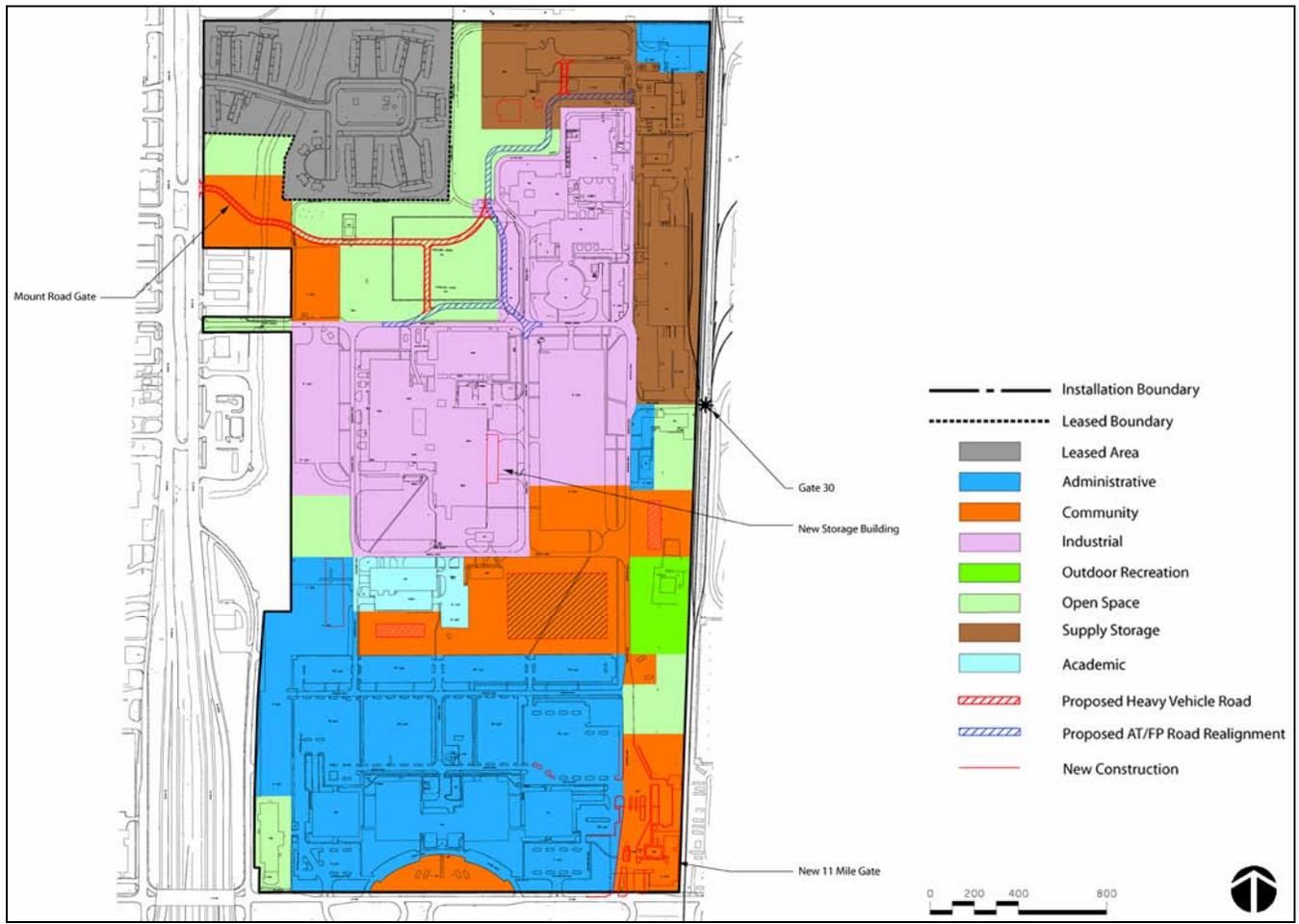


Figure 4-3 Future Land Use Map (2005)

### 4.3 PROPOSED LAND USE

The ideal land use arrangement for Detroit Arsenal would have administration and community facilities within walking distance of each other (Figure 4-3). Supply/Storage would be in close proximity to Research & Development to support the ongoing missions of TACOM and TARDEC.

The Division of Installation Support provided objectives used for the development of Detroit Arsenal's future land use plan. These include:

- Improve quality of life on the installation.
- Remove the cooling pond.
- Adapt antiterrorism/force protection standards into future construction and operations.
- Develop additional open space, outdoor recreation and buffer areas.

## Section 5 Visual Themes and Zones

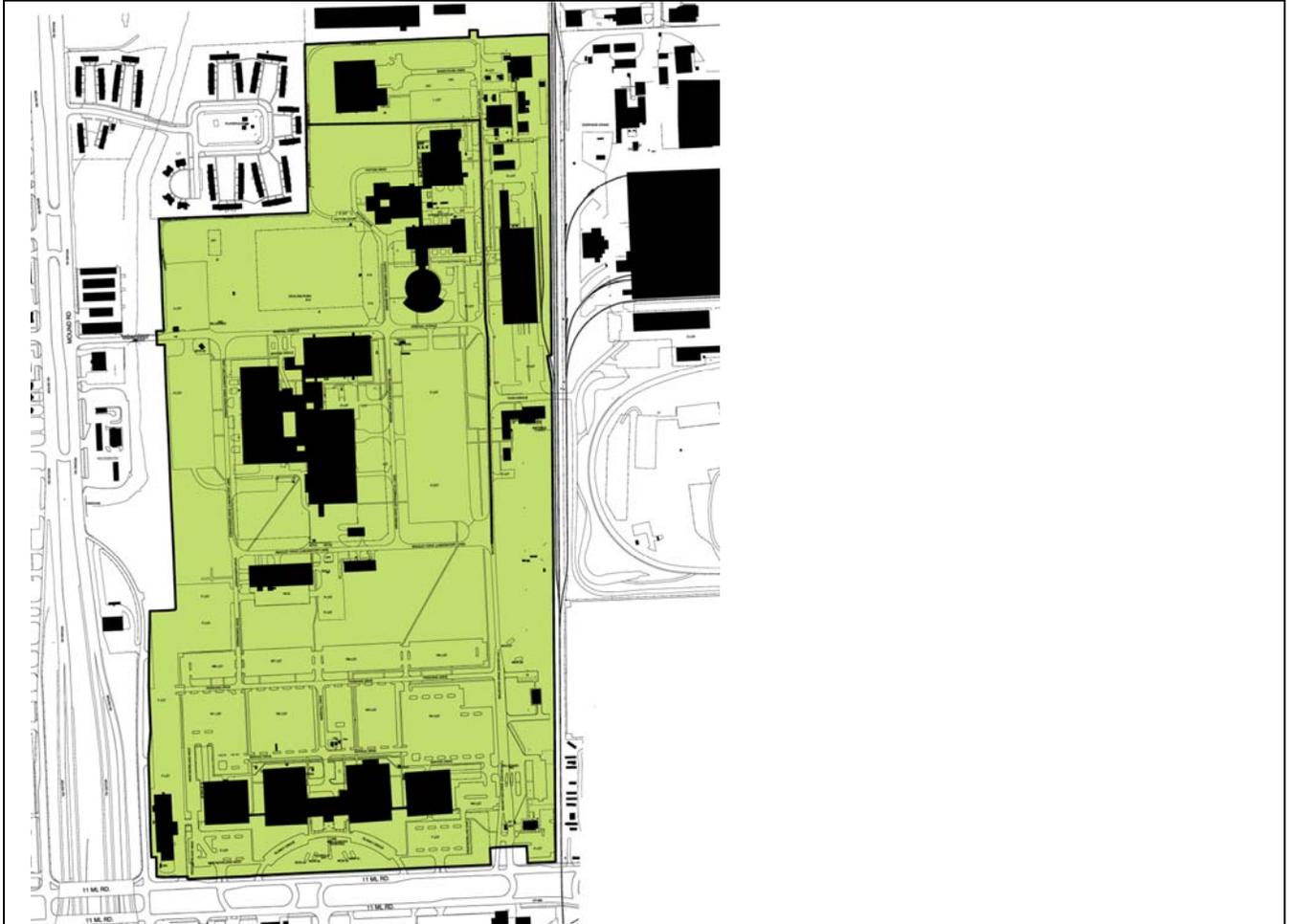


Figure 5-1 Corporate Campus Visual Theme (2005)

### VISUAL THEME

 CORPORATE CAMPUS

### 5.1 INTRODUCTION

Visual themes and zones are determined after performing the visual survey mentioned in paragraph 2.2. This survey was conducted using existing installation maps, visual inspection, interviews, questionnaires, and photographs to record impressions of visual and spatial impacts. The data captured was used to define the visual themes and zones of the installation. Figure 5-1 presents a graphical portrayal of the of the installation's visual zones and themes.

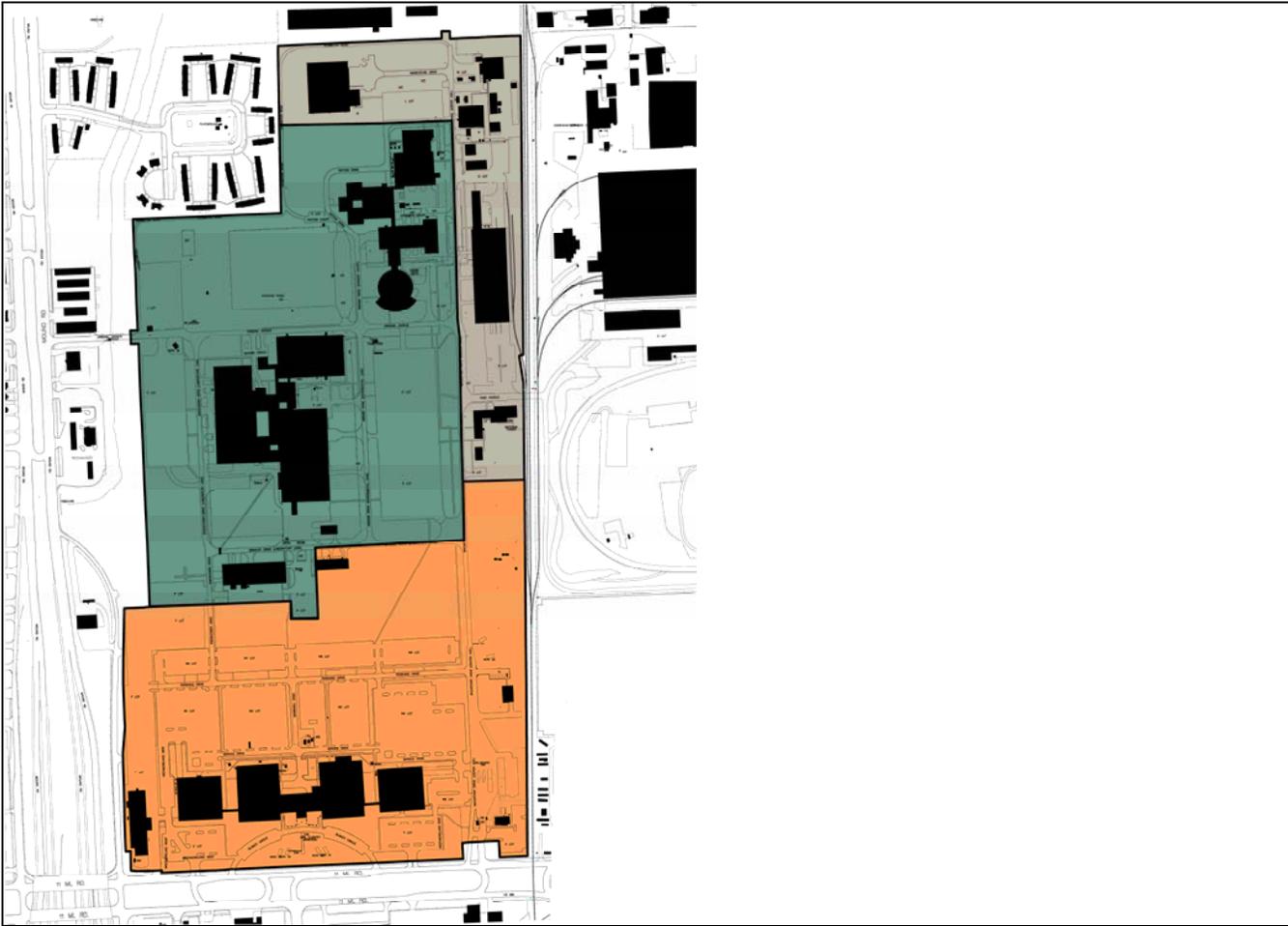


Figure 5-2 Detroit Arsenal Visual Zones (2005)

## 5.2 VISUAL THEMES

Visual themes create a perception of unification within the installation. These themes create design consistency that provides orientation and a "sense of place".

Visual themes are generalized groupings of visual zones that provide the same general use and visual characteristics. Visual themes include broad scale activities that occur on the installation. These activities typically include similar design and layout characteristics.

Detroit Arsenal visual theme, Corporate Campus, was established to complement its corporate neighbors and have the "look and feel" of private industry standards. The creation of this theme will also create cohesion between the different users, and create one overall image.

## 5.3 VISUAL ZONES

Visual zones are areas within the installation that include similar visual characteristics (Figure 5-2). Visual characteristics define a "look and feel" of an area together with the dominant features that define its image. Typical visual characteristics include unique buildings, vehicular and pedestrian corridors, natural features, and spatial relationships.

The following paragraphs present a functional analysis of each of the visual zones. This analysis includes a description of the visual character, a visual analysis map, assets, liabilities, and recommendations for each zone.

### VISUAL ZONES

- ADMINISTRATION
- INDUSTRIAL
- RESEARCH AND DEVELOPMENT

The visual analysis maps graphically illustrate the features and constraints that affect the visual character of the zone.

Assets and liabilities are determined according to the following criteria: installation visual goals and objectives ([Section 3, para 3.2](#)), design principles ([Section 3, para 3.3](#)) and visual elements ([Section 3, para 3.4](#)) in relationship to the six design components described in Sections 7 through 12 of this Army Installation Design Guide.

Recommendations are made to correct the liabilities or enhance the assets. These recommendations are used to generate projects that are listed in Section 6, Improvement Projects.



Figure 5-3 Administrative Visual Zone (2005)

## 5.4 ADMINISTRATION VISUAL ZONE

### 5.4.1 Visual Character

The Administration Visual Zone (Figure 5-3) is located on the southern edge of the Arsenal, adjacent to Eleven Mile Road. Constructed of brick, stone and concrete, the buildings are large scale, however are appropriate for their function. Despite the massive presence of these structures, the other dominant visual image within this zone is large expanses of parking areas.

#### LEGEND

-  ENTRANCE
-  OPEN SPACE
-  SIGNIFICANT VEGETATION
-  PRIMARY ROAD
-  SECONDARY ROAD
-  VISUAL ZONE LIMITS
-  BUFFER
-  GOOD VIEWS





**Figure 5-4** Open Area at Detroit Arsenal



**Figure 5-5** Variety of Plant Materials is Positive



**Figure 5-6** Comfortable Pedestrian Atmosphere

## 5.4.2 Assets

### Site Planning

There are a few open areas that are beneficial to this zone; the area East of MacArthur Drive (Center Avenue), the area south of Buildings 229, 230 and 231 and the area north of the large parking area near Buildings 219 and 233.(Figure 5-4).

### Buildings

Building styles in this zone are consistent with administrative uses.

Buildings 229 and 231 are appropriate scale and proportion to adjacent Building 230.

Building 229, 230 and 231 all have similar color and materials that provide a consist look to this zone. The locations of these buildings create a strong presence along Eleven Mile road.

### Circulation

The parking areas are clearly defined.

Arsenal Avenue and MacArthur Avenue (Center Avenue) are easily distinguishable as the major streets.

The Eleven Mile Gate is recognizable as the main gate.

Circulation within the Arsenal to the Eleven Mile Gate is direct and easy to maneuver.

### Plant Material

Trees have been planted throughout the installation along roads and within open spaces.

A variety of plant material has been planted creating seasonal interest (Figure 5-5).

Trees have been used to commemorate people previously associated with the Arsenal .

The area to the south of Buildings 229, 230 and 231 contains numerous, older trees that create a comfortable atmosphere for pedestrians (Figure 5-6).

### Site Elements

Memorials scattered through the zone are a pleasant reminder of the history of the base (Figure 5-7).

Benches, planters and trash receptacles are consistent through the zone (Figure 5-8).

The handicapped ramp to the south of Building 230 has been integrated discreetly into the landscape scheme (Figure 5-9).

### Force Protection

Planters have been successfully used as force protection measures (Figure 5-10).

The Visitor's Center (Building 232) is an asset for Force Protection purposes. Maintaining a sort of "gateway" through which all new people must enter limits the number of unknown entities on the base. The knowledge that one must pass through this secure threshold acts as a deterrent to those who should not be there.

The new fencing is trespass protective.



**Figure 5-7** Detroit Arsenal Memorial



**Figure 5-8** Coordinated Planters, Benches and Trash Receptacles



**Figure 5-9** Handicapped Ramp



**Figure 5-10** Planters Used as Barricades



**Figure 5-11** Utilities Located in Parking Lot



**Figure 5-12** Parking is the Dominant Visual Feature

### 5.4.3 Liabilities

#### Site Planning

Glancy Circle is too close to the fence per force protection standards, and therefore has rendered the parking to the south of Building 230 unusable. This area has become largely forgotten.

Utilities are inappropriately located in parking lots throughout the zone (Figure 5-11).

Parking areas are adequate but the expansive lots create long walks for some.

The parking areas are so large that they are a dominant visual feature of this zone (Figure 5-12).

The visitor/contractor badge drop-box is inconveniently located at the Eleven Mile Road Gate, and causes sudden vehicular stops.

A mailbox drop is located in the island at the Eleven Mile Road Gate, which causes unnecessary vehicular backups and unsafe pedestrian access.

Building 252 is located too close to the perimeter fence.

#### Buildings

The Visitors Center (Building 232) and parking area are too small for its intended use.

Circulation

Pedestrian circulation is not encouraged. Walks are in poor condition.

Walks are not adequate throughout this zone. Existing walks are circuitous and inconvenient (Figure 5-13).

Pedestrians are being forced to create their own pathways through the site (Figure 5-14).

Pedestrian crossings are located in the middle of blocks, and lack traffic calming measures (Figure 5-15).

Long expanses of walks through the central greenspace lack trees to provide human scale and protection from the sun (Figure 5-16).

Gravel areas located at intersections throughout the zone are difficult to walk on and create hazardous conditions for pedestrians.



**Figure 5-13** Circuitous Circulation



**Figure 5-14** Forced Pathways



**Figure 5-15** Mid-Block Crossing



**Figure 5-16** Long Unsheltered Walk



**Figure 5-17** Random Plant Island



**Figure 5-18** Trees are Dying in Islands



**Figure 5-19** Radically Pruned Shrubs



**Figure 5-20** Decorative Edging Compromises Health of Trees

### Plant Material

Planted “islands” have been installed in random locations along roadways throughout the zone (Figure 5-17).

Trees are dying in the parking lot islands because of lava rock (Figure 5-18). From an environmental and aesthetic point of view, red lava stones are an inappropriate choice for planting bed treatments.

Shrubs are being radically pruned (Figure 5-19).

The health of some trees has been compromised by intentional and unnecessary damage.

Some shrubs located to the south of Buildings 229, 230 and 231 are of the wrong scale and form, and are inappropriate species for their locations.

Decorative edging around the bases of trees are bad and can damage the tree (Figure 5-20).

Parking lots lack shade trees, planted islands and shrubs to buffer cars along major roads.

### Site Elements

Smoking structures are unattractive and do not complement the building character for this zone (Figure 5-21).

The quantity and location of bike racks is insufficient. (Figure 5-22).

Yellow and orange plastic barriers are used excessively throughout this zone thus, creating visual clutter (Figure 5-23).

Some planters are located inappropriately.

Chain link fences located adjacent to parking lots on the north side of buildings 220, 230 and 231 serve no purpose and add visual clutter.

Handrails lack consistency throughout the zone. An interesting (and clever!) Arsenal specific style of construction has been developed. However, the construction methods do not easily allow for topographical changes, causing them to look unattractive in certain locations (Figure 5-24).

The decorative chain and bollard type fencing found between in the courtyard of building 230 is inconsistent with standard fencing and adds additional visual clutter to the zone.

Perimeter fencing along Eleven Mile Road is unattractive, industrial looking, and inconsistent with a Corporate Campus theme.

Roadway and parking poles and fixtures are inconsistent throughout the zone. Pedestrian lighting is virtually non-existent.

### Force Protection

The barbed wire on the new perimeter fencing was incorrectly installed to keep people in, rather than out of the arsenal.

There is an excessive number of Jersey Barriers used. Many are cracked, and no longer filled with water, providing extremely limited protection.

The distance between the buildings and the road is adequate enough to limit the pressure generated from a 4000 lb. bomb detonated on 11 Mile Road to 4 lbs. per square foot.



**Figure 5-21** Smoking Structure is Out of Character



**Figure 5-22** Bike Racks Are Needed



**Figure 5-23** Plastic Barriers Create Visual Clutter



**Figure 5-24** Handrails Are Unattractive

#### 5.4.4 Recommendations

##### Site Planning

Maintain open space in future development planning.

Relocate utilities located in parking lots, or blocking walks, etc.

Establish a recreation area along MacArthur Drive (Center Avenue) consisting of tennis courts, picnic tables, etc.

Relocate both the visitor/contractor badge drop-box and the mailbox drop-box to the Post Office located on MacArthur Drive (Center Avenue).

##### Buildings

All future buildings in this theme area should be constructed in a style and scale consistent with Buildings 229, 230 and 231.

Building 252 use should change to be consistent with force protection measures.

Provide appropriate screening around Building 200 to hide dumpster, tanks, mechanical equipment etc.

##### Circulation

Use established paths as a means for determining new walks throughout this zone.

Walks should allow for a constant path from parking to building entrances, from building entrance to building entrance, and from parking lot to parking lot.

##### Plant Material

Soften parking lots by adding trees and groundcover to the parking islands.

Plant evergreen shrubs to buffer parked vehicles from major roads, thus buffering the parking areas from view.

Parking islands can be transformed into rain gardens, to contain stormwater runoff from the lots.

Open spaces should be planted with shade trees.

Plant palettes around buildings should be simple –trees, groundcover and lawn.

Eliminate red lava rocks from all parking islands. Trees are currently dying most likely because of the heat stored in the rocks. Replant with trees, shrubs, and perennials consistent with rain gardens for clay soils. Use lawn or groundcover in place of red lava rock. Any ground treatments used should be uncolored natural materials (e.g., hardwood mulch)

Shrubs should be allowed to reach their natural shapes and sizes. Pruning should be minimal, and only for the health of the plant. Transplant or remove any shrubs that are located inappropriately given their natural sizes and structures. Replace with appropriate plantings. Allow the shrubs to grow together which decreases maintenance and improves the look of the plant

Eliminate all decorative edging from around the bases of trees (both concrete block and plastic edging). This type of practice stresses the trees, and at worst, can kill them.

Mulch should not be piled around the base of trees as this will potentially suffocate the tree. Piling mulch also creates an ideal condition to allow detrimental pests to bore into the tree. There should be at least a two inch (2”) clearance around the flare of the trunk where there is no mulch.

Eliminate gravel from the sides of roads and replace with walks and lawn as appropriate.

All swales should be planted, simply, as rain gardens with grass, shrubs, and trees where consistent with force protection standards.

#### Site Elements

The consistency between benches, planters and trash receptacles is positive, although the style chosen is not consistent with the zone. Replace elements as needed with more consistent choices (see [Chapter 11](#)).

Eliminate all plastic jersey barriers if possible. If parking is not used, remove pavement and turn area into greenspace.

Replace all handrails with products of a style consistent with the architecture of the zone.

Simplify the landscape. Eliminate all extraneous site elements, such as small flags, stones, and the decorative chain fencing, such as that found in the courtyard of Building 230. These are not consistent with the Corporate Campus Theme.

Smoking pavilions should be replaced with more attractive and consistent structures that do not detract from the look of the base. All structures should be located the appropriate distance from buildings according to force protection standards.

Replace perimeter fencing along Eleven Mile Road with more decorative fencing consistent with neighboring corporate campuses.

Bike racks should be located near all buildings in the zone.

#### Force Protection

Given the Corporate Campus theme, the use of jersey barriers should be limited. The use of curbs, planters, plantings, berms and other approved security measures should replace as many jersey barriers as possible.

Screen the areas to the south of Buildings 229, 230 and 231. Landscape screening will provide blast resistance.

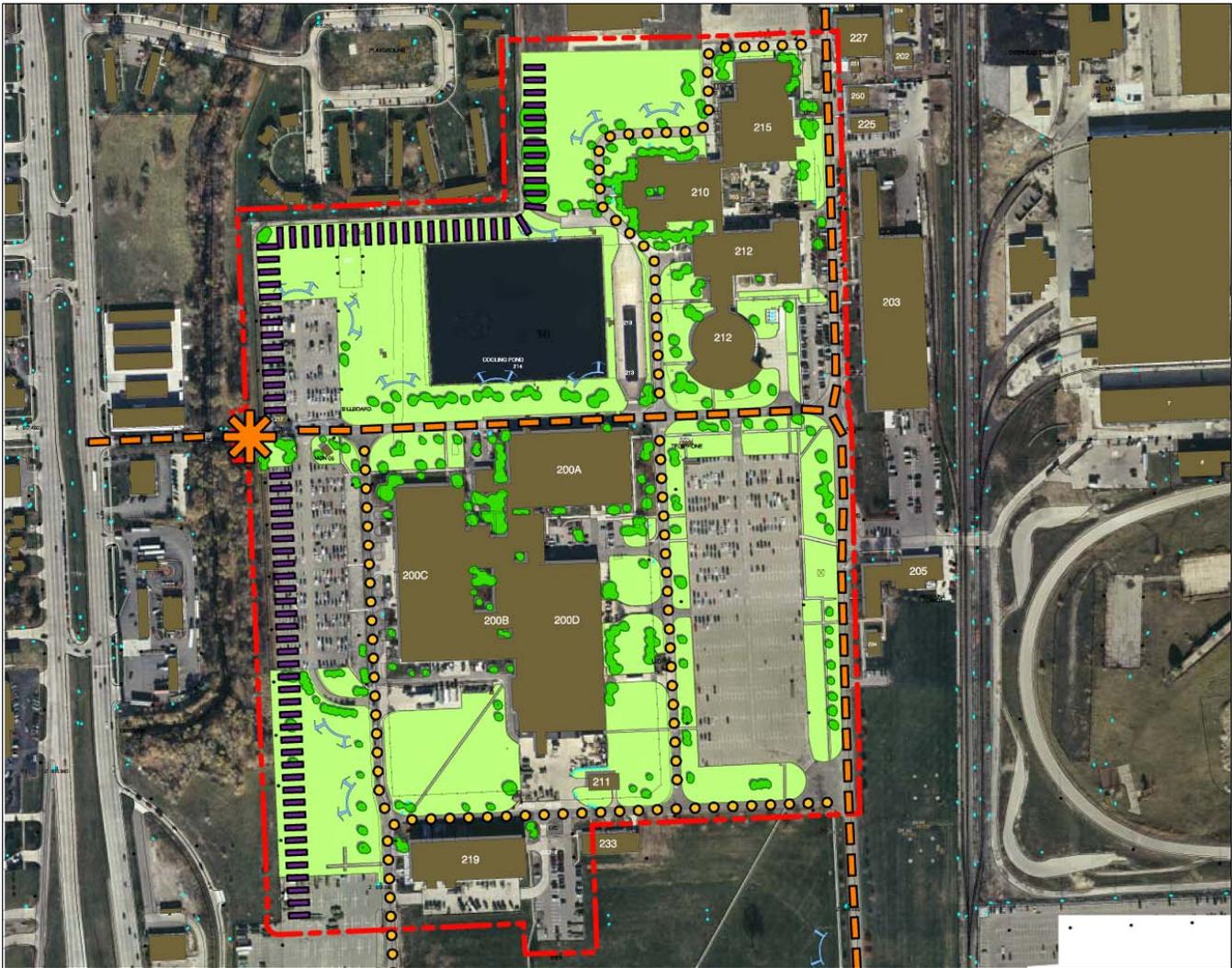


Figure 5-25 Research and Development Visual zone (2005)

**LEGEND**

-  ENTRANCE
  -  OPEN SPACE
  -  SIGNIFICANT VEGETATION
  -  PRIMARY ROAD
  -  SECONDARY ROAD
  -  VISUAL ZONE LIMITS
  -  BUFFER
  -  GOOD VIEWS
-  

**5.5 RESEARCH AND DEVELOPMENT**

**5.5.1 Visual Character**

The Research and Development Visual Zone (Figure 5-25) is defined by MacArthur Drive (Center Avenue) to the east, Perimeter Road to the west, Bradley Drive (Laboratory Lane) to the south and the southern edge of Parking Lot L to the north. The zone consists of large, monolithic structures consistent with the research occurring on the Arsenal. Several buildings are of an architectural style that is innovative, and unique, and help to give the zone a campus-like feeling. The dominant visual characteristic of this zone is Building 200 and Building 212. Another dominant feature is the cooling pond.

## 5.5.2 Assets

### Site Planning

The cooling pond is an attractive feature of this zone.

This zone's buildings are conveniently located near parking.

### Buildings

The architectural styles match the activities of this zone. Building 212 is extremely unique and should be maintained as true to its original form as possible (Figure 5-26).

Buildings 200A, B, C and D all have the same detailing, and good pedestrian scale.

The courtyards in Buildings 200C and 210 are a good amenity and provide natural light to the interior of the building.

### Circulation

The entire arsenal is easily accessible on foot from this zone.

Perimeter road is used as a walking trail.

Mound Gate is easily assessable from this zone.

### Plant Material

There are numerous trees that have been well maintained.

Savage Circle has been landscaped to create a more attractive entry to the Buildings 200 A, B, C, and D (Figure 5-27).

### Site Elements

Benches are located throughout the site for use by employees (Figure 5-28).

### Force Protection

Planters have been used at Savage Circle for force protection measures.

Pathways are provided to determine “proper” movement through the site. Those deviating from the paths can be considered suspicious.



**Figure 5-26** Building 212 Is Unique



**Figure 5-27** Plantings at Savage Circle



**Figure 5-28** Benches at Savage Circle are Typical for the zone



**Figure 5-29** Savage Circle Driveway



**Figure 5-30** Utilities Interfere with Pedestrian Circulation



**Figure 5-31** Typical Drainage Swale



**Figure 5-32** Entry to Building 215

### 5.5.3 Liabilities

#### Site Planning

The Savage Circle cartway is too close to the vestibule of Building 200 per force protection standards (Figure 5-29).

There is no buffer between the arsenal and the off-base housing located near perimeter road.

Utilities have been given priority (in terms of location) above pedestrian circulation in many cases (Figure 5-30).

All drainage swales have been lined with gravel, which is unsightly and is a maintenance nuisance (Figure 5-31).

Outdoor seating areas are inadequate, and of the wrong style for the zone.

Buildings 200A, B, C, and D lack distinction. The buildings all blend together and lack clear entrances.

The entries to Building 215 are unattractive and unwelcoming (Figure 5-32).

Canadian Geese are a problem throughout the zone.

**Buildings**

Inappropriate building colors have been used for newer structures in this zone (Figure 5-33).

The south entrance for Building 200C has been poorly maintained.

Several of the buildings in this zone have fallen into disrepair (Figure 5-34).

Utilities at the back of Building 215 are extremely unattractive, and give an image that is inconsistent with this zone (Figure 5-35).

Buildings of a seemingly temporary nature are located in prominent spots within this zone. The trailer by Building 212 detracts from the visual zones character (Figure 5-36).

The south entrance for Building 200C has been poorly maintained.

Trash dumpsters, chemical tanks and mechanical equipment are visible from various sides of Buildings 200A, B, C, and D.

The exterior paint is peeling off of Building 212.



**Figure 5-33** Inappropriate Color Choice



**Figure 5-34** Buildings are in Disrepair



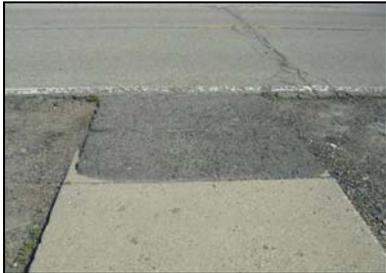
**Figure 5-35** Utilities are Unattractive



**Figure 5-36** Trailer at Building 212



**Figure 5-37** Walks are Poorly Maintained



**Figure 5-38** Insufficient ADA Access

### Circulation

Pedestrians and vehicles are using Perimeter road.

There are not enough walks in this zone.

Walks are poorly maintained (Figure 5-37).

ADA ramps are insufficient (Figure 5-38).

Parking lots are used for storage which is unsightly and eliminates needed parking spaces.

Mound Road Gate is difficult to find because the entry sign is obscure.

Mound Road Gate is difficult to enter or exit from during peak hours of traffic.

Plant Material

Trees have been inappropriately planted. The plastic material leftover from the rootball is still surrounding their roots (Figure 5-39).

Newly planted trees have not been maintained and are dying (Figure 5-40). New plants must be watered on a regular basis (weekly or more often depending on the weather, and plant).

Islands of plantings unconnected to buildings or other structures do not make sense.

Inappropriate plant choices have been made at Savage Circle (Figure 5-41). Annuals are not proper plants for a Corporate Campus theme.

Pavers around trees adds stress and is not visually appropriate for the zone.

Red mulch has been used in planting beds, and around the bases of trees (Figure 5-42) which is visually inappropriate for the zone.



**Figure 5-39** Inappropriate Planting Technique



**Figure 5-40** Trees Need Greater Care



**Figure 5-41** Inappropriate Planting Choice



**Figure 5-42** Red Mulch Rings are Inappropriate



**Figure 5-43** Ineffective Fencing



**Figure 5-44** Unattractive Fencing



**Figure 5-45** Wheel Stops Used as Edging



**Figure 5-46** Decorative Chain at Savage Circle

### Site Elements

There are numerous fences that provide no security protection, and are unsightly (Figure 5-43).

The tennis courts are poorly maintained.

The fence around the cooling pond is unattractive (Figure 5-44).

Wheel stops are inappropriately used as edging (Figure 5-45).

Decorative chains used around Savage Circle are inappropriate and unnecessary visual clutter (Figure 5-46).

Smoking shelters are unattractive, poorly sited and located too close to buildings. Smoking containers have been poorly located, and are poorly maintained.

Outdoor gathering places are poorly located, and inappropriate styles for the zone.

Parking Lot E lacks appropriate lighting, creating hazardous conditions.

Force Protection

Mound Gate is in direct alignment with Building 200A.

Arsenal Drive is too close to Building 200A.

Plastic barriers are used excessively through the zone (Figure 5-47).

**5.5.4 Recommendations**Site Planning

Use the cooling pond as a feature of the Arsenal. Replace the fencing with a more attractive, yet effective style. Replant edges with more aesthetically pleasing choices.

Savage Circle should be reconfigured to ensure force protection compliance. This should include entry landscaping that is suitable.

A planted buffer should be established between the off-base housing near Perimeter Road and the Arsenal. For force protection measures, activities on the arsenal should be shielded from civilian activities.

Coordinate pedestrian circulation with utilities to minimize interference.

Institute programs to minimize the number of geese on the arsenal.

Create additional planted islands within the large expanse of bituminous parking lots. These islands can double as water collectors, and pedestrian travel locations.

Buildings

Building 210 is an example of architecture for future development in this area. Their clean lines, glass and more modern styles are appropriate for the activities in this zone.

Unightly utilities should be relocated to roofs, or to more inconspicuous locations and should comply with force protection standards.

Replace south entrance on Building 200C with an entrance that is consistent with the existing architecture.

Provide appropriate screening around Building 200 to hide trash dumpster, tanks, mechanical equipment etc.

Remove trailer located near Building 212 and replace the lost space with a permanent building that complements the character of this visual zone.

Repaint Building 212.

Circulation

The perimeter road through this zone should be reconfigured to allow for separate pedestrian and vehicular travel.

Walks should be established along the steam channels to provide safe and convenient pedestrian corridors. Reconfigure the covers to storm channels in to allow for maintenance access, but to ensure safety of pedestrians. All walks should be ADA compliant.

Relocate or remove all items being stored in parking lots.

Plant Material

Plant street trees on each side of MacArthur Drive (Center Avenue) and Arsenal Avenue. This will emphasize that they are the primary roads on the installation.



**Figure 5-47** Plastic Jersey Barriers

Landscape can be used to minimize the number of Canada Geese on the base. Instead of keeping lawns mowed in non-occupied areas, establish meadows that not only will deter the geese, but will decrease maintenance.

Shrubs should be allowed to reach their natural shapes and sizes. Pruning should be minimal, and only for the health of the plant.

Transplant or remove any shrubs that are located inappropriately given their natural structures. Replace with appropriate plantings.

Island plantings of shade trees, shrubs and grasses should be established to soften the parking lots, as well as provide a more comfortable and safe climate for pedestrians.

Eliminate all gravel from roadsides. All swales should be planted as rain gardens with grass, shrubs and trees to give a more professional look to the Arsenal.

Remove all dead and dying trees, shrubs and groundcover.

Eliminate randomly planted beds.

Remove all edging material from around bases of trees.

Replace all red mulch with shredded hardwood mulch or groundcover.

Use temporary plant boxes around temporary trailers for aesthetic and force protection measures.

#### Site Elements

Outdoor seating should be carefully located in areas that provide shade, and away from smoking areas. Seating elements should be carefully chosen to comply with the visual aesthetic of the zone.

Remove all fences that are unnecessary for force protection purposes.

Repair the tennis courts.

Remove all wheel stops. They are unnecessary, and become a problem for maintenance (i.e, snow removal).

Remove all decorative chains from around Savage Circle.

Replace all smoking shelters with more appropriate models.

Add additional lighting in Parking Lot E. Maximize the number of foot-candles in this area according to regulations.

#### Force Protection

Relocate high-ranking officers to the center of the installation.

Provide force protection for Building 200A from Arsenal Avenue and Mound Gate.

Jersey barriers are not visually compatible with a Corporate Campus theme. Eliminate as many as possible, while maintaining heightened level of force protection. Choose aesthetically pleasing force protection measures.

Use landscape around buildings to establish the perimeter standoff.

Create an adequate inspection area at Mount Road Gate. As deliveries to buildings on the campus cannot be minimized, adequate inspection is essential to maintaining safety.

Landscape the perimeter fencing in this zone. Landscaping will help minimize blast damage.

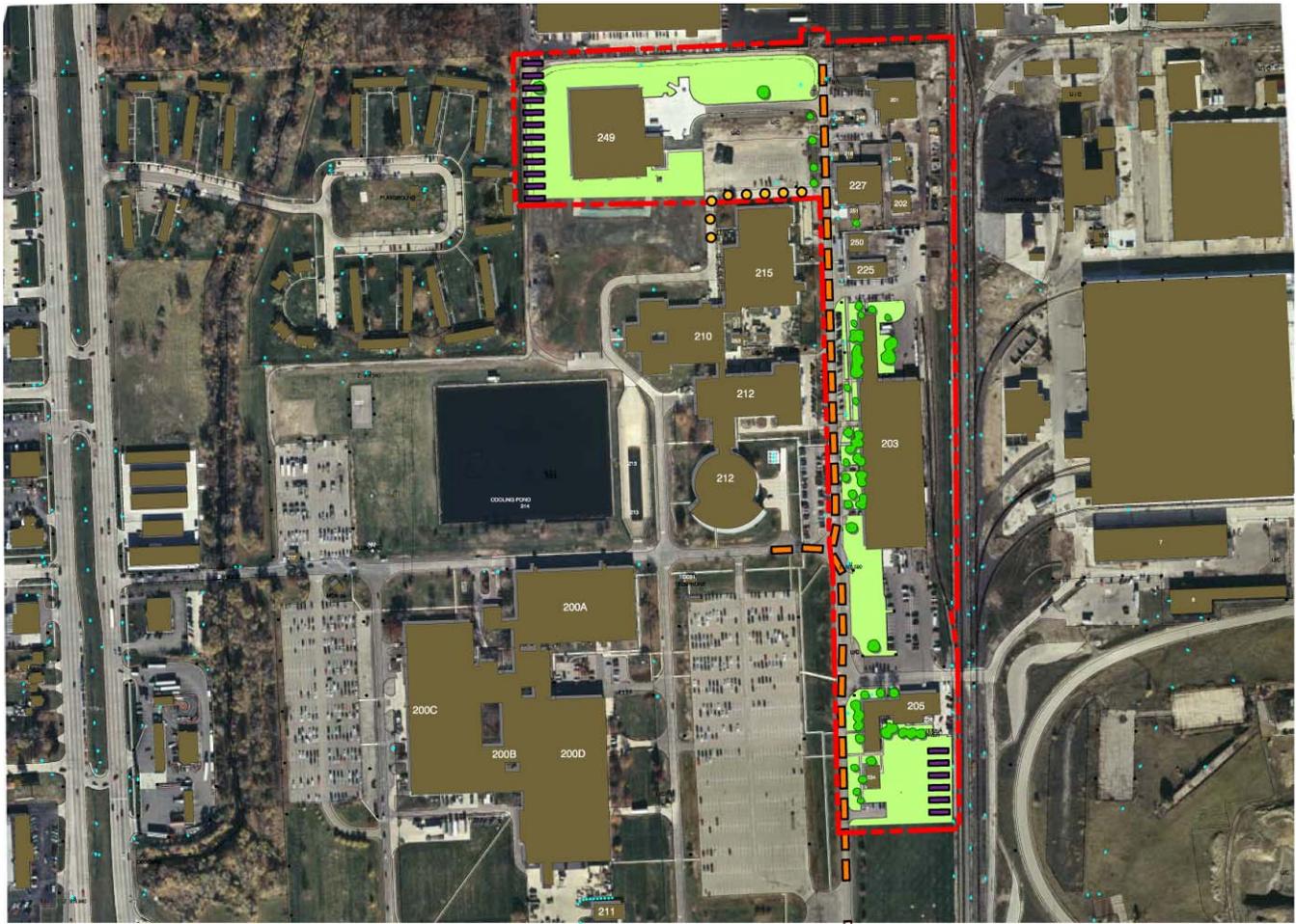


Figure 5-48 Industrial Visual Zone (2005)

**LEGEND**

-  OPEN SPACE
-  SIGNIFICANT VEGETATION
-  PRIMARY ROAD
-  SECONDARY ROAD
-  VISUAL ZONE LIMITS
-  BUFFER



250' 0 500'

**5.6 INDUSTRIAL VISUAL ZONE**

**5.6.1 Visual Character**

The Industrial Visual Zone (Figure 5-48) is located in the northeastern corner of the arsenal. It is bound to the east by the railroad tracks, to the west by Perimeter Road and MacArthur Drive (Center Avenue), to the north by Perimeter Road and to the south by the edge of Parking Lot B. This zone consists of extremely varied types of architecture. It is the smallest zone on the Arsenal.

### 5.6.2 Assets

#### Site Planning

Utilities are poorly located, and are accessible to damage (Figure 5-49).

#### Buildings

Buildings 249, 250, 251, 201 have similar color and material palette.

Building 249 is a good example for new construction for this visual zone (Figure 5-50).

#### Circulation

Perimeter Road is used as a walking trail (Figure 5-51).

#### Plant Material

Efforts have been made to landscape around certain buildings in this zone.

#### Site Elements

New lights along the perimeter of the zone are attractive, and of a suitable style (Figure 5-52).

Benches have been located for pedestrians.

#### Force Protection

The Perimeter Road is a positive force protection measure in this area by providing an area that encourages significant usage by moving pedestrians. It creates natural surveillance along this part of the perimeter.



**Figure 5-49** Poorly Located Utility



**Figure 5-50** Building 249



**Figure 5-51** Perimeter Road



**Figure 5-52** New Perimeter Lighting



**Figure 5-53 Building 225 Has Not Been Maintained**



**Figure 5-54 Walks Dead End**



**Figure 5-55 Tree Is In An Inappropriate Location Given Its Size**



**Figure 5-56 Planting Box is Bad for Tree**

### 5.6.3 Liabilities

#### Site Planning

Walks are almost non-existent in this zone.

The width and integrity of MacArthur Drive (Center Avenue) is inconsistent along its length.

The neighborhood to the north west of the arsenal lacks buffers.

#### Buildings

Buildings 202 and 225 have not been maintained properly (Figure 5-53).

There is a random scale and arrangement of buildings in this visual zone.

#### Circulation

Walks are not ADA accessible, and often dead end for no reason (Figure 5-54).

#### Plant Material

Several of the plants chosen for landscaping around buildings are inappropriate for their locations (Figure 5-55).

Trees are surrounded by boxes or edging, and have mulch piled above the root flares (Figure 5-56).

Site Elements

Trash receptacles are inappropriately used as bollards (Figure 5-57).

Lighting styles in this zone are inconsistent.

Force Protection

Proximity to railroad tracks is a security risk. The sound of the train makes the gate a weak link.

Emergency Response Facilities are located too close to the perimeter.

The chain link fence along the Perimeter Road is a weak point in the security of the Arsenal. Chain link is easily scaled, and the wiring installed to strengthen the fence is easily cut, and provides minimal security.

**5.6.4 Recommendations**Site Planning

Relocate any utilities that are subject to be damaged by vehicular traffic.

Buildings

Use Building 249 as a style for future construction in this zone.

Relocate any temporary buildings off the main roads toward the perimeter. If force protection is an issue, reconsider using other methods to ensure security.

Repair poorly maintained buildings.

Develop new construction in this area in a way that will create common space between buildings, provide adequate shared parking and develop an organized building layout that will begin to establish a visual sense of continuity.

Circulation

Reconfigure steam channels to sustain pedestrian traffic.

Continue the hierarchy of MacArthur Drive (Center Avenue) all the way to the Perimeter Road.

Enlarge the width of Perimeter Road to separate vehicular and pedestrian traffic.

Walks should not be located directly on curb. In order to eliminate small walk widths as a result of vehicular overhang, either enlarge all walks adjacent parking lots by two feet or add a grass verge/median two to three feet wide.

Plant Material

Buffer the residential community to the northwest of the arsenal.

Establish a planting that gives hierarchy to MacArthur Drive (Center Avenue).

Plantings in this zone should be minimal-lawn and shade trees are adequate.

Shrubs should be allowed to reach their natural shapes and sizes. Pruning should be minimal, and only for the health of the plant.

Transplant or remove any shrubs that are located inappropriately given their natural structures. Replace with appropriate plantings.

Eliminate all gravel from roadsides. Swales should be planted with grass, or converted into rain gardens.

Remove all red mulch from the zone. Replace with more appropriate mulch such as shredded hardwood mulch or groundcover



**Figure 5-57** Trash Receptacles Used as Bollards

### Site Elements

All poles and fixtures within this zone should be consistent.

Outdoor seating areas should be shaded, and of a style consistent with this zone.

### Force Protection

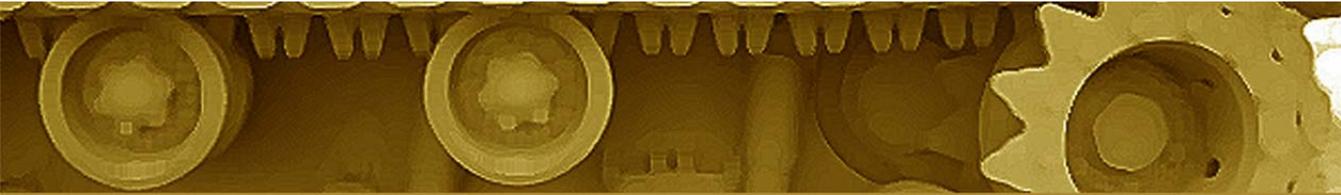
Emergency Response Facilities should be centrally located. Once they are, the Tank Avenue Gate becomes a weak link. Ensure that the gate is adequately marked with warning signs of surveillance, alarms, etc. Maintain grounds, paint, and other materials around this gate to make it obvious that the gate is carefully monitored.

The bench located in front of Building 205 is a security risk. It allows acceptable surveillance of the Emergency Response Facilities.

Install call boxes along the Perimeter Road. These will ensure not only personal safety, but will be an effective force protection measure.

The relationship between the housing community and the Arsenal is important to force protection. Change the fence along Perimeter Road to wrought iron. It is more decorative, will be more enjoyed by the community, and therefore cared for. Providing a landscape buffer along Perimeter Road will not only encourage natural surveillance from the residents, but will protect the arsenal from blasts. Planting an allée of trees will direct movement along the road, creating an expected path of vehicular travel. The road can even meander, thereby slowing traffic, making the area safer for pedestrians, more attractive, enjoyable, and therefore occupied. Motion triggered lighting can enhance security along this edge.

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## Section 6 Improvement Projects

### 6.1 INTRODUCTION

Section 6 consists of projects generated from the recommendations presented in the visual zone analysis section starting at [paragraph 5.4](#). The projects may consist of enhancement of a single visual element or improvement of an area that includes a variety of visual elements. Depending on the project scope and cost, the projects could include: Military construction (MILCON), Non-appropriated-funded (NAF), Other Procurement, Army (OPA) and maintenance and repair, local minor construction. Each improvement project is described and cost-estimated in enough detail to place each project within the appropriate project list or annual work plan, in an appropriate Fiscal Year, within the statutorily correct funding program.

The paragraphs below discuss each project at length and includes existing conditions, project description, design concept, cost estimate, primary and alternate recommended funding sources, photographs, sketches, maintenance impact as applicable and the benefits to the site if the recommendation is implemented.

[Appendix G](#) of this Army Installation Design Guide, the Prioritized Improvement Projects List, records information on each project and prioritizes them in accordance with the installation goals and objectives stated in [paragraph 3.2](#), Goals, Objectives and Recommendations. The appendix is an interactive form and designed to be altered as circumstances effecting the prioritization scheme change.

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Figure 6-1 Exterior Signage Priority Improvement Project (2005)

## 6.2 PIP #1: EXTERIOR SIGNAGE

- BUILDING ADDRESS SIGNAGE
- BUILDING OCCUPANT SIGNAGE
- STREET NAME SIGNAGE  
(2 SIGNS PER SYMBOL)
- DIRECTIONAL SIGNAGE
- ENTRANCE SIGNAGE
- - - PROPERTY LINE

### 6.2.1 Existing Conditions

There is currently a lack of standardization between different types of signage at the Detroit Arsenal. The inconsistencies include color, font, graphics, and physical orientation.

### 6.2.2 Project Description

Remove and replace existing signage at the Detroit Arsenal to meet standards described in the Army Signage Technical Manual, and this IDG.

### 6.2.3 Design Concept

Install signage according to Army standards throughout the Detroit Arsenal to enhance the visual character of the site and minimize confusion while traveling through the site. The signs installed will include street identification signs, building address and building occupant signs, and strategically located directional signs.

Quantity	Unit	Item	Unit Cost	Total
50	ea	Street Sign w/ metal pole	182.00	9,100.00
39	ea	Exterior Identification Sign - Address	228.00	8,892.00
39	ea	Exterior Identification Sign - Occupant	516.00	20,124.00
8	ea	Directional Signage	516.00	4,128.00
136	Ea	Removal of Existing Signage	107.00	14,552.00
2	Ea	Installation Entrance Sign	9,824.00	19,648.00
<b>TOTAL</b>				<b>76,444.00</b>

**Figure 6-2** Cost Estimate - Exterior Signage

#### 6.2.4 Cost Estimate

See Figure 6-2

#### 6.2.5 Site Plan

See Figure 6-1.

#### 6.2.6 Maintenance Impact

The maintenance impact created by this project will be minimal because existing signs will be removed and replaced. Standardizing the signage at the Detroit Arsenal will result in fewer types of materials that must be stored, and reduce the number of maintenance techniques used to service the signage.

#### 6.2.7 Recommended Funding Source

Operations and Maintenance Army (OMA) Funds.

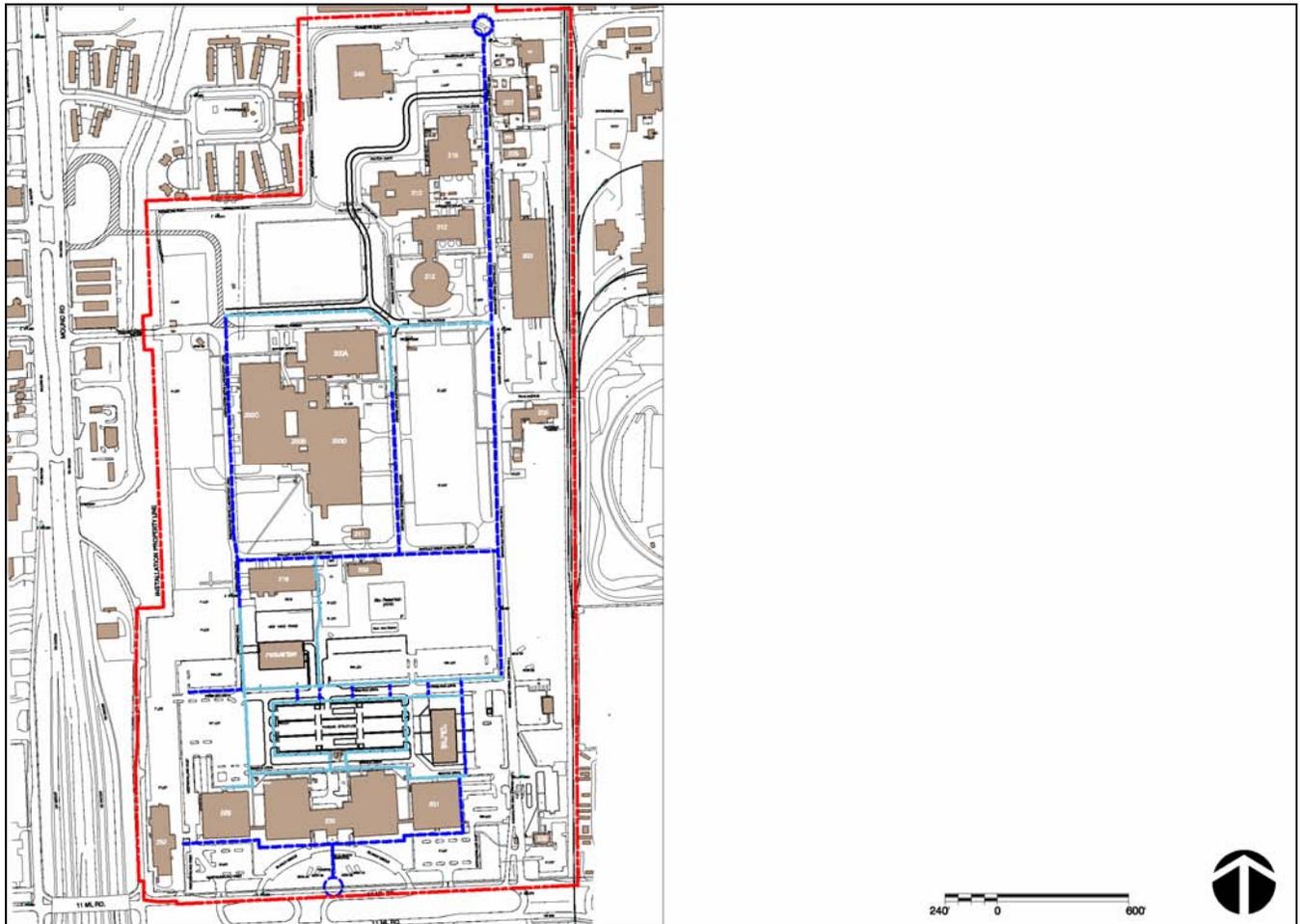


Figure 6-3 Pedestrian Circulation Route

### 6.3 PIP #2: PEDESTRIAN CIRCULATION

- - - PROPERTY LINE
- - - PEDESTRIAN CIRCULATION ROUTE (EXISTING OR COMPONENT OF BRAC PROJECT)
- - - PROPOSED PEDESTRIAN CIRCULATION ROUTE (6' MIN. SIDEWALK)
- CONNECTION TO PERIMETER TRAIL

#### 6.3.1 Project Description

The project focuses on organizing the pedestrian walkways to facilitate safe and efficient circulation throughout the installation.

#### 6.3.2 Design Concept

The concept of this project is to create a comprehensive pedestrian circulation system at Detroit Arsenal. The pedestrian should have the ability to travel from one side of the installation to the other with relative ease, and feel safe in doing so. A series of sidewalks that follow primary roadways and connect parking lots with the buildings which they support must be present to accomplish this project. It is imperative that the circulation routes are direct and thoroughly connect the entire installation, so that wandering is not encouraged.

Quantity	Unit	Item	Unit Cost	Total
53,442	sf	Concrete Sidewalk <sup>1</sup>	4.99	266,675.58
4,780	sy	Seeding (2' restoration along edge of walk)	0.80	3,824.00
<b>TOTAL</b>				<b>270,499.58</b>
<sup>1</sup> calculation is based upon 10,755 linear feet of new sidewalk, and excludes linear footage of existing sidewalk along the pedestrian circulation route. Calculation does not include a cost for sidewalks proposed in BRAC future projects.				

**Figure 6-4** Cost Estimate - Pedestrian Circulation

### 6.3.3 Cost Estimate

See Figure 6-4.

### 6.3.4 Site Plan

See Figure 6-3.

### 6.3.5 Maintenance Impact

There will be an increase in the linear footage of sidewalk at the Detroit Arsenal, which will increase the required maintenance. But, this project will result in pedestrians following specific sidewalks rather than deviating onto grass/vegetated areas. This will decrease the necessary maintenance required to fix eroded and worn down areas caused by this foot traffic.

### 6.3.6 Recommended Funding Source

Operations and Maintenance Army (OMA) Funds.



Figure 6-5 Buildings 230/231/229 North Entrance

-  PROPOSED CANOPY TREE
-  PROPOSED FLOWERING TREE
-  PROPOSED ORNAMENTAL SHRUBS
-  PROPOSED EVERGREEN SHRUBS
-  PROPOSED GROUNDCOVERS AND BULBS
-  PROPOSED LAWN
-  EXISTING TREES

**6.4 PIP #3: BUILDINGS 230/231/229 NORTH ENTRANCE**

The rear (north) of Buildings 229, 230, and 231 currently faces towards an expansive parking area. Due to increased security requirements at all Army installations, the rear of the buildings have become the front entrances. This project’s description will refer to the north side of the buildings as the ‘front’ of the buildings.

The areas in front of the buildings are very hard, and do not instill a sense of arrival and comfort to the building users or its guests. There are parking areas and drive lanes that encroach upon the required Anti-Terrorism/Force Protection (AT/FP) setbacks, and have subsequently been barricaded.

There are sidewalks connecting the separate buildings, however they do not provide any destination points for pedestrians to arrive at or congregate in.

**6.4.1 Project Description**

This project will address the areas in front of Buildings 229, 230, and 231. These areas have the opportunity to act as a destination place for building users, and create more aesthetic entrances.

A new Administration Building and parking structure are being proposed in the parking areas to the North of Buildings 230 and 231. This project has been designed to allow integration with these two future projects at the Detroit Arsenal. This project must also address force protection from the inhabited buildings to the parking lots.

Quantity	Unit	Item	Unit Cost	Total
41	ea	Shade Trees	400.00	16,400.00
22	ea	Ornamental Trees	200.00	4,400.00
33	ea	Ornamental Shrubs	35.00	1,155.00
11,459	sy	Seeding	0.80	9,167.20
6	ea	Tree Removal	500.00	3,000.00
42,000	sf	Concrete Sidewalk	4.99	209,580.00
1,000	lf	Fence Removal	3.05	3,050.00
4	ea	Site Amenities - Tables and Chairs (4seats)	2,120.00	8,480.00
6	ea	Site Amenities - Trash Receptable (30-gal)	495.00	2,970.00
4	ea	Site Amenities - Recreation Shelter (16' x 16')	6,700.00	26,800.00
1	ls	Site Amenities - Bollard system along roadway <sup>1</sup>	46,862.00	46,862.00
<b>TOTAL</b>				<b>331,864.20</b>
<sup>1</sup> Bollard and maritime cargo chain (greater than 1" high steel) component system. Cost has been determined using a K12 rating.				

**Figure 6-6** Cost Estimate - Buildings 230/231/229 North Entrance

#### 6.4.2 Design Concept

The areas in front of Buildings 229, 230, and 231 should be reclaimed as a pedestrian oriented space. The drive lanes that encroach upon the AT/FP setbacks have been identified in the site plan, but have not been relocated due to the future implementation of the new Administration Building and parking structure. The drive lanes are part of the vehicular pattern around the new construction, which prohibits any relocation opportunities.

#### 6.4.3 Cost Estimate

See Figure 6-6.

#### 6.4.4 Site Plan

See Figure 6-5.

#### 6.4.5 Maintenance Impact

This design will increase maintenance requirements through the introduction of new plant materials, sidewalks, lighting, benches, and other site elements; however these impacts can be mitigated by using site specific and durable materials.

#### 6.4.6 Recommended Funding Source

Operations and Maintenance Army (OMA) Funds.



Figure 6-7 Glancy Circle Priority Improvement Project



## 6.5 PIP #4: GLANCY CIRCLE

### 6.5.1 Existing Conditions

The areas adjacent to Glancy Circle, on the South side of Buildings 229, 230, and 231, are a mixture of parking, open space, and memorial. This area is also home to four static displays of military vehicles. Eleven Mile Road runs parallel to these areas, which has required the implementation of a high security reinforced fence system.

### 6.5.2 Project Description

This project entails redesigning Glancy Circle and the areas to the South of Buildings 229, 230, and 231 to meet AT/FP guidelines. The project suggests maintaining the areas within the 82' AT/FP setback as open space, and reclaiming remainder of the site for parking. This project has been designed in conjunction with PIPs 6 (Eleven Mile Road Fencing) and 9 (Perimeter Trail).

### 6.5.3 Design Concept

The concept of this project involves the development of a pedestrian oriented space to the South of the administration buildings, adjacent to a redesigned parking lot. The existing open space is home to a memorial and military static displays, which have been incorporated into the redesigned open space. The open space has been supplemented with a series of pedestrian pathways and gathering areas to encourage the building users to use the natural environment. This project takes advantage of the opportunity to connect the area to the remainder of the installation through a strategic connection with the perimeter trail.

Quantity	Unit	Item	Unit Cost	Total
54	ea	Shade Trees	400.00	21,600.00
26	ea	Ornamental Trees	200.00	5,200.00
18	ea	Ornamental Shrubs	35.00	630.00
5,186	ea	Groundcovers	4.00	20,744.00
20,621	sy	Seeding	0.80	16,496.80
15	ea	Tree Removal	500.00	7,500.00
38,000	sf	Concrete Sidewalk	4.99	189,620.00
1	ls	Parking modifications	480,887.72	480,887.72
5	ea	Site Amenities - Tables and Chairs (4seats)	2,120.00	10,600.00
6	ea	Site Amenities - Trash Receptacle (30-gal)	495.00	2,970.00
4	ea	Site Amenities - Recreation Shelter (16' x 16')	6,700.00	26,800.00
16	ea	Parking Lot lights (Bega, 13' to 15' height)	2,100.00	33,600.00
4	ea	Static Display Relocation and Concrete Pad	3,700.00	14,800.00
1	ls	Flagpole Relocation	1,090.00	1,090.00
2	ea	Security Gate	12,190.00	24,380.00
<b>TOTAL</b>				<b>858,953.52</b>

**Figure 6-8** Cost Estimate - Glancy Circle

The parking area associated with this project has been designed outside of the 82' AT/FP offset from the administration buildings. The total number of spaces in the lot increased from approximately 225 in its current configuration to 321. Vehicular access to the parking lots will be maintained through the use of access control points at Westmoreland East and Westmoreland West.

#### 6.5.4 Cost Estimate

See Figure 6-8.

#### 6.5.5 Site Plan

See Figure 6-7.

#### 6.5.6 Maintenance Impact

This design will increase maintenance requirements through the introduction of new plant materials, sidewalks, lighting, benches, and other site elements; however these impacts can be mitigated by using site specific and durable materials.

#### 6.5.7 Recommended Funding Source

Operations and Maintenance Army (OMA) Funds.



Figure 6-9 MacArthur (Center) Avenue Priority Improvement Project



## 6.6 PIP #5: MACARTHUR (CENTER) AND ARSENAL AVENUES

### 6.6.1 Existing Conditions

The primary roadways at the Detroit Arsenal, Center Avenue and Arsenal Avenue, lack a distinguishable cross section. There are sections of both roads that begin to take on a visual hierarchy, but a continuous pattern does not exist.

### 6.6.2 Project Description

This project will create a distinguishable visual hierarchy between primary and secondary roadways at the Detroit Arsenal by incorporating design features such as landscaped medians, sidewalks, lighting, and site furnishings.

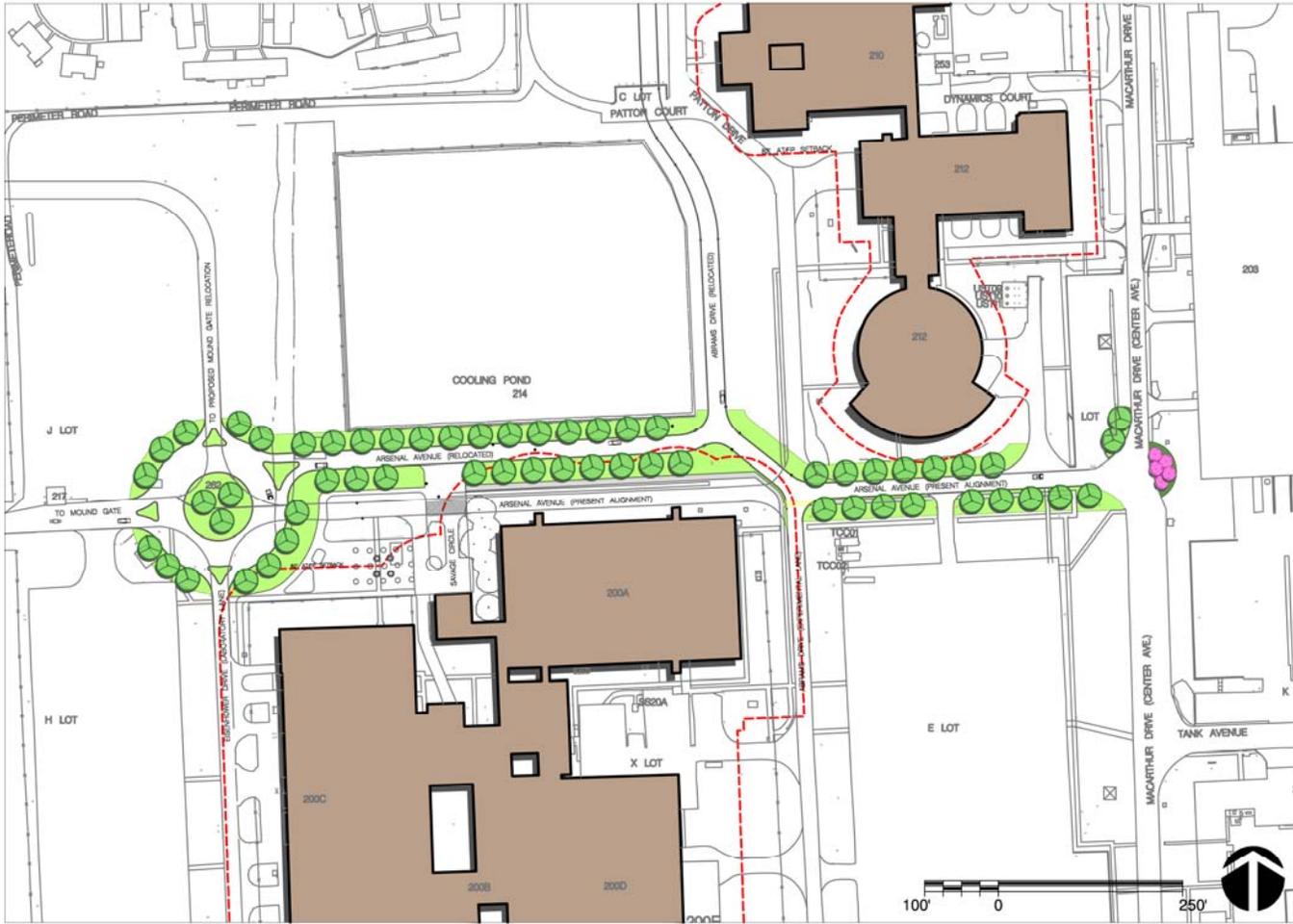
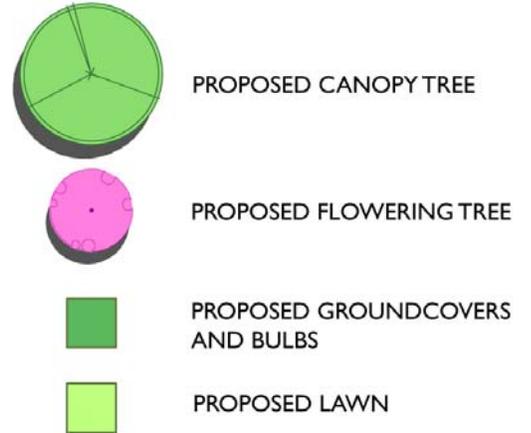


Figure 6-10 Arsenal Avenue Priority Improvement Project

**6.6.3 Design Concept**

MacArthur Drive (Center Avenue) and Arsenal Avenues require specific streetscape features to delineate them as primary thoroughfares at the Detroit Arsenal. These features include landscaped medians that provide visual interest for individuals traveling the roadways, shade trees alongside the roadways to frame the travel lanes, pedestrian pathways to enhance circulation, lighting for safety, and site furnishings for comfort.



Quantity	Unit	Item	Unit Cost	Total
110	ea	Shade Trees	400.00	44,000.00
30	ea	Ornamental Trees	200.00	6,000.00
6,250	ea	Groundcovers	4.00	25,000.00
15,000	sy	Seeding	0.80	12,000.00
10,100	sf	Demolition - road widening	1.67	16,867.00
1	ls	Construct Median Islands	58,445.00	58,824.00
1	Ls	Traffic Circle along Arsenal Avenue	178,325.00	178,325.00
20,100	sf	Concrete Sidewalks	4.99	100,299.00
10	ea	Benches	1,020.00	10,200.00
10	ea	Trash Receptacles	495.00	4,950.00
3,500	lf	Exterior Lighting	32.00	112,000.00
50	ea	Street Lights	2,100.00	105,000.00
<b>TOTAL</b>				<b>673,465.00</b>

**Figure 6-11** Cost Estimate - MacArthur (Center) and Arsenal Avenues

#### **6.6.4 Cost Estimate**

See Figure 6-11.

#### **6.6.5 Site Plan**

See Figure 6-9 and Figure 6-10.

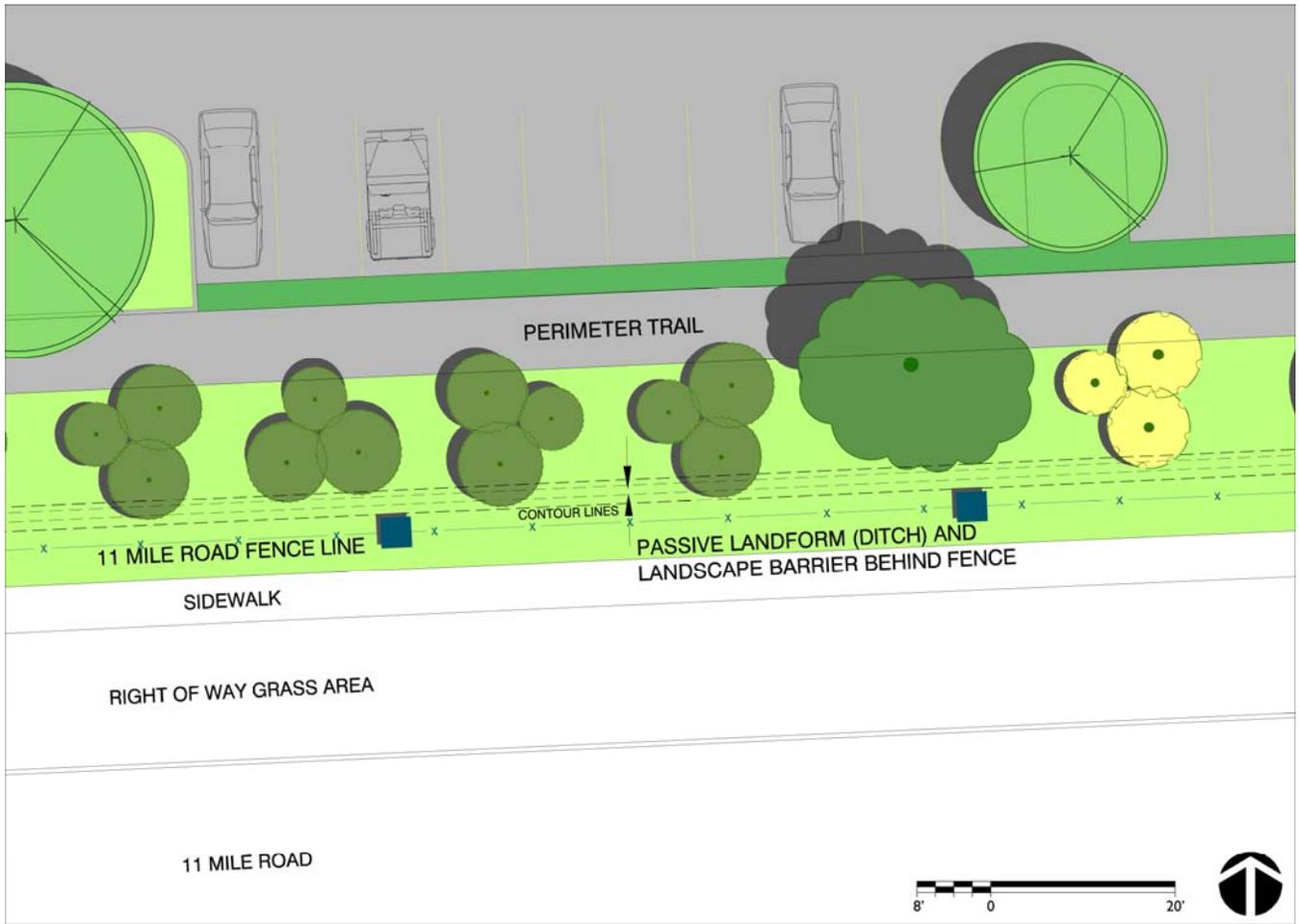
#### **6.6.6 Maintenance Impact**

The implementation of these concepts will impact maintenance requirements through the introduction of new plant materials and curbing; however these impacts can be mitigated through the use of site specific and low maintenance plant materials.

#### **6.6.7 Recommended Funding Source**

Operations and Maintenance Army (OMA) Funds.

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**Figure 6-12** Eleven Mile Road Fencing Priority Improvement Project

## 6.7 PIP #6: ELEVEN MILE ROAD FENCING

### 6.7.1 Existing Conditions

The existing perimeter fencing along Eleven Mile Road is a chain link fence, reinforced with aircraft cabling to enhance its protective characteristics. There are several gates that exist where Glancy Circle and the parking lots once entered onto Eleven Mile Road.

### 6.7.2 Project Description

This project should provide the Detroit Arsenal with a perimeter treatment that is able to withstand a security threat while maintaining a 'Corporate Campus' theme and be aesthetically pleasing.

### 6.7.3 Design Concept

This project suggests several options for the fence treatment along Eleven Mile Road. The first option involves replacing the existing fence with a more appropriate style that maintains the 'Corporate Campus' image and is a K-rated fence. The second design suggestion is to utilize man-made 'Ditch and Berm' or 'Tank Traps' to act as AT/FP barriers. This will allow the Detroit Arsenal to choose a more appropriate style fence without the added cost of a K-Rated fence system.

Quantity	Unit	Item	Unit Cost	Total
20	ea	Shade Trees	400.00	8,000.00
150	ea	Ornamental Shrubs	35.00	5,250.00
75	ea	Evergreen Shrubs	35.00	2,625.00
3,000	sy	Seeding	0.80	2,400.00
		Earthwork – General Grading, Ditch and Berm Work (12" Ditch and Berm)		
990	cy		7.90	7,821.00
1,900	lf	Decorative Fence (6' height)	35.50	67,450.00
32	ea	Decorative Pillars	2,296.80	73,497.60
<b>TOTAL</b>				<b>167,043.60</b>

**Figure 6-13** Cost Estimate - Eleven Mile Road Fencing

#### 6.7.4 Cost Estimate

See Figure 6-13

#### 6.7.5 Site Plan

See Figure 6-12

#### 6.7.6 Maintenance Impact

The maintenance impact of this project can be minimized by using quality materials that can be easily serviced in the future.

#### 6.7.7 Recommended Funding Source

Operations and Maintenance Army (OMA) Funds.



Figure 6-14 Savage Circle Priority Improvement Project



## 6.8 PIP #7: SAVAGE CIRCLE

### 6.8.1 Existing Conditions

Savage Circle is currently used as a drop-off point for Building 200. There are several parking spots in front of Building 200, and a landscaped island enhances the entrance. There are lawn areas adjacent to Savage Circle with canopy trees, shrubs, and walks. A service drive and gate pass directly beside the entrance to Building 200.

### 6.8.2 Project Description

This project will convert the existing Savage Circle into a functional and aesthetically pleasing space that can be used for gatherings and ceremonies.

### 6.8.3 Design Concept

The conversion of Savage Circle to a pedestrian scale space will be made in conjunction with plans to realign Arsenal Avenue. This realignment will increase the available space for the courtyard, and provide an increased standoff distance between Building 200 and the roadway. It is important to address AT/FP guidelines through the implementation of vehicle barriers within the courtyard.

The new courtyard should provide a focal point for the users, which can be seen from both the roadway and from within Building 200. The courtyard also has the opportunity to act as a gathering space for lunches with the incorporation of tables and chairs. Deciduous shade trees should be planted to

Quantity	Unit	Item	Unit Cost	Total
3	ea	Shade Trees	400.00	1,200.00
18	ea	Ornamental Trees	200.00	3,600.00
750	ea	Groundcovers	4.00	3,000.00
100	sy	Seeding	0.80	80.00
10	ea	Tree Removal	500.00	5,000.00
1	ls	Demolition	3,000.00	3,000.00
27,000	sf	Concrete Sidewalk	4.99	134,730.00
2	ea	Site Amenities - Raised Bench	2,000.00	4,000.00
4	ea	Site Amenities - Table and Chairs	1,250.00	5,000.00
1	ls	Site Amenities - Bollard system along roadway <sup>1</sup>	77,074	77,074.00
4	ea	Site Amenities - Removable bollards at curb cut	955.00	3,822.40
1	ls	Site Amenities - Water Feature	5,000.00	5,000.00
<b>TOTAL</b>				<b>245,506.40</b>

<sup>1</sup>Bollard and maritime cargo chain (greater than 1" high steel) component system. Cost has been determined using a K12 rating.

**Figure 6-15** Cost Estimate - Savage Circle

take advantage of their shade during the hot summer months, while allowing the sun to reach the surface during the winter.

#### 6.8.4 Cost Estimate

See Figure 6-15. Cost estimate for traffic circle included in Figure 6-11.

#### 6.8.5 Site Plan

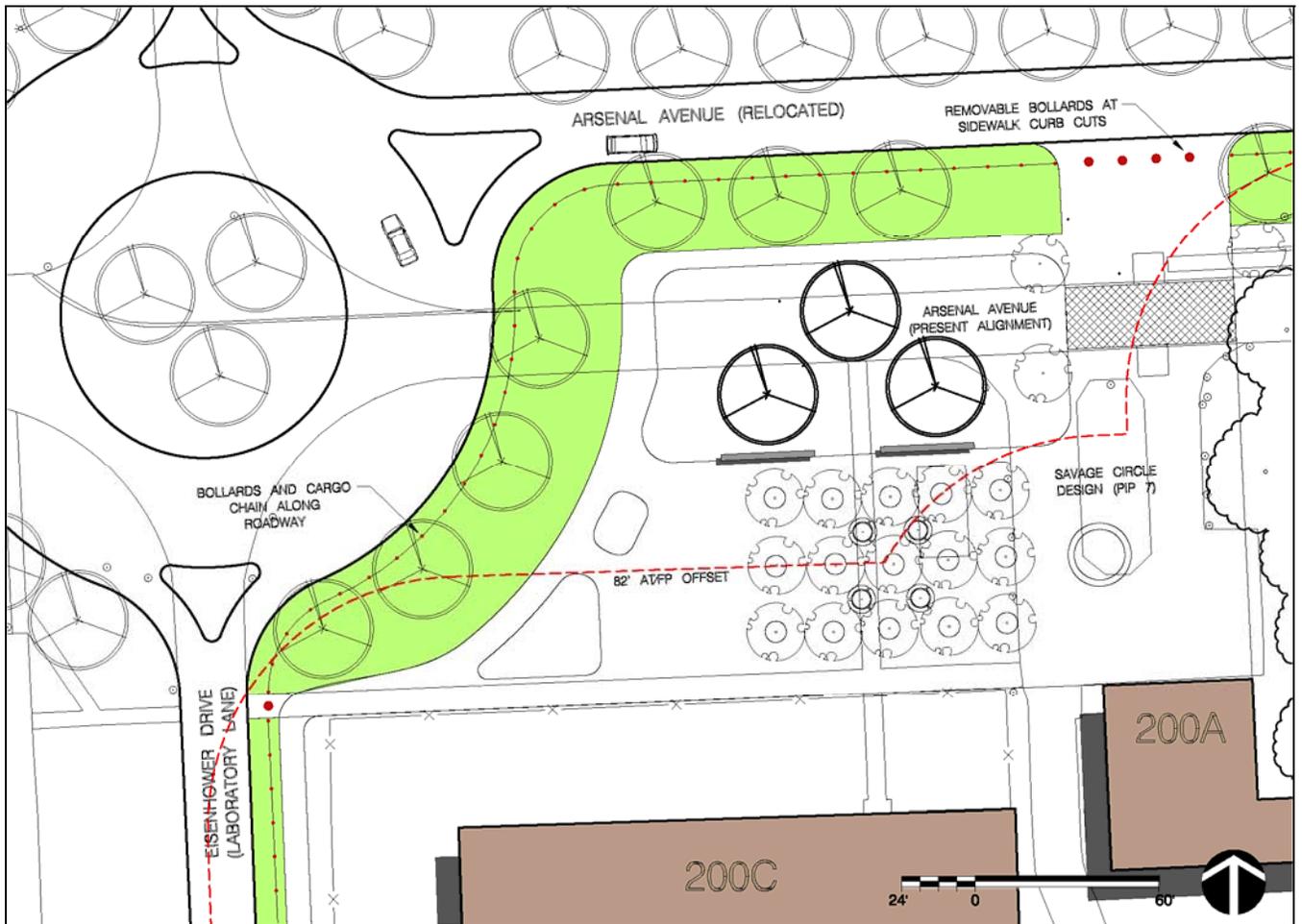
See Figure 6-14.

#### 6.8.6 Maintenance Impact

This design will increase maintenance requirements through the introduction of new plant materials, walks, lighting, benches, and other site elements; however these impacts can be mitigated by using site specific and durable materials.

#### 6.8.7 Recommended Funding Source

Operations and Maintenance Army (OMA) Funds.



**Figure 6-16** Building 200 Force Protection Priority Improvement Project

## 6.9 PIP #8: BUILDING 200 FORCE PROTECTION

### 6.9.1 Existing Conditions

The existing alignment of Arsenal Avenue places the roadway in proximity to Building 200. There are preliminary plans to realign Arsenal Avenue to the North to increase the standoff distance between the Building and the roadway.

### 6.9.2 Project Description

Reduce the vulnerability of Building 200 by designing AT/FP measures into the corner of Arsenal Avenue and Laboratory Lane.

### 6.9.3 Design Concept

This design should be completed in conjunction with the Savage Circle PIP (PIP #8) to ensure a cohesive concept. The introduction benches, walls, and plant materials have been included in the Savage Circle PIP. This project suggests a bollard and cargo chain system be installed prevent vehicles traveling along Arsenal Avenue from entering the Savage Circle courtyard. The realignment of Arsenal Avenue and introduction of a traffic circle will also have beneficial effects on the protection of Building 200 by slowing and redirecting vehicular movement.

### 6.9.4 Cost Estimate

Costs associated with this PIP have been included in the cost estimate for Savage Circle PIP. Cost estimate for traffic circle included in Figure 6-11.

**6.9.5 Site Plan**

See Figure 6-16

**6.9.6 Maintenance Impact**

This design will increase maintenance requirements through the introduction of new site elements; however these impacts can be mitigated by using site specific and durable materials.

**6.9.7 Recommended Funding Source**

To be determined.

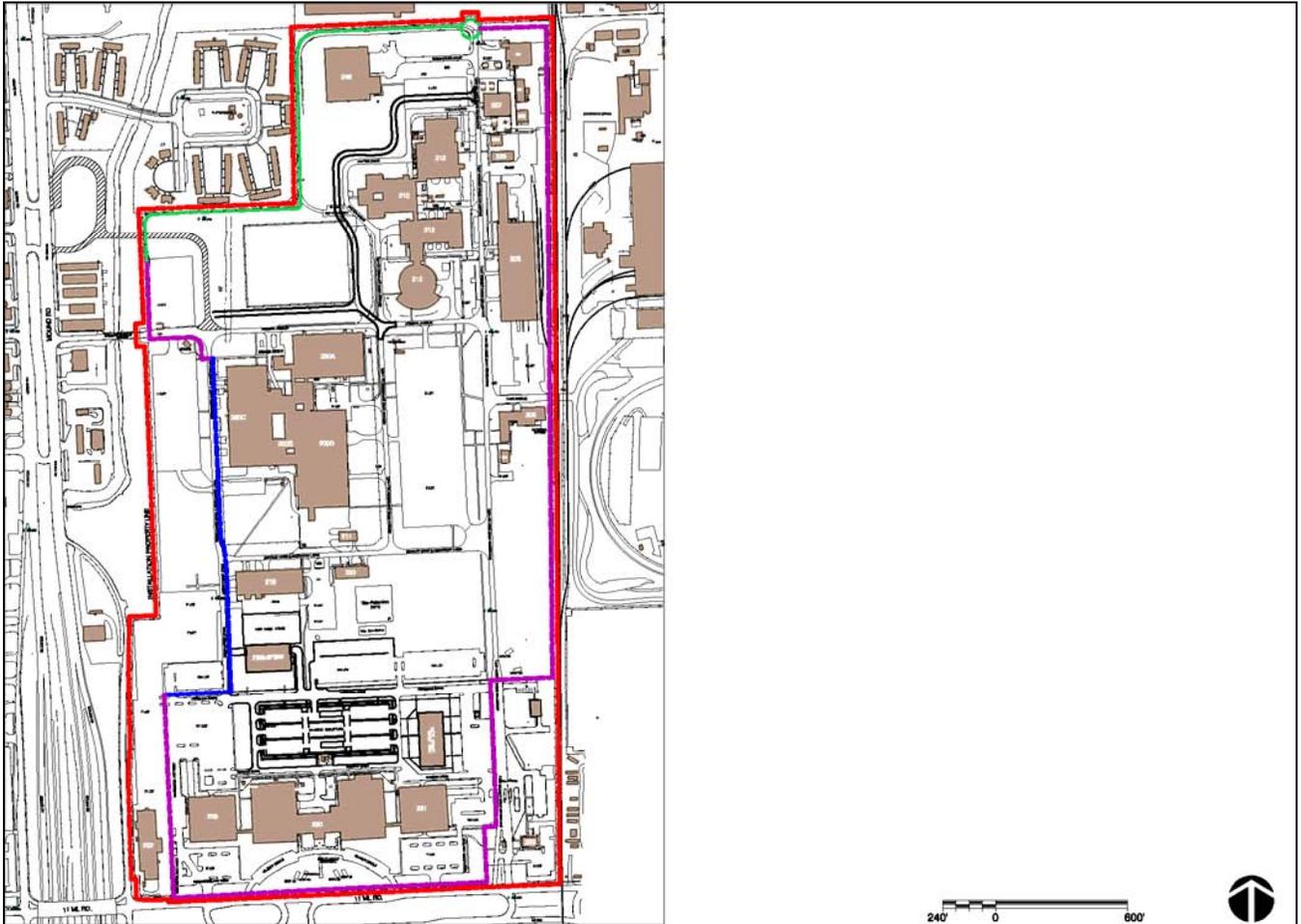


Figure 6-17 Perimeter Trail Priority Improvement Project

- — — — — PERIMETER LINE
- - - - - EXISTING PERIMETER TRAIL ENHANCEMENTS (8' AVERAGE WIDTH)
- - - - - POTENTIAL EXPANSION OF EXISTING PERIMETER TRAIL (8' AVERAGE WIDTH)
- - - - - CONVERGENCE WITH PEDESTRIAN CIRCULATION ROUTE (PIP 2)
- CONNECTION TO PEDESTRIAN CIRCULATION ROUTE

**6.10 PIP #9: PERIMETER TRAIL**

**6.10.1 Existing Conditions**

Detroit Arsenal currently has no perimeter trail that can be used for recreation. There are areas along the perimeter that would facilitate such a trail, but there are also areas in which the trail would need to be redirected to the interior of the installation, such as where parking lots abut the perimeter fence line.

**6.10.2 Project Description**

Construct a jogging/walking/bike trail that follows the perimeter of the installation, as much as possible, and strategically connects to the pedestrian circulation system.

**6.10.3 Design Concept**

This project would provide a trail along the perimeter of the installation that can be used for exercise and recreation. The trail must minimize pedestrian and vehicular conflicts, and create a pathway for security and surveillance. A trail at the installations perimeter will facilitate human presence along the site boundaries, which can intimidate potential threats.

Design elements such as prickly foliated plant materials should be used in isolated areas to eliminate potential hiding places. It will also be vital to light the trail for security purposes.

Quantity	Unit	Item	Unit Cost	Total
19,260	sf	Bituminous trail (average 8' wide) <sup>1</sup>	6.25	120,375.00
60	ea	Walkway luminaire (40' on center)	445.00	26,700.00
25	ea	Ornamental Trees	300.00	7,500.00
100	ea	Ornamental Shrubs	55.00	5,500.00
1,070	sy	Seeding (2' restoration along edge of walk)	0.80	856.00
Sub-Total Existing Trail Enhancements				160,931.00
75,428	sf	Bituminous trail (average 8' wide) <sup>1</sup>	6.25	471,425.00
160	ea	Walkway luminaire (40' on center)	445.00	71,200.00
50	ea	Ornamental Trees	300.00	15,000.00
360	ea	Ornamental Shrubs	55.00	19,800.00
4,190	sy	Seeding (2' restoration along edge of walk)	0.80	3,352.00
Sub-Total Proposed Trail Extensions				580,777.00
<b>TOTAL</b>				<b>741,708.00</b>
<sup>1</sup> Bituminous sidewalk, 1" thick paving, 4" gravel base, 8' width.				

**Figure 6-18** Cost Opinion – Perimeter Trail

#### 6.10.4 Cost Estimate

See Figure 6-18.

#### 6.10.5 Site Plan

See Figure 6-17.

#### 6.10.6 Maintenance Impact

There will be an increase in the maintenance requirements with the installation of new trails throughout the installation. These maintenance impacts will depend upon the type of trail installed, and the linear footage of the trail.

#### 6.10.7 Recommended Funding Source

To be determined.



Figure 6-19 Installation Master Plan for Trees

- CANOPY TREE OPPORTUNITIES (DECIDUOUS)
- SMALL TO MEDIUM TREE OPPORTUNITIES (DECIDUOUS AND EVERGREEN)
- MEDIAN TREE OPPORTUNITIES (DECIDUOUS)
- PROPERTY LINE

**6.11 PIP #10: INSTALLATION MASTER PLAN FOR TREES**

**6.11.1 Existing Conditions**

Detroit Arsenal has many areas in which large trees have been well maintained and are an asset to the installation. There are shade trees planted along roadways, and canopy trees occupy areas adjacent to buildings as well as areas of open space. There are instances in which trees have either died, or are struggling to remain alive. The majority of these problems occur in the parking lot islands

**6.11.2 Project Description**

This project proposes a master plan for trees at Detroit Arsenal to ensure that existing trees will remain on site as an asset to the installation, and provide guidance for the planting of all new trees so that cohesiveness in materials and patterns are maintained. The master plan should take into consideration all existing materials, and formulate a plan for the future that addresses dying trees and future projects.

**6.11.3 Design Concept**

The mater plan for trees is a conceptual guide for the installation rather than a detailed planting plan. The plan sets a framework to enhance the functionality of the base and provide the flexibility to adapt to future projects.

Quantity	Unit	Item	Unit Cost	Total
200	ea	Shade Trees	500.00	100,000.00
200	ea	Ornamental Trees	300.00	60,000.00
50	ea	Evergreen Trees	350.00	17,500.00
<b>TOTAL</b>				<b>177,500.00</b>

**Figure 6-20** Cost Opinion - Master Plan for Trees

Section 10 of this document details a set of landscape design standards and principles that should be adhered to in the planning and installation of all landscape related projects, including the master plan for trees. The master plan includes the strategic planting of roadways on the installation to provide shade and visual hierarchy to the vehicular circulation routes. The tree master plan focuses on the parking lots, and tree species should be chosen for their ability to thrive in harsh conditions. Pedestrian circulation should be considered when implementing the plan. Trees should be planted to enhance sidewalks and jogging trails, and provide pockets of shade in open areas.

#### **6.11.4 Cost Estimate**

See **Figure 6-20**

#### **6.11.5 Site Plan**

See Figure 6-19.

#### **6.11.6 Maintenance Impact**

The maintenance impact from this project will be minimal. There will be added maintenance requirements from the introduction of new plant materials, but the proper placement and species selection will help to minimize these increases. The use of native species tolerant of specific site conditions will also assist in mitigating both maintenance and life cycle costs of each tree.

#### **6.11.7 Recommended Funding Source**

Operations and Maintenance Army (OMA) Funds.

## Section 7 Site Planning and Design Standards



Figure 7-1 Site Plan

### 7.1 INTRODUCTION

Site Planning is the process of arranging an external physical environment in complete detail to include the structures, circulation patterns, and other elements that form the built environment. The site planning and design process is used to develop a project that fulfills facility requirements and creates the optimal relationship with the natural site. See [Unified Facilities Criteria \(UFC\) 3-210-06FA, Design: Site Planning and Design](#) for detailed guidance on site planning to include program analysis, site analysis, site verification, and concept development. This document also discusses site design guidelines, describes the steps in the site planning process, and contains examples of various sketches/diagrams developed in support of these steps. Also see [TI 800-01, Design Criteria, Chp. 3, Site Planning and Design Criteria](#). Environmental documentation will be prepared prior to site selection to support the construction activity in accordance [AR 200-2, Environmental Effects of Army Actions](#).

The site planning component provides the spatial arrangement of the installation. (Figure 7-1) The installation master plan provides information that forms the foundation for site planning. The master plan is a mechanism for ensuring that individual projects are sited to meet overall installation requirements. [AR 210-20, Master Planning for Army Installations, and the Master Planning Instructions \(MPI\)](#), provide additional information concerning the master plan.

The other five design components are dependent upon site planning for their location and spatial relationships. The other five components are identified below and discussed in Sections 8-12.

- [Section 8 - Buildings Design Standards](#)
- [Section 9 - Circulation Design Standards](#)
- [Section 10 - Landscape Design Standards](#)
- [Section 11 - Site Elements Design Standards](#)
- [Section 12 - Force Protection Design Criteria](#)

This guide is to be used as applicable. Not all sections apply to Detroit Arsenal, but are included for completeness.

### 7.2 SITE PLANNING OBJECTIVES

The goal of site planning for the installation is to produce an attractive, safe and sustainable development. Sustainability requires the built environment to be designed and constructed to preserve and enhance the natural environment. Manmade facilities are designed as a part of the environment to minimize negative environmental impacts. General site planning techniques resulting in sustainable development are cost efficient because they conserve energy and reduce construction and maintenance cost. Typical site planning objectives include the following:

- Preserve natural site features such as topography, hydrology, vegetation, and tree cover when possible and practical.
- Locate facilities with consideration of climatic conditions such as wind, solar orientation, and microclimate.

- Preserve the natural site by molding development to fill around existing land forms and features whenever possible and applicable. This development approach minimizes extensive earthwork, preserves existing drainage patterns, and preserves existing vegetation.
- Plan for facilities to be clustered to preserve land and reduce construction cost. Clustering should occur on the flattest land areas. Room for expansion should be provided. When clustering facilities Force Protection measures must be considered.

### 7.3 SITE PLANNING CONSIDERATIONS

The primary “fit” of the development to its environment is initially determined by the site analysis and subsequent site planning. The determination of primary issues that provide basic location and organization of spatial relationships are determined during the site planning (Figure 7-2).

#### 7.3.1 Accessibility

Any building or facility used only by able-bodied personnel need not be accessible to the disabled. Nevertheless, when feasible and appropriate, seek to incorporate accessibility measures into the design since the facility use may change over time (military exclusion is provided by UFAS 4.1.4 (2)). All other structures or facilities must meet the standards of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and the Uniform Federal Accessibility Standards (UFAS), with the most stringent standards applied in the event of conflicting guidelines. (See AR 420-70, Chapter 2, Para 2.8). This includes the avoidance of site barriers through the use of curb cuts, ramps, handrails, and grade-level entrances to avoid site barriers. Provide designated handicapped parking spaces in all major parking lots and drop-off zones for persons with mobility impairments. Modify existing structures for handicapped accessibility whenever possible, especially community facilities that are most likely to be used by families, veterans or visitors.

#### 7.3.2 Environmental

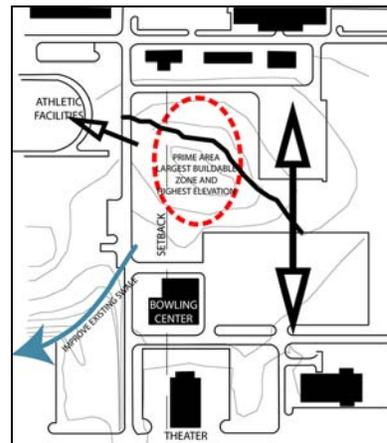
Environmental issues to consider in the preparation of a site plan include any action or proposal that has a detrimental affect on a site area’s land, water, or air quality. The location of facilities on land that results in minimal disturbance to the existing topography, vegetation, and drainage patterns greatly reduces the negative impact on the environment. It is the Garrison Commanders responsibility to ensure that all National Environmental Policy Act (NEPA) documentation is started before the site selection process, as this process feeds the 1391 process.

NEPA requires that an Environmental Impact Statement (EIS) be submitted to the U. S. Environmental Protection Agency (EPA) for major projects that may significantly effect the environment. The EPA reviews and responds to filed impact statements. Information pertaining to Environmental Impact Statements and their submission can be found at the following EPA websites.

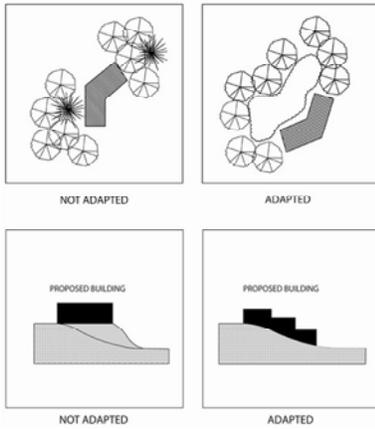
- [Environmental Impact Statement \(EIS\)](#)
- [Submitting Environmental Impact Statements \(EISs\)](#)

Federal law requires that prior to the undertaking of activities which effect the nation's waterways, described as "navigable waters of the United States" and "waters of the United States" to include wetlands, a permit must be acquired. Information regarding statutory, administrative, and judicial matters, including general regulatory policy, definitions of "waters of the United States" and "navigable waters", and processing of permits can be obtained at the following Corps of Engineers website:

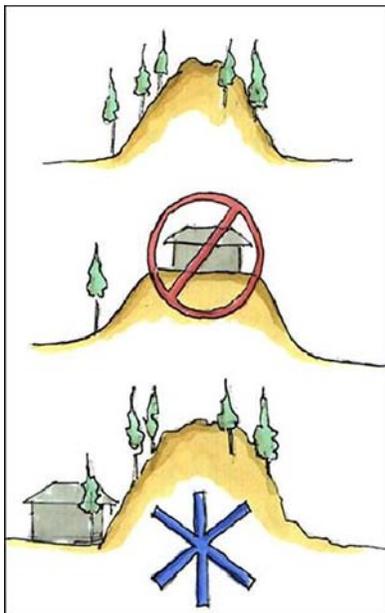
- [Statutory, Administrative, and Judicial Materials](#)



**Figure 7-2** Site Opportunity and Constraints Plan



**Figure 7-3** Accommodate Natural Conditions



**Figure 7-4** Develop Around Natural Landforms

Include procedures for mitigating environmental concerns in the early stages of project development. To the maximum extent possible avoid siting development or individual buildings in environmentally sensitive areas. The installation master plan environmental overlay should be reviewed prior to the development for areas designated as threatened and endangered species habitat areas.

## 7.4 SITE PLANNING DESIGN CRITERIA

The site planning component of installation design comes first in the design process and determines the general location of the other components. Consequently, site planning must consider the criteria for architectural design, circulation, landscape architecture, site elements, and force protection. Site planning criteria is divided into two categories, natural conditions and manmade conditions. Each is discussed separately in the following paragraphs. These criteria are to be utilized for the assessment of the visual and spatial impacts of site planning.

## 7.5 NATURAL CONDITIONS

### 7.5.1 Topography

Detroit Arsenal, in its present location, does not currently contain significant topographical change. In the event of expansion onto new sites, the natural terrain will be a major determinant of the layout and form of the installation. The following guidelines should be used to maintain the natural topography of the installation (Figure 7-3 and Figure 7-4).

- Maintain natural ground slopes and elevations whenever possible and practical.
- Align roadways and buildings along topographic lines.
- Locate facilities that have expansive ground coverage on relatively flat terrain.
- Use moderately sloping areas for buildings with less ground coverage area.
- Avoid development on steep slopes.
- Avoid development in natural drainage ways and flood plains.
- Provide a reasonable balance of cut and fill.

### 7.5.2 Hydrology

Currently, Detroit Arsenal is a completely urban site, containing no drainage corridors, floodplains, wetlands or waterways. However, in the case of expansion onto a new site, the site planning team will need to consider the following hydrologic concerns for natural drainage corridors, floodplains, and waterways during the site planning process.

Preserve and maintain natural drainage areas and floodplains.

Limit development in floodplains to open spaces and recreation uses.

Preserve rivers, lakes, streams, or other waterways, and incorporate them into the design layout.

### 7.5.3 Climate

The installation will be designed in response to local climatic conditions to provide a more comfortable environment, and reduce the demands for heating and cooling.

Design site development by maximizing the warming effect of solar radiation in winter and reducing the impact of cold winter winds (Figure 7-5).

### 7.5.4 Views and Vistas

The installation will be designed to preserve and enhance scenic and other attractive views and vistas, and to screen unattractive views and vistas. Visual extensions through open spaces provide a sense of orientation, relief, and enjoyment. Given the classified nature of Detroit Arsenal, and its urban location, the installation has a responsibility to aesthetically screen itself from surrounding neighborhoods.

### 7.5.5 Vegetation

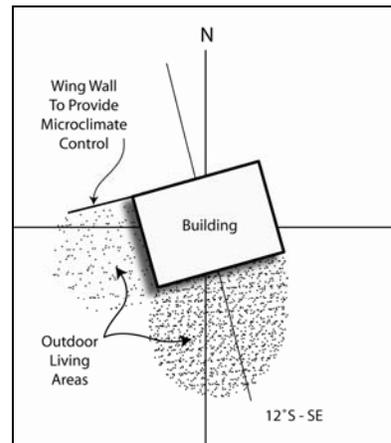
Future expansion of the installation will be designed to protect and preserve existing native vegetation to reasonable extents. This preservation reduces maintenance and enhances sustainability. A preferred plant matrix ([Appendix O, Plant Palette](#)) is included in this Army Installation Design Guide. (Also, see [Section 10 – Landscape Design Component](#)).

## 7.6 MANMADE SITE CONDITIONS

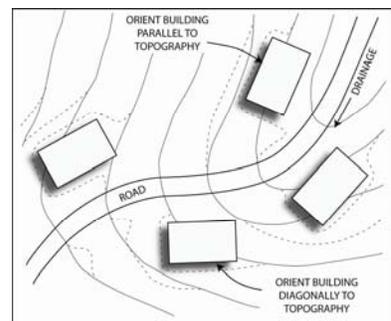
The site plan provides the locations of the manmade development that will occur on site. It establishes the spatial relationships as well as the relationships between manmade and existing natural features. Manmade site conditions include all development on the installation to include buildings, roadways, parking lots, walkways, walls, fences, utilities, and other facilities. Buildings, roadways, parking lots and above ground utilities are the primary manmade visual determinants.

The following site planning guidelines will be used in the visual and spatial review of the installation:

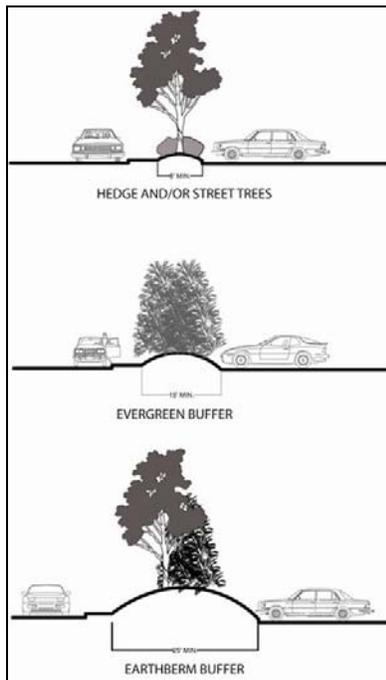
- Cluster buildings to reduce impact on the natural environment, and reduce roadways and utility corridors needed to serve the development, however, at the same time giving full consider to antiterrorism and force protection requirements.
- Locate large buildings in relatively flat areas to reduce the cut and fill and preserve the natural vegetation and drainage and orient to topography (Figure 7-6).
- Minimize solar heat gain for cooling and maximize solar heat gain and retention for heating.
- Site buildings with consideration for the microclimate conditions of the site that result in variances in wind or light because of adjacent land forms, structures, or trees.
- Orient outdoors pedestrian areas for most comfortable exposure and coordinate with ATFP measures.
- Utilize lighter colored building surfaces exposed to the sun and darker colors on recessed surfaces to absorb radiation.
- Orient windows according to impact of climatic conditions and in accordance with surveillance strategy.
- Locate development on leeward side of hills.
- Design and locate roads to provide a hierarchy of traffic carrying capacities.
- Locate roads to blend with topography and vegetation.



**Figure 7-5** Building Oriented for Passive Solar Heating and Cooling in Cool Regions



**Figure 7-6** Orient Buildings and Roads to Topography



**Figure 7-7** Screen Parking Areas

- Design and locate parking lots to minimize visual impact of broad expanses of pavement and vehicles but ensure surveillance is possible (Figure 7-7).
- Design and locate pedestrian walkways and bicycle paths to fit the physical environment, and provide a comfortable pedestrian experience, limiting conflicts with vehicular traffic.
- Locate trees and shrubs to buffer harsh natural conditions while providing alternate surveillance so that inappropriate activities do not take place in these buffered areas.
- Deciduous material provides for sun in the winter and shade in the summer. Evergreen material provides windbreaks for cold north winds.
- Design and locate site elements to blend with and enhance the physical environment.
- Force Protection requirements should be designed and located to blend with the physical environment.

## 7.7 ARMY STANDARDS

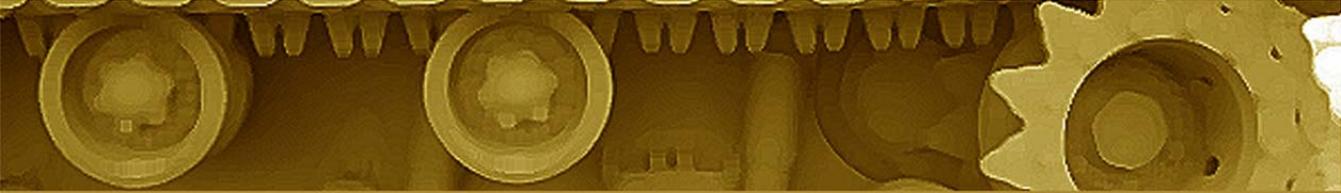
The cited Army Standards shall be met.

- Unified Facilities Criteria (UFC) 3-210-06FA, Design: Site Planning and Design
- Americans with Disabilities Act Accessibility Guidelines (ADAAG)
- Uniform Federal Accessibility Standards (UFAS)

## 7.8 REFERENCES

The following references are provided for guidance.

- Unified Facilities Criteria (UFC) 2-600-01, Installation Design, Chap 7
- Unified Facilities Criteria (UFC) 3-400-01, Design: Energy Conservation
- Unified Facilities Criteria (UFC) 3-210-01A Design: Area Planning, Site Planning, and Design,
- Unified Facilities Criteria (UFC) 3-230-15FA, Design: Subsurface Drainage Facilities for Airfields and Heliports
- Unified Facilities Criteria (UFC) 3-230-16FA, Design: Drainage and Erosion Control Structures for Airfields and Heliports
- Unified Facilities Criteria (UFC) 3-230-17FA , Design: Drainage for Areas Other than Airfields
- Unified Facilities Criteria (UFC) 3-230-18FA, Design: General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas
- Unified Facilities Criteria (UFC) 3-260-02, Design: Pavement Design for Airfields
- Unified Facilities Criteria (UFC) 3-250-01FA, Design: Pavement Design for Roads, Streets, Walks and Open Storage Areas
- Army Regulation (AR) 200-2, Environmental Effects of Army Actions
- Technical Instructions (TI) 800-01, Design Criteria
- Technical Instructions (TI) 801-02, Family Housing
- Master Planning Instructions (MPI)
- Whole Building Design



## Section 8 Building Design Standards

### 8.1 INTRODUCTION

The design character of an installation's buildings affect the installations overall image. The visual analysis of buildings and related structures helps define visual zones and themes and is an important part of an installation's assets and liabilities assessment.

The building design component encompasses the character of the buildings as well as the arrangement of buildings to one another and to their environment. In general, use architectural style, materials, and colors indigenous to the region. The preservation of historically and culturally significant structures adds to an installation's character and provides a sense of heritage.

The visual analysis of structure also includes concern for accessibility, use of materials, placement of entrances, incorporation of additions and renovations, the incorporation of plazas and courtyards, interior design and the appropriateness and quality of building maintenance.

This section provides the objectives and visual determinants that should be utilized to identify and assess the building design quality of the installation. This section also provides standards and guidance pertaining to the development and maintenance of the various interiors and exteriors of buildings on the installation. Not all sections are applicable to Detroit Arsenal, but are included for completeness.

### 8.2 BUILDING OBJECTIVES

#### 8.2.1 Sustainability

The architectural style of existing and future buildings should reflect and reinforce the sustainability of the installation. Sustainable design reduces construction and maintenance cost and conserves energy through proper construction and materials selection. See [Appendix D](#) for a more complete discussion on Sustainable Design.

##### Sustainable Sites

Minimize the impact of placing a building on a site, with emphasis on land use compatibility and biodiversity. Channel development to installation areas with existing infrastructure, rehabilitate damaged sites, and reduce impact from automobile use.

##### Water Efficiency

Minimize the use of potable water for landscape irrigation and within the building.

##### Energy and Atmosphere

Ensure that buildings work as intended. Establish energy efficiency and optimization for the base building and for systems and encourage use of renewable and distributed energy systems. Reduce ozone depletion and support early compliance with the Montreal Protocol.

### Materials and Resources

Reduce waste from construction and building occupants and redirect recyclable material back to the manufacturing process. Extend the life cycle of existing building stock, in part by extending the life cycle of targeted building materials. Increase use of building products with recycled building material and of locally manufactured building products. Reduce depletion of finite raw materials and encourage environmentally sensitive forest management.

### Indoor Environmental Quality

Promote indoor air quality (IAQ). Provide a connection between indoor spaces and the outdoor environment through the introduction of sunlight and views into the occupied areas of the building. Provide appropriate acoustic conditions for user privacy and comfort.

### Facility Delivery Process

Deliver a facility that optimizes tradeoffs among sustainability, first costs, life cycle costs and mission requirements. Assure that the delivery process insures efficient operation and maintenance of the facility.

### Current Mission

Ensure that the delivery process establishes efficient operation and maintenance of the facility. Provide a high quality, functional, healthy, and safe work environment to promote soldier and workforce productivity and retention.

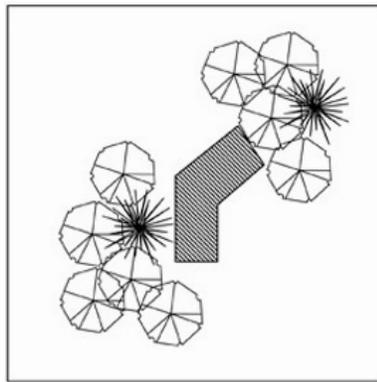
### Future Missions

Require the understanding of: (1) the typical or likely lifespan of the function to be accommodated by the facility in order to recognize how soon the facility should be expected to adapt to a different use; and (2) the life spans of the building systems to understand when they will need to be updated during the lifespan of the facility and to design the facility in a manner that facilitates the updating of each system. Require design of the facility to maximize accommodation of future uses. The greater the future flexibility, the less likely it is that the facility will become a source for waste materials, or that it will require additional materials.

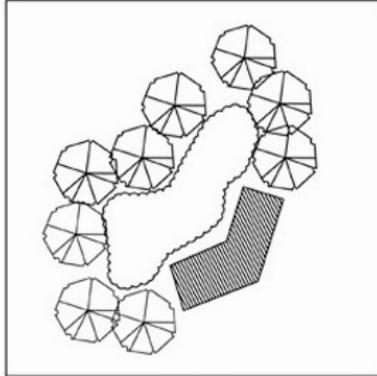
### **8.2.2 Building Design Objectives:**

The construction and location of new buildings and additions built onto existing buildings will be designed to strengthen the sustainability of the installation. Sustainable design can be used to reduce construction and/or maintenance costs, and to conserve energy requirements through proper construction and materials selection.

The following topics are good characteristics of sustainable design:



NOT ADAPTED



ADAPTED

**Figure 8-1** Site Adaptation**Figure 8-2** Emphasize Vertical Structures**Figure 8-3** Maximize Natural Light**Site Adaptation**

Adapt building designs and siting to natural site and environmental conditions, such as sloped topography, predominant wind direction, solar exposure, position on hillsides, etc (Figure 8-1).

**Land Preservation**

Design buildings in clusters to preserve land and reduce construction and maintenance costs.

**Coherent Architectural Styles**

Develop a coherent architectural style that results in the blending of new and old structures. However, when considering historical buildings one should be able to differentiate between the historic fabric and the new material.

**Emphasize Vertical Structures**

Design buildings to include more floors in a vertical structure that results in a smaller footprint and more efficiently utilizes limited installation land areas (Figure 8-2).

**Multi-activity Facilities**

Combine multiple activities in one building to reduce the number of buildings required and more efficiently utilize limited installation land areas.

**Multi-Use Facilities**

Design multiple use facilities with the capability to quickly change interior layouts to accommodate changing requirements.

**Indigenous Materials**

Use indigenous construction materials and practices that require less energy to produce and transport and may be recycled at the end of their usefulness.

**Window Location**

Locate windows to maximize natural light, ventilation and outward views (Figure 8-3). Use false windows to obscure sensitive areas.

**Building Re-use**

Consider adaptive reuse of buildings once their initial use is no longer required.

**8.2.3 Architectural Styles****Corporate Campus Visual Theme**

Detroit Arsenal will be under the Corporate Campus visual theme and will consist of three visual zones: Administrative, Research & Development & Industrial/Warehouse. The Corporate Campus visual theme is aimed at unifying the entire installation while allowing different functioning zones to have their own identity. The architectural style for new buildings on Detroit Arsenal should be designed to supplement the Corporate Campus theme.

- **Administrative Visual Zone**

Buildings 229, 230 & 231 are good examples of the kind of architectural style that help develop a corporate aesthetic in this zone. The multi-storied and detailed facades were considered modern for their day and their siting creates a strong presence along Eleven Mile Road. In order to unify the visual aesthetic of this zone, new buildings should be designed with an appropriate scale and use materials that relate to the existing buildings.

- **Research & Development Visual Zone**

The majority of the buildings in this zone are similar in size and detail. Their pedestrian scale and interior courtyards create a comfortable work environment. New construction in this zone should use quality materials that portray a high tech look and emphasize the research & development mentality.

- Industrial/Warehouse Visual Zone

The buildings in this zone should all have an industrial look. Metal roofing or metal siding on the majority of these buildings gives this zone a character that portrays their functional properties. Building 249 is a good example of what the architectural style of this zone should be and used as a reference for new building in this zone.

### 8.3 STRUCTURAL CHARACTER

The character of installation architecture varies according to the use of the structure and when it was built. This use and age variation can result in character incompatibilities.

The difference in character may also result when the designer ignores the character and scale of adjacent buildings or uses an imitative technique unsuccessfully.

The coordination of structural character on an installation provides a consistent and coherent “sense of order” and “sense of place”. This relationship of design comes from using compatible scales, massing, form, color, texture, materials, and fenestration. These design techniques can be utilized in the visual review and analysis of the installation. They are further explained below:

#### 8.3.1 Scale

Scale refers to the size of a building facade in relation to humans. Buildings that include predominant vertical facades, which dwarf the individual, are defined as monumental in scale. Buildings with more horizontal facades designed to relate more to the size of the human figure are defined as human scale (Figure 8-4). The scale of most buildings on installations should be more human than monumental. All new construction should be compatible in scale with adjacent buildings. Monumental architectural design is typically utilized for more ceremonial buildings, such as worship centers, headquarters complexes, and hotel facilities. These buildings make use of large, glazed areas at entrances and oversized fenestration elements to create a scale appropriate to the building’s use (Figure 8-4). Scale and relief should be provided through roof form, fenestration, building articulation and landscape plantings.

#### 8.3.2 Massing

Massing refers to the overall bulk or volume of a building or buildings (Figure 8-5). The size and proportion of the individual buildings in a grouping of buildings should be designed to be proportionally compatible with the adjacent structures.



**Figure 8-4** Human Scale Architecture



**Figure 8-5** Building Massing



**Figure 8-6** Positive Color Use in Architecture



**Figure 8-7** Fenestration



**Figure 8-8** Detroit Arsenal Building Entrance

### 8.3.3 Form

The form of a building is determined by its size, mass, shape and proportions. The use of similar building forms provides continuity to the installation architectural impact. The result is a more aesthetically pleasing environment.

### 8.3.4 Color

The use of a color scheme that is consistent throughout the installation, where possible, results in a continuity of buildings and contributes to a sense of place (Figure 8-6) However, color schemes throughout the installation often vary according to the visual zone and visual theme in which the structure is located.

### 8.3.5 Texture

The use of materials of similar texture in buildings helps to provide visual continuity for the installation

### 8.3.6 Materials

The use of the same materials in the exterior finish and trim of buildings helps provide visual continuity.

### 8.3.7 Fenestration

Building fenestration includes features such as doors, windows, and building decoration details. These features should be similar in arrangement, design, size, and proportion for architectural compatibility and visual consistency and continuity (Figure 8-7).

## 8.4 BUILDING ENTRANCES

A building entrance is a primary feature of any building design. The entrance should be defined and recognizable as the point of entry regardless of the size or importance of the building, but should not face adjacent uncontrolled roadways or parking areas to protect from blast and other direct attacks (Figure 8-8).

The details of an entrance should be designed to provide continuity with other entrances to the building and the entrances of adjacent buildings.

## 8.5 SERVICE AREAS

Service areas, such as loading docks and trash dumpsters, should be screened from the views of primary use areas such as entrances, courtyards, gathering areas, streets and parking lots. These spaces should be provided an alternate means of surveillance to deter and detect inappropriate activities.

Trash and garbage collection areas must be located a minimum of 25 meters (82 feet) from troop billeting, family housing areas (containing more than 12 units), and stand-alone retail facilities. They will be placed a minimum of 10 meters (33 feet) from all other inhabited structures ([UFC 4-010-01](#), Table B-1). The surround should be maintained secure. If the surrounding design is not secure then the dumpsters should be maintained secured so that inappropriate items cannot be easily placed within.

## 8.6 BUILDING ACCESSIBILITY

All structures or facilities, other than the exceptions mentioned below, must meet the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#) and the [Uniform Federal Accessibility Standards \(UFAS\)](#) accessibility standards. The more stringent standards apply in the event of conflicting guidelines.

- Any building or facility that is specifically restricted by occupancy classification to use only by able-bodied personnel during the expected useful life of the building or facility need not be accessible (military exclusion is provided by [UFAS 4.1.4 \[2\]](#)), but accessibility is recommended since the intended use of the facility may change with time.

In particular, the following facilities need not be designed to be accessible: unaccompanied personnel housing, closed messes, vehicle, and aircraft maintenance facilities.

## 8.7 SEISMIC POLICY

The minimum performance objective for Army facilities is Substantial Life-Safety. To ensure compliance, seismic evaluations and mitigation of unacceptable seismic risks shall be performed. Higher levels of seismic protection for mission essential facilities will be considered in the evaluation.

### 8.7.1 Seismic Evaluation

Guidance for the seismic evaluation of existing facilities is given in [TI 809-05, Seismic Design Evaluation and Rehabilitation for Buildings](#). Buildings will have a seismic evaluation performed when:

- A change in the building's use causes a change in the occupancy category, as defined in [TI 809-04, Seismic Design for Buildings](#), to a category of greater importance (lower category number).
- A project is planned which causes the capacity of the structural system or components to be reduced to 90 percent or less of original stability and strength.
- A project will significantly extend the facility's useful life or will significantly increase the facility's value and the cost exceeds 50 percent of the current replacement value.
- A facility is damaged or is deemed to be an exceptionally high risk to occupants or to the public.

### 8.7.2 Exceptions to Seismic Evaluations

Existing facilities are exempt from seismic evaluation if:

- The original design was done according to the provisions of the 1982 or later edition of [TM 5-809-10](#), or the 1988 or later edition of [TM 5-809-1](#).
- Replacement is scheduled within 5 years.
- The facility is intended only for minimal human occupancy, and occupied by persons for a total of less than 2 hours a day.
- The facility is a one or two family dwelling, two stories or less, located in zone 1 or 2, as shown in [TM 5-809-10](#).
- The gross area is less than 3000 square feet (275 square meters).  
Mitigation of unacceptable seismic risks. If the seismic evaluation determines that the facility does not meet Substantial Life-Safety or higher performance standards, as appropriate, unacceptable seismic risks will be mitigated. Rehabilitation will be performed in accordance with [TI 809-05](#).

### 8.7.3 New Facilities or Additions or Extension of Existing Facilities

New facilities and additions or extension of existing facilities will be designed to provide the level of seismic protection required by [TI 809-04](#).

## 8.8 INDIGENOUS STRUCTURES

Sustainability in the design and construction of buildings includes incorporating time-proven building designs that are indigenous to the region. Indigenous design elements should be utilized in the design of new buildings.

## 8.9 HISTORIC ARCHITECTURE

### 8.9.1 Maintain Integrity of Historic Buildings

The visual integrity of historic buildings or districts on the installation will be preserved and protected (Figure 8-9). The Army's management of historic properties is pursuant to the duties and responsibilities established by Congress under the National Historic Preservation Act (NHPA). The NHPA



Figure 8-9 Building 212

also created the National Register of Historic Places as the official listing of the nation's historic properties considered worthy of preservation. When working with historic properties the Army uses the following three categories:

### 8.9.2 Historic Buildings or Structures

These are significant buildings or structures, which are listed in or eligible for listing in the National Register of Historic Places.

Detroit Arsenal Historic Buildings:

- Building 212 is interpreted as of exceptional significance under the following National Register Criteria:
- Criteria A - as a unique representative of a specialty laboratory built for Army tank testing and is associated with the broad pattern of events focused upon both the Korean and Cold Wars.
- Criteria C – as an excellent early-career example of the work of Minoru Yamasaki.
- Criteria Consideration G – accommodates those properties not-yet 50 years old that have unusual merit through their design and/or historic significance. Building 212 is the only Cold War era, high-technology laboratory of its kind in the United States, and one of no more than three such laboratories in the world.

### 8.9.3 Historic District

A distinct group of buildings, structures, or landscapes that possesses significance and are listed in or eligible for listing in the National Register.

The APE Historical District (located to the northeast of the Arsenal is a historic district. All construction slated to occur in this area of the Arsenal must be evaluated and cleared by the Historic SHPO.

### 8.9.4 National Historic Landmarks

Buildings, structures, or landscapes listed in the National Register, but also recognized as nationally significant. National Historic Landmarks can either be listed individually or as a district.

For further guidance use [Army Regulation 200-4](#) and [Department of the Army Pamphlet 200-4](#). Specific requirements and recommendations for the treatment of historic properties are available in the National Park Service's [Secretary of the Interior's Standards for the Treatment of Historic Properties](#). A working awareness of historic preservation policies and procedures followed by the Army Corp of Engineers can be found in the [Technical Instruction \(TI\) 800-01, Design criteria, Chp. 16, Preservation of Historic Structures](#).

See [Appendix M, Historic Preservation Guidelines](#).

## 8.10 RENOVATIONS AND ADDITIONS

When existing buildings are renovated or additions are constructed, the architectural character of the renovation or addition should be compatible with the architectural character of the existing building and the adjacent buildings. This compatibility includes the use of materials, color, shape, size, scale, and massing in the addition or renovation that blends with the architectural character of the existing structure. However, when renovating or adding to historical buildings one should be able to differentiate between the historic fabric and the new material.

## 8.11 PLAZAS AND COURTYARDS

Plazas and courtyards can be located as part of the primary entrance to a building, or as an extension of non-primary entrance areas to the outside (Figure 8-10). Wide, paved entrance plazas need vehicular barriers.

## 8.12 BUILDING MAINTENANCE

Buildings designed and constructed to incorporate sustainable design criteria should minimize life cycle, energy and maintenance costs through proper selection of forms, materials, and construction details.

## 8.13 INTERIOR DESIGN

### 8.13.1 Introduction

Inhabited spaces, that require the selection of furnishings or equipment, should be designed by professional interior designers. Interior design impacts the functioning and productivity of people. People spend the majority of their time inside, working, eating, sleeping, and relaxing. The productivity, comfort, and safety of the personnel living, working, or relaxing in the facilities they inhabit is directly related to the quality of interior design provided within the facility.

### 8.13.2 Interior Design Guidance

Interior design is required on building construction and renovation projects regardless of the funding source. General interior design guidance and interior design guidance for medical facilities and family housing is provided at the following websites.

- General Guidance. [Design Guide \(DG\) 1110-3-122, Design Guide for Interiors.](#)
- Medical Facilities. Interior design guidance for medical facilities is furnished in [Unified Facilities Criteria \(UFC\) 4-510-01, Design: Medical Military Facilities.](#)
- Family Housing. Interior design for family housing will be in accordance with [Technical Instruction \(TI\) 801-02, Family Housing.](#)

### 8.13.3 Interior Design Requirements

[Engineering Regulation \(ER\) 1110-345-122, Engineering and Design, Interior Design,](#) defines projects that require interior design, design requirements and responsibilities of participants, and methods and funding for execution of interior design. For cost estimating see [Air Force Interior Design Guides, Chap. 3, Cost Estimating Guide.](#)

### 8.13.4 Space Planning

Space planning is the basic building block of the facilities program for administration and operational facilities. [Army Regulation \(AR\) 405-70, Utilization of Real Property \(Appendix D\)](#) provides numerical planning allowances and addresses the quantities for programming space for personnel and equipment.

Space planning takes into consideration the following: who will be using a space, how this space will be used, what activities will take place there, and the interaction of other people in the building. Professionally trained interior designers are best at gathering the required information to formulate a space utilization plan.

#### Bubble Diagrams

Bubble diagrams show the working relationship of one group to another. They do not represent a space plan or floor plan, but the relationship of organizations to one another. The adjacency requirements for individuals, user groups, and support functions to accomplish the product of service provided is

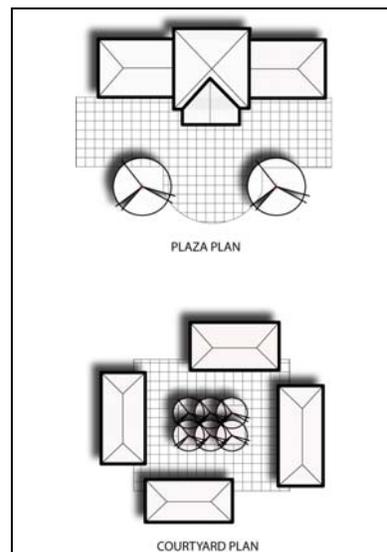


Figure 8-10 Plazas and Courtyards

analyzed. Bubble diagrams assist in organizing an existing facility as well as a new facility.

#### Blocking Diagram

An extension of the bubble diagram is the block diagram. The blocking diagram is made more regular and is for fit inside the proposed floor plan.

The next step in the process is the development of the actual space plan. The layout of the space plan is detailed to the workstation level.

### **8.13.5 Electrical and Communications**

#### Electrical

Electrical power supply in the United States is available in a number of configurations, the most common of which are 120/240 volt single-phase three wire, 120/208 volt 3-phase 4-wire, and 277/480 volt 3-phase 4 wire.

Design standards for interior electrical systems are found in [Unified Facilities Criteria \(UFC\) 3-520-01, Interior Electrical Systems](#). Compliance with this UFC is mandatory for the design of interior electrical systems. This UFC:

- Establishes criteria for the design of interior electrical systems.
- Establishes system-level design criteria.
- Establishes facility-level criteria for interior electrical systems,
- Provides a starting point for determining the applicable design criteria for a facility.

#### Communications

Communications systems handle the transport of telephone and data networks (e.g. video, multi-media, teleconferencing, data transfer, facsimile transmission, and voice conversation).

The design criteria for interior wiring of communications and information system is found in the Installation Information Infrastructure Architecture (I3A) Design and Implementation Guide. This guide shall be used as the basis for designing both the premises distribution system (inside plant) and the outside plant cable distribution system for all new construction and renovation projects. The Installation Information Infrastructure Architecture (I3A) Design and Implementation Guide is Appendix A of [U.S. Army Corps of Engineers engineering technical letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide](#).

See [Section 12.8](#) for Mass Notification Standards.

#### Distribution

Distribution of electrical and electronic systems through a building is generally accomplished through branched distribution. A central chase or trunk will run the length or height of the facility, then horizontal distribution systems run from a central connection closet to the end user. This distribution may be overhead or underfoot, in many instances it is a combination of the two.

### **8.13.6 Color**

Color plays an important role in the design of interior environments. Color has a large impact on how we feel and behave in a space. Its quality affects emotions directly and immediately. Successful interior designs harmonize form, space, light, and color.

Information on color and light, optical effects, basic color theory, color schemes, and applying color in facilities can be found in Corps of Engineers, [Design Guide \(DG\) 1110-3-122, Design Guide for Interiors](#), Chap. 3, Light and Color and in the Air Force Interior Design Guides, Chap. 9, Color Principles, [Part 1](#) and [Part 2](#).

### 8.13.7 Acoustics

Acoustics as an environmental variable significantly impacts the human impression of an interior environment. Productivity, speech intelligibility, privacy, safety, positive user attitude and response, and environmental comfort all depend on proper acoustic design. The interior designer is concerned with reducing unwanted noise and preserving desirable sound in a space. Sound can be controlled in the following three ways: eliminate the source, isolate the source, i.e. provide a barrier between the user and the source or mask the offending sound.

A discussion of the dynamics and control of acoustics can be found in the [Design Guide \(DG\) 1110-3-122, Design Guide for Interiors](#), Chap. 5.

### 8.13.8 Interior Lighting

Lighting will be designed with the work activities being performed in mind. Always supplement overhead lighting with task lighting and use architectural lighting in entrances, corridors, waiting rooms, and other spaces to light artwork and provide interest.

For Army installation buildings to achieve a high quality lighting environment, lighting equipment/systems selected must satisfy both performance and aesthetics (Figure 8-11). Factors for consideration in this selection are based on the following: lumens per watt, color temperature, color rendering index, life and lumen maintenance, availability, switching, dimming capability, and cost.

Lighting design approaches and lighting applications can be found in the following publications:

- [Technical Instructions \(TI\) 811-16, Lighting Design; Design Guide for Interiors, DG 1110-3-122 Chp. 5](#)
- [Air Force Interior Design Guides, Chp. 10](#)
- [Unified Facilities Criteria \(UFC\) 3-520-01, Interior Electrical Systems, Appendix F.](#)

Lighting Maintenance, Types, and Problem Solving. Information on lighting maintenance, types, and lamp trouble-shooting is found in [TM 5-683, Electrical Interior Facilities](#), Chp. 9.

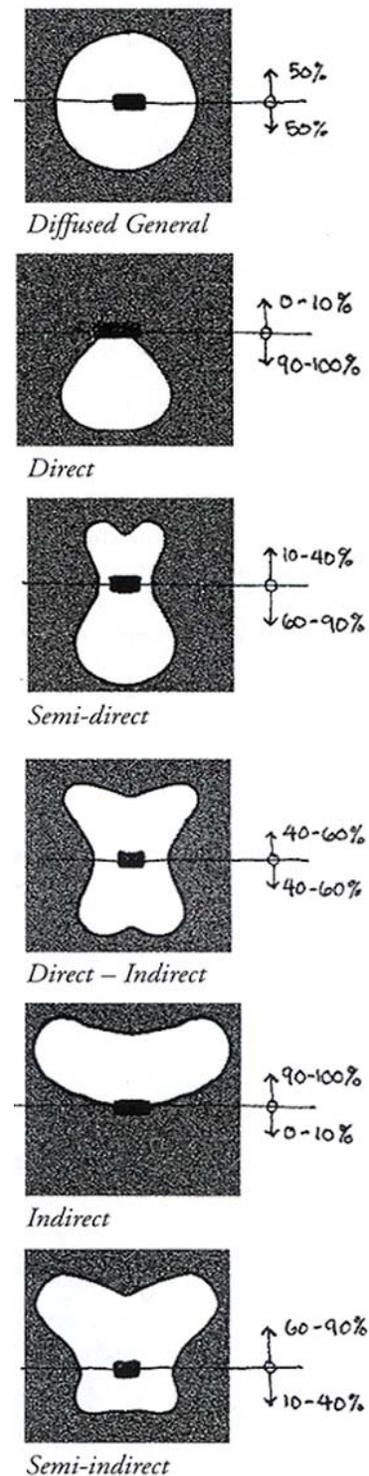
### 8.13.9 Finishes

Interior finish standardization is important for administrative and financial reasons. Standardization presents a unifying element throughout all buildings that is more cost effective, efficient, and easy to maintain.

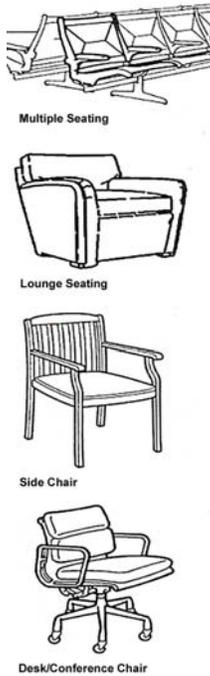
### 8.13.10 Installation Finishes Standards

Installation finishes standards are found in Appendix I, Interior Finishes Standards of this guide.

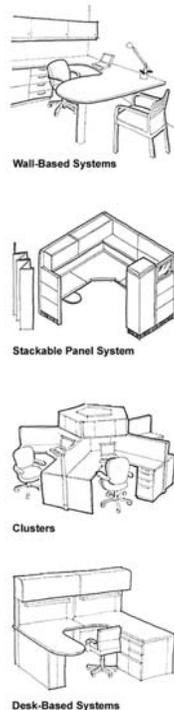
Note: Interior finishes include flooring (carpet, tile, resilient flooring, recessed walk off mats, concrete), walls (wall base, paint, vinyl wall covering, and ceramic tile), counter and surface material (restrooms, cabinetry), doors, ceilings, and lighting. Include pictures where possible and cross-reference materials to a "Finish Materials Listing for Products Specifications".



**Figure 8-11** Typical Distributions of Light



**Figure 8-12** Contract Seating, Various Chair Classes



**Figure 8-13** Systems Furniture

### 8.13.11 Furnishings

Furnishings are elements added to a building for utility or ornamentation following construction. These include furniture such as chairs (Figure 8-12), desks, sofas, and tables and also cabinetry, window treatments, signage, accessories, art, and plants. When selecting furnishings for an interior environment, care should be taken to include their design as an integral part of the overall concept and to ensure coherency between architecture, materials, furniture, art, and signage. The following paragraphs discuss the various furnishings components and give guidance on the programming, acquisition, functionality, and maintenance of the various components.

#### Furniture

Furniture systems are a wide range of furniture types comprised of components to create a custom designed work environment to meet specific functional needs. Furniture includes seating and case goods. Case goods are furniture elements constructed from box-like components. These include desks credenzas, file cabinets, etc. Case goods fall under two major categories: conventional and modular. Conventional case goods are delivered as pre-assembled, ready-to-use products. Modular case goods are manufactured as separate pieces that may be grouped into a number of different arrangements.

#### Systems Furniture

Systems furniture (Figure 8-13) is ergonomically designed to meet a variety of conditions and requirements. Careful planning is critical during the initial stages of designing new systems furniture layouts. Power and communications requirements must be determined and planned so they are available at the locations where they are needed. Provisions for furniture systems electrical and data requirements must be made a part of the construction documents. See paragraphs 8.13.5 for interior design standards for electrical and communications wiring respectively. Surface mounted conduit and power poles are unsightly and should be avoided.

For a detailed discussion on the Army Interior Design Process (planning and programming, procurement, and design services) and Planning for Administrative Work Environments (data collection, analysis, space planning, layout, design coordination, documentation, and implementation) see Appendix A and Appendix B of [Design Guide for Interiors, DG I10-3-122](#) respectively.

**Budgeting for Furniture Systems.** Furniture systems represent a significant percentage of a project. Furniture systems are O&M funded and should be included in the project scope along with such items as built-in casework. Furniture systems are listed on the DD Form 1391 as a non-add entry in Block 9 for "Equipment Provided for Other Appropriations". In Block 12b, the furniture systems should be as an O&M funded item, the fiscal year the funds are requested, and the line item cost. Accessories can amount for a significant portion of the furniture systems package and should be budgeted with the basic system components.

- **Systems Furniture Design Guidelines.**

- **General**

During the initial planning of new systems furniture, consider the condition and appearance of existing paint, wall coverings, carpet, and base of the area.

When planning the location of office equipment and break areas, do not place heat generating devices, such as coffee makers or copiers, near a thermostat.

Circulation paths should be clear and easy to navigate.

Topics that should be considered when designing new systems furniture layouts include:

- Function of the office
- Adjacencies of personnel and activities
- Meeting and conference room requirements
- Individual storage needs
- Areas for common use office equipment such as the copier and fax
- Reception area with waiting and guest seating space
- Special furniture or needs of a particular office, such as drafting tables or extra storage space
- Communications equipment
- Task lighting, daylight, and ambient lighting
- Special security requirements
- Budget constraints
- Flexibility to allow future changes
- Schedules of design, delivery, and installation
- Air conditioning
- Acoustic performance requirements
- Panels

Full height panels should be used only in areas with a specific need for increased privacy or separation, such as conference rooms, break areas, and certain private offices.

Provide glass panels in corners and at windows to open up the space and allow natural light to filter into the center of the space. Also, place glass panels to view room entrances for an added access control component.

Provide access panels in the systems furniture to allow for communications connection.

Panels should generally not exceed 66 inches in height in an open office area. Taller panels cut off air circulation, block views and natural light, and create a closed-in feeling.

The location and use of taller panels must be carefully planned and coordinated because they can interfere with the proper functioning of air conditioning diffusers, fire sprinklers and smoke detectors, lighting fixtures, switches, thermostats, and sensors.

Panels should not block service access to mechanical, electrical, or telephone equipment.

Do not install panels in front of windows, as they will block natural light for the entire area. Panels installed perpendicular to windows should be installed at a window mullion.

- Color and Texture.

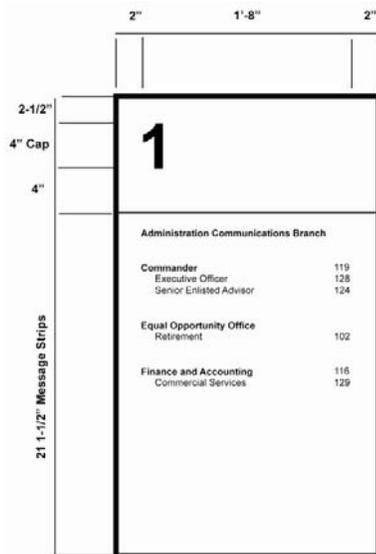
To maintain a professional atmosphere, the style and types of systems furniture should be consistent throughout the area.

The materials and colors of the panels and chairs should be durable. They should be heavy-duty and stain resistant.

The fabric on the systems furniture panels should harmonize with the overall building color scheme.

- Window Treatments.

Window treatments serve many purposes in an interior environment. They provide privacy, light and sun control, reduced energy consumption, and decreased sound transmission. The type of treatment, as well as the



**Figure 8-14** Directional Signage Directs Circulation

type of material used, will determine the effective of the treatment in and give instance. The following should be taken into consideration when selecting fabric type:

- Sheer or semi-sheer fabrics will provide minimum privacy, shade, and energy conservation.
- Heavy, opaque fabric and hard treatments should be used only where total light exclusion is required.
- Full, soft treatments will absorb more sound than hard treatments.

Window treatments should complement and support the interior design of a space. Window treatments also conceal architectural defects, or change the apparent size, shape, and character of a room. Consider the following factors when making a window treatment selection:

- Light control requirements
  - Architectural style
  - Historical context
  - Desired level of surveillance
- Signage
 

Signage may be informational, directional, or regulatory. Informational signage provides the user with information and includes room or area labels, bulletin boards, menus, artwork descriptions, and emergency information. Directional signage directs circulation and provides orientation. It includes entry directories, directional arrows, and maps. The purpose of regulatory signage is control: providing prohibitions, warnings, emergency instructions, and use restrictions (Figure 8-14).

Interior signage is covered in detail in [Technical Manual \(TM\) 5-807-10, Signage](#). The manual includes graphics for the following: directional, identification signs, information, and pictograms.

- Accessories
 

Accessories may be either functional or decorative. Whatever the purpose, accessories serve to make a room appear inviting and personal.

**Functional Accessories.** These accessories include letter trays, coat racks, lamps, product displays, magazine racks, brochure racks, and message boards. This group of accessories should be selected for utilitarian aspects as well as aesthetic qualities that may contribute to the total design concept. Repetitive elements can act as unifiers and help tie the accessories to the design theme.

**Decorative Accessories.** Decorative accessories are objects such as artwork and plants.
- Art
 

The preparation of artwork to be displayed and positioned in an interior space involves many important decisions. The designer must work closely with the user to determine placements that are satisfactory for both functional and visual composition. Some of the factors to be taken into consideration in the selection of are:

  - Quality (posters, prints, original art),
  - Subject matter,
  - Medium (photography, paper, oil, etc.),
  - Size,
  - Placement,
  - Method of display (permanent collection or rotating program),
  - Lighting, and
  - Integration with design scheme.

- Plants

Plants add color, texture, and variety of form and shape to the interior. They bring a natural element to an interior space. They are used for focal points, screen, and for psychological effect. Increasingly, plants are being incorporated into the interior environment for the health and well-being of the user, as well as enrichment of the space.

When selecting plants, their light, water, and temperature needs, continuing care requirements, and ease of replacement must all be considered. Also, the types and amount of light the space has (direct or indirect) daylight, fluorescent, or incandescent must be considered. Plants should not be positioned such that their location presents a problem when watering.

Detailed information on interior planting to include design considerations (light requirements, temperature, atmosphere considerations, and planters), plant maintenance, and a listing of recommended plants can be found at the following web locations (Air Force Interior Design Guides, Chapter 8):

- Design Considerations
- Maintenance
- Recommended Plant List

#### **8.13.12 Unified Facilities Guide Specifications**

See the "Division 12 - Furnishings" section on the [Construction Criteria Base](#) website for Unified Facilities Guide Specifications for furnishings.

#### **8.13.13 Installation Furnishings Standards**

Installation furnishings standards are not standardized at Detroit Arsenal.

#### **8.13.14 Interior Operations Policies.**

To preserve the quality of facilities, operations policy is set between the user and the installation management. The user is responsible for preserving the visual appearance of the facility, and installation management is responsible for providing maintenance needed to preserve facility quality. Interior operations policies address the following issues:

- Housekeeping responsibilities.
- Policy to prevent and eliminate visual clutter.
- Carpet cleaning, repair, and replacement policy.
- Height restrictions for partitions and furniture.
- Policy on buildings modifications including: partitions, painting, window treatment, HVAC, lighting, and the installation of communications and electric wiring.
- Maintenance of directories and signage.
- Smoking and eating locations.
- Procurement information on matching or compatible furniture.
- Policy on personalization and plants.

#### **8.13.15 Interior Appearance Policy**

- Keep work areas cleared of clutter. Cleanup, throw away.
- Avoid hanging things in the work area. Find another way to refer to organization charts, personnel listings, and calendars, other than having them hung on walls or partitions except framed artwork, diplomas, awards, etc.
- Notes and references hung on partition walls should be kept below the height of the partitions. Some things may be mounted on the partitions by

hooking into the metal supports between the partitions, but not by hooking into the fabric.

- Anything not contributing to the overall décor of the work area should be put in a drawer or on a shelf behind a closed door.
- Do not overwhelm the work area décor with an excess of plants or personal artifacts. Personal artifacts can communicate personal information that can be used by criminals to harm the occupant either directly (hitting them with it) or indirectly (theft of the item, identity theft, etc.)
- Thin out your files.
- Keep walkways into work areas open and free of clutter. Do not store things on the floor, or on top of shelves, or partitions.
- Office chiefs should consider the overall office appearance and visual contrasts between work areas.
- Be sure that anything you do in your work area contributes to color coordination, rather than detracts from it.
- Keep vacant workstations and common areas clean. Do not use them as a dumping area for things you do not know what to do with.
- Telephone booths should be incorporated into building architecture, to be installed in “recessed” areas, equipped with appropriate lighting and utilizing standard, wall-mounted phone enclosures.

#### **8.13.16 Room Numbering**

Assignment of room numbers at Detroit Arsenal shall comply with the following principles:

- Room numbers must follow a logical progression within a specific building
- Room numbers must be unique within the building
- The room numbering system shall contain a code which tells the first responders, Fire Department and Security Police, the character of the occupancy.

For a detailed description of the Room Numbering process at Detroit Arsenal, refer to [Appendix R](#).

### **8.14 EXTERIOR BUILDING MATERIALS AND COLOR**

#### **8.14.1 Exterior Building Materials**

Building materials make a major contribution to the scale, color, texture, and character of a military installation. A limited palette of durable, low maintenance materials should be used that, while encouraging a variety of expression, provides a cohesive and consistent architectural character through the installation and within each visual zone. Material should reflect the function of a building, and its hierarchy within the installation.

Use the following guidelines when selecting exterior building materials.

- Choose materials for their longevity and maintenance characteristics.
- Use materials with integral colors - avoid painting exterior colors.
- Use installation standard colors for exterior walls. Add accent colors sparingly. Accent colors can be used in recesses and to accent certain portions of a buildings façade.
- Use pre-finished material where possible - gutters, window frames, doorframes, etc.
- Use blended colors on pitched roofs.

[Appendix K, Exterior Materials Charts](#) list the building materials applicable to the visual zones listed in the following paragraphs:

#### **8.14.2 Exterior Building Color**

Color charts have been developed for specific geographical areas giving consideration to climate, geography, culture, facility function, historical context,

architectural character, etc. Color changes will be implemented during normally scheduled paint cycles (see Appendix L, Exterior Color Charts).

Color is closely linked to the appropriate selection of exterior building materials and is a critical design element in relating adjacent buildings and creating a compatible visual environment within an installation.

#### Historic Buildings

Repaint the building or structure to match the existing colors or colors that can be documented to have been used on that building.

## 8.15 KEY FACILITY TYPES STANDARDIZATION

### 8.15.1 Key Facility Types Standards

The Assistant Chief of Staff for Installation Management (ACSIM) establishes Army facility standards and approves deviations from the standards.

### 8.15.2 Residential Communities Initiative

The intent of the Residential Communities Initiative (RCI) is to improve the housing for military families by providing quality housing that is built in attractive neighborhoods.

The Military Housing Privatization Initiative (MHPI) legislation allows developers to build housing to local standards. In those areas where local standards do not meet the quality of life requirements of soldiers, the Community Development and Management Plan (CDMP) process allows a negotiated determination of those standards. To ensure a uniform level of quality throughout RCI, Headquarters, Department of the Army has developed a "[Quality Standards for New and Replacement Residential Communities Initiative \(RCI\) Family Housing](#)" to be used as reference points during CDMP preparation.

All RCI projects planned or under design will meet the "Gold" SPiRiT rating (as of 18 March 2003). See [Assistant Secretary of the Army Memorandum Subject: Sustainable Design and Development Requirements, dated 18 March 2003](#).

### 8.15.3 Department of the Army (DA), Facilities Standardization Program

Under the DA Facilities Standardization program, standard design packages are developed for facility types that are repetitively designed and constructed at Army installations. These design packages are developed to the definitive design level (10%-15%) and once approved are mandatory for Army MILCON.

Currently, there are thirty one (31) DA standard design packages. Headquarters, U.S. Army Corps of Engineers has established eight (8) Centers of Standardization to develop and maintain the definitive and design packages. See [Appendix P, DA Facilities Standardization Program Centers of Standardization](#) for a list of the various centers and the facility type assigned to each center. ([Centers of Standardization homepage](#).)

Army Chapel Design Standards are complete and approved. See The Army Standard for Chapel Construction – January 2004 and Memorandum for Record, subject: [The Army Standards for Chapels](#), dated 21 January 2004.

### 8.15.4 Unaccompanied Personnel Housing (Army Barracks Modernization Program)

The Army's Barracks Modernization Program is based upon a whole community approach providing modernized private living and sleeping areas for soldiers as well as a more functional work environment. This is being realized with the construction and renovation of barracks, and associated Company Operations Facilities (COF), Battalion Headquarters (BN HQ) and Brigade

Headquarters BDE HQ), and Dining Facilities (DEFAC). For a detailed discussion of the Army Barracks Modernization Program see the [Army Barracks Master Plan](#). The Army Barracks Master Plan only includes requirements for activity duty permanent party soldiers' barracks.

#### Army Barracks Standards

The Army Barracks Modernization Program design criteria gives commanders and contractors the direction to incorporate best business practices around a modular floor plan. The [Army Barracks Master Plan, Appendix I, Army Barracks Standards](#), promotes barracks with an appropriate balance between private and common areas. The Vice Chief of Staff of the Army (VCSA) specified the “New Army Barracks Construction Criteria” in his [Memorandum Subject: New Barracks Construction Criteria, dated 11 July 2002](#) in which he strongly endorsed the new standards. The criteria was further revised in [Memorandum Subject: Revised Barracks Construction Criteria](#), dated 1 May 2003 which makes the following four changes to the Army Barracks Standards:

- Establishes the two-bedroom/one bath module as the standard module;
- Requires installation of a stove or cook top;
- Requires laundries in the barracks; and
- Eliminates the separate soldier community building.

See the above memorandum for detailed guidance.

#### Furnishings.

Acquisition of new furnishings is planned and accomplished in concert with the facility design and construction schedule so that delivery of the new furnishings coincides with the beneficial occupancy date (BOD).

The U.S. Army Interior Design Manual (IDM) for Single Soldiers provides guidance to help furniture managers prepare order packages. The manual uses standard Army furniture specifications; i.e. medium oak wood furnishings or acceptable wood/steel alternatives; construction and fabric specification, and specific information for authorized items of furniture. The manual also contains standard living/sleeping room arrangements, and SCB plans with color schemes. The manual includes information on waiver requirements, the procurement process, order forms, and final inspection checklist.

Construction design criteria for COFs, BBN HQ buildings, BDE buildings, and DEFAC facilities can be viewed on the web at [ProjNet](#).

#### **8.15.5 Army Lodging**

The Army Lodging Standards promote economies in serving the Army traveler, but not at the expense of quality or service. The standards define the facilities and the level of service the Army traveler should expect.

The following standards provide the level of service that a guest should expect when they travel to an Army installation. That expected level of service should be consistent from installation to installation. The following documents provide the service, operations, and facilities standards for Army Lodging.

- [Army Lodging Standards for Service](#)
- [Army Lodging Standards for Operations](#)
- [Army Lodging Standards for Facilities](#)

#### **8.15.6 Morale, Welfare, and Recreation (MWR) Branded Theme Operations**

The U.S. Army Community and Family Support Center (CFSC) through its Theme Operations, offers comprehensive theme packages pertaining to restaurants and entertainment centers. The packages are customized to the installation.

CFSC will conduct an assessment for market viability, provide architectural designs, and other promotional items. Information on the CFSC Branded Theme Operations to include how to get a theme operation, management support, and food service support is located on the CFSC website at the [Army Brand Theme Operations Home Page](#).

#### **8.15.7 Range Standards**

The Army Sustainable Range Program (SRP), proponent is HQDA Office Deputy Chief of Staff Operations, ODCSOPS/G3 (DAMO-TRS), phone number (703) 692-6410. To contact SRP technical support call (256) 895-1535 or e-mail [RTPL@HND01.usace.army.mil](mailto:RTPL@HND01.usace.army.mil).

The SRP develops and manages standard designs for Army Ranges in accordance with AR 210-21 and Training Circular 25-8 Army Training Ranges. The Range Standards are available on the following web pages.

Design Manual for Remoted Target Systems (RETS) Ranges, [CEHCN 1110-1-23 Manual](#).

[Revised Range Design/Construction Interface Standards](#).

Unexploded Ordinance Considerations in the Planning, Design, and Construction of Ranges, [Supplement to CEHNC 1110-1-23 Manual](#).

### **8.16 PHYSICAL SECURITY REQUIREMENTS**

To assure the required physical measures are met the installation Provost Marshall or Physical Security Officer will be coordinated with during the planning, design, and construction of all construction projects. ([AR 190-13, The Army Physical Security Program, Para 1-26](#)) See [Section 12, Force Protection](#) for a more detailed discussion regarding Antiterrorism measures.

### **8.17 SALE AND OUTLEASE OF ARMY ASSETS**

In an effort to offset some of the impacts of constrained resources, the Army has implemented initiatives that improve cost effectiveness and efficiency of installation operations. To the extent permitted by law, funds that become available as a result of these initiatives are retained by, or returned to, garrison commanders.

The Office of the Assistant Secretary of the Army for Financial Management and Comptroller (OASA (FM&C)) has developed the "[Sales and Outlease of Army Assets - Installation Guide](#)" to assist garrison commanders in using the sales and outlease program. The guide provides an overview of major policies, procedures, and responsibilities pertaining to the following three major initiatives of the program:

Sale of Real Property;

Outlease of Real Property; and

Outlease of Personal Property.

The guide provides hyperlinks to Sale and Outlease governing regulations and legal and informational references.

## 8.18 ARMY STANDARDS

The cited Army Standards shall be met.

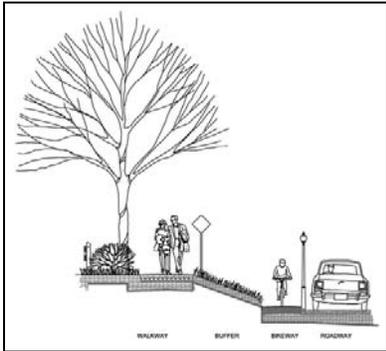
- [Army Regulation \(AR\) 420-70, Buildings and Structures](#)
- [Unified Facilities Criteria \(UFC\) 3-520-01, Interior Electrical Systems](#)
- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)
- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Secretary of the Interior's Standards for the Treatment of Historic Properties](#)
- [U.S. Army Corps of Engineers Engineering Technical Letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide](#)
- [Standards of Seismic Safety for Existing Federally Owned and Leased Buildings](#)
- [Army Barracks Master Plan, Appendix I, Army Barracks Standards](#)
- [Memorandum Subject: Revised Barracks Construction Criteria, dated 1 May 2003](#)
- [Quality Standards for New and Replacement Residential Communities Initiative \(RCI\) Family Housing](#)
- [Army Lodging Standards](#)
- [Design Manual for Remoted Target Systems \(RETS\) Ranges, CEHCN 1110-1-23 Manual](#)
- [Unexploded Ordinance Considerations in the Planning, Design, and Construction of Ranges, Supplement to CEHNC 1110-1-23 Manual](#)
- [Revised Range Design/Construction Interface Standards](#)

## 8.19 REFERENCES

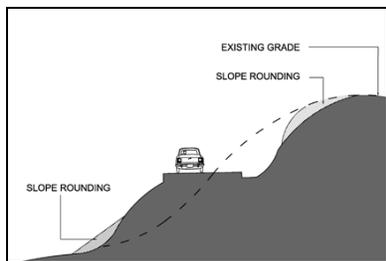
The following references are provide for guidance.

- [Army Regulation \(AR\) 190-13, The Army Physical Security Program](#)
- [Army Regulation \(AR\) 200-1, Environmental Protection and Enhancement](#)
- [Army Regulation \(AR\) 200-2, Environmental Effects of Army Actions](#)
- [Army Regulation \(AR\) 200-4, Cultural Resources Management](#)
- [Army Regulation \(AR\) 405-45, Real Property Inventory Management](#)
- [Army Regulation \(AR\) 405-70, Utilization of Real Property](#)
- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 8](#)
- [Unified Facilities Criteria \(UFC\) 1-200-01, Design: General Building Requirements, 31 July 2002](#)
- [Unified Facilities Criteria \(UFC\) 4-510-01, Design: Medical Military Facilities](#)
- [Unified Facilities Criteria \(UFC\) 3-400-01, Design: Energy Conservation](#)
- [Engineering Regulation \(ER\) 1110-345-122, Engineering and Design, Interior Design](#)
- [Department of the Army Pamphlet \(DA PAM\) 200-4, Cultural Resources Management](#)
- [U.S. Army Corps of Engineers, Design Guide \(DG\) 1110-3-122, Design Guide for Interiors](#)
- [Department of Defense \(DoD\) Interior Design Website](#)
- [Technical Instructions \(TI\) 800-01, Design Criteria](#)
- [Technical Instructions \(TI\) 809-04, Seismic Design for Buildings](#)
- [Technical Instructions \(TI\) 809-05, Seismic Design Evaluation and Rehabilitation for Buildings](#)
- [Technical Instructions \(TI\) 811-16, Lighting Design](#)
- [Technical Manual \(TM\) 5-683, Electrical Interior Facilities](#)
- [Technical Manual \(TM\) 5-688, Foreign Voltage and Frequencies Guide](#)
- [Technical Manual \(TM\) 5-809-10/Navy NAVFAC P-355/Air Force AFM 88-3, Chap 13, Seismic Design for Buildings](#)
- [Technical Manual \(TM\) 5-809-10-2/Navy NAVFAC P-355.2/Air Force AFM 88-3, Chap 13, Sec B, Seismic Design Guidelines for Upgrading Existing Buildings](#)
- [Army Barracks Master Plan](#)
- [Air Force Sustainable Facilities Guide](#)
- [Air Force Interior Design Guides](#)
- [Office of the Assistant Secretary of the Army for Financial Management and Comptroller \(OASA \(FM&C\)\) Sales and Outlease of Army Assets - Installation Guide](#)
- [Assistant Chief of Staff for Installation Management, Sustainable Design and Development Website](#)
- [U.S Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory \(CERL\), Sustainable Design and Development Website](#)
- [U.S. Army Corps of Engineers Engineering Technical Letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide](#)
- [Whole Building Design Guide](#)
- [Unified Facilities Guide Specifications \(UFGS\), "Division 12 - Furnishings", Construction Criteria Base](#)
- [Engineering and Construction Bulletins](#)

## Section 9 Circulation Design Standards



**Figure 9-1** Vehicular/Pedestrian System



**Figure 9-2** Adapt Circulation to Topography

### 9.1 INTRODUCTION

The image of the installation is greatly determined by the design and location of roadways, walkways, entrances, and parking lots. The primary roadway system and parking lots utilize considerable amounts of land and are a visually dominant element of any installation. The location of primary circulation elements is presented in [Section 7, Site Planning](#). This section discusses the details of circulation design and impacts.

The circulation system provides a primary vantage point from which all installations are viewed. Safe and efficient vehicular movement results in better orientation and contributes to the development of a positive environment for installation personnel and visitors. The circulation component is used to assess the circulation elements of the installation and identify specific characteristics that provide visual zone and theme identity.

Roadways, pedestrian walkways, and bicycle trails will be designed to provide a hierarchy of circulation design and carrying capacity. Functionally, a hierarchical network can be created that separates incompatible types of traffic. This separation of traffic promotes sustainability because it results in more efficient energy consumption.

Visually, the circulation hierarchy can be reinforced through design, planting, signage, and lighting to promote a more attractive visual experience and promote a sense of orientation.

### 9.2 CIRCULATION OBJECTIVES

The goal for the circulation system on the installation is to establish a sustainable system that promotes aesthetic appeal, environmental preservation, and energy conservation while providing safe and efficient circulation. The objectives below should be followed to achieve a sustainable circulation system:

- Provide circulation that meets antiterrorism and security requirements and promotes and enhances public health and safety.
- Provide a system of circulation that includes all forms of vehicular and pedestrian circulation (Figure 9-1).
- Provide a system that includes hierarchies of vehicular and pedestrian traffic flow.
- Adapt the circulation system to the natural conditions of the site (Figure 9-2).
- Improve the existing circulation network for expansion, safety, way finding and appearance.
- Promote maintenance and repair of existing and proposed circulation systems.

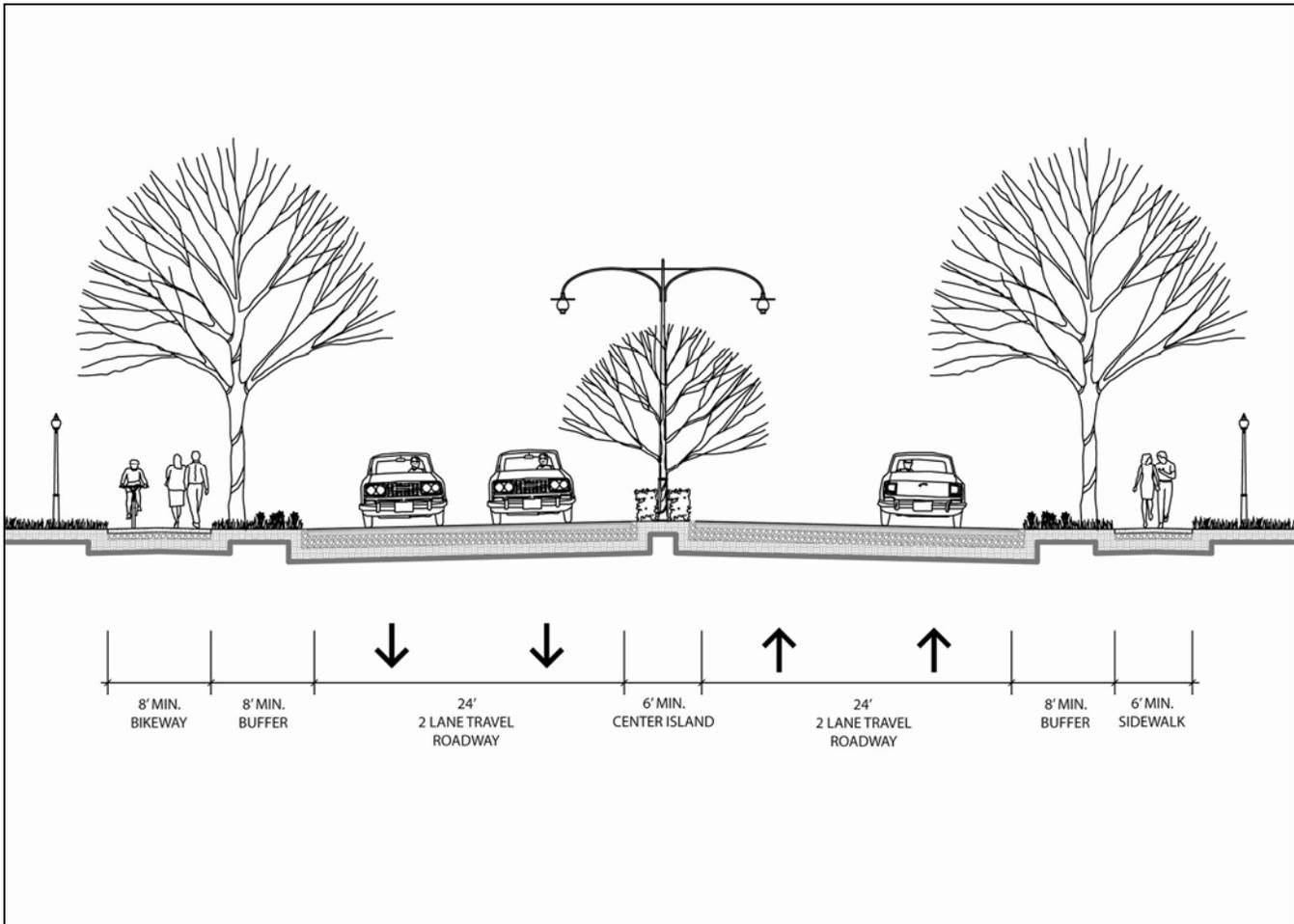


Figure 9-3 Boulevard

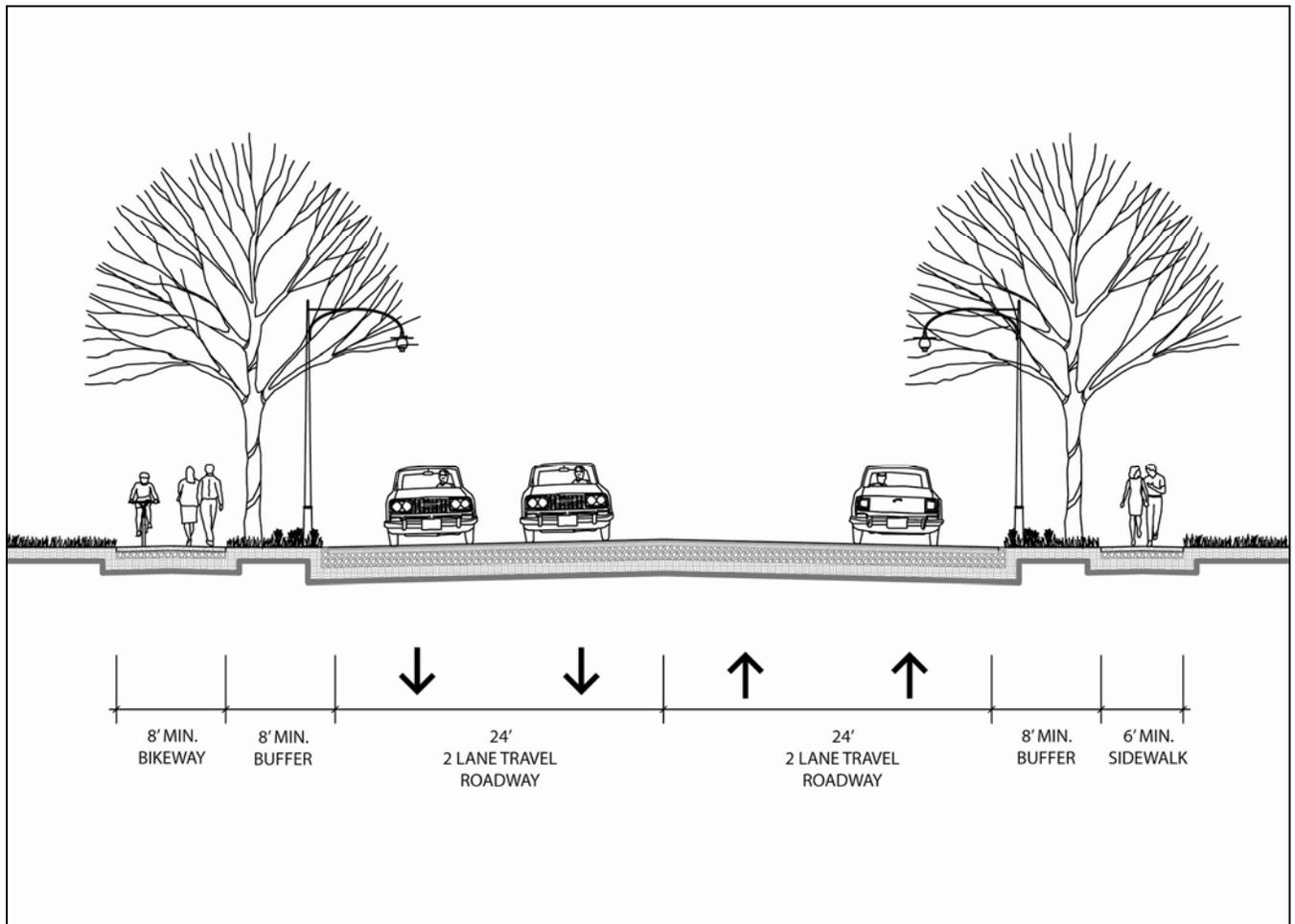
### 9.3 ROADWAY HIERARCHY

The roadway network of the installation should functionally and visually reflect a logical hierarchy of traffic circulation. The network should separate types of traffic by function and volume, ranging from through traffic to local traffic. The visual character of each segment of the network should appropriately convey its role and function within the overall network. The basic network is classified as follows in terms of the type, character, and appearance of the road (Figure 9-3).

#### 9.3.1 Boulevard

Boulevards provide primary access to, around, or through a military installation. The design includes:

- Continuous, relatively straight or large radii curvilinear alignments that carry traffic movement between major activity centers.
- A minimum of two lanes in each direction typically divided by a median or median divider.
- Green space buffers between the road and adjacent uses.
- Controlled access onto the road.
- Shoulders for emergency stopping but strict prohibition of on-street parking.
- Street signing, lighting, and planting that reflects the higher-speed nature of traffic movement.

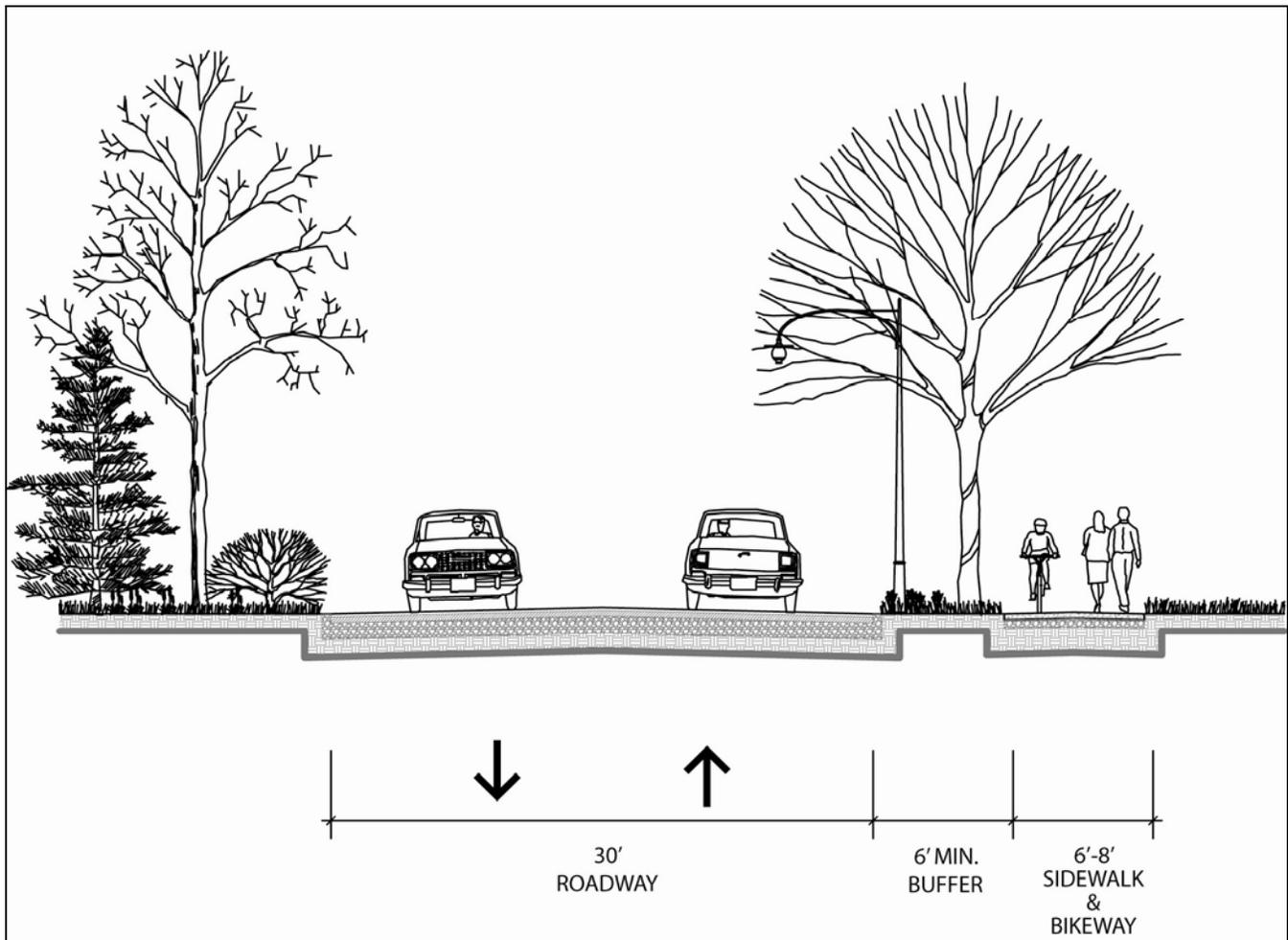


**Figure 9-4** Primary Roadway

### 9.3.2 Primary Roadways

These are arterial routes that connect major activity centers, provide the primary access through the installation, and provide the means by which most people view the installation (Figure 9-4). These roadways often traverse the entire installation and carry the heaviest volume of traffic that results in high speed and high visibility corridors. Direct access to this type of road should be restricted to crossing at major intersections. Primary roadways are designated as boulevards in urban areas and as avenues in rural and suburban areas. Design characters include:

- Continuous, through-traffic alignments that are relatively straight or large-radii curvilinear to handle moderate to heavy traffic.
- Alignments that form the boundary between different land uses are preferable to alignments that transect a land use zone.
- Two or more moving lanes in each direction typically divided by a median.
- Controlled access limited to entranceways to major facilities or building groups.
- At-grade intersections with signal controls.
- On-street parking prohibited.
- Medians, street lighting, signing, and planting that enforces the moderate-to-high speed nature and importance of the road.
- Gutters, and sidewalks provided in all cantonment areas with densities greater than two dwelling units per acres.

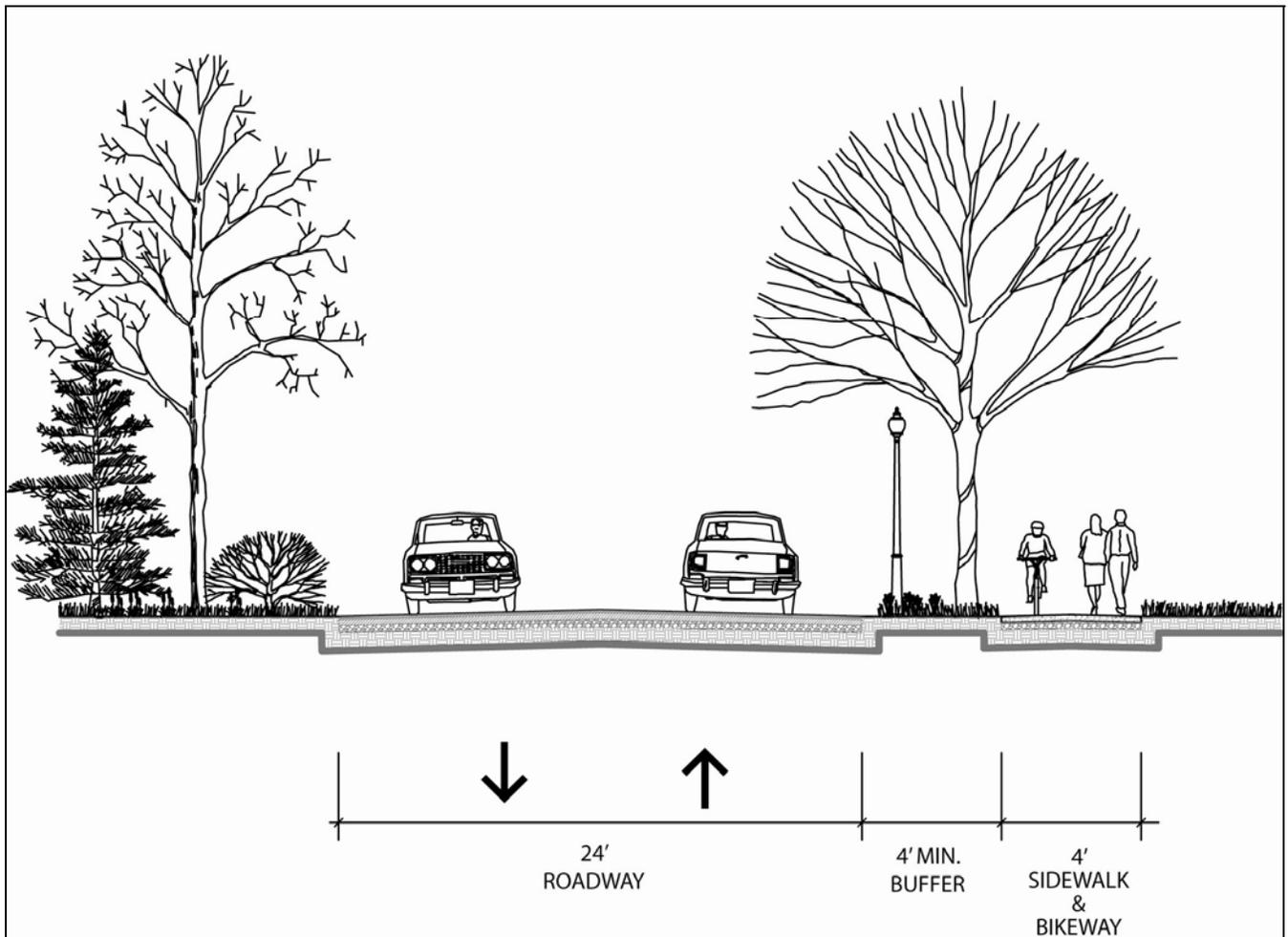


**Figure 9-5** Secondary Roadway

### 9.3.3 Secondary Roadways

Secondary roadways serve as connectors between primary roads and tertiary roads and typically connect primary roads to adjacent land use zones (Figure 9-5). Secondary roads accommodate moderate to slow traffic speeds with one moving lane in each direction. On-street parking should be prohibited and left-turn lanes provided at intersections with primary roads. Design characteristics include:

- Continuous through-traffic alignment between primary roads, either straight or curvilinear based upon the design speed topography and land pattern.
- Direct access to abutting property.
- A maximum of two moving traffic lanes in each direction, either undivided or a boulevard with planted median.
- On-street parking generally prohibited.
- Sidewalk separated from the road by a planting strip.
- Street lighting, signing, and planting that reflects the moderate-to-slow speed nature of traffic and the character of the land use area they are in.
- Gutters, and sidewalks provided in all cantonment area and other residential areas with densities greater than two dwelling units per acre.

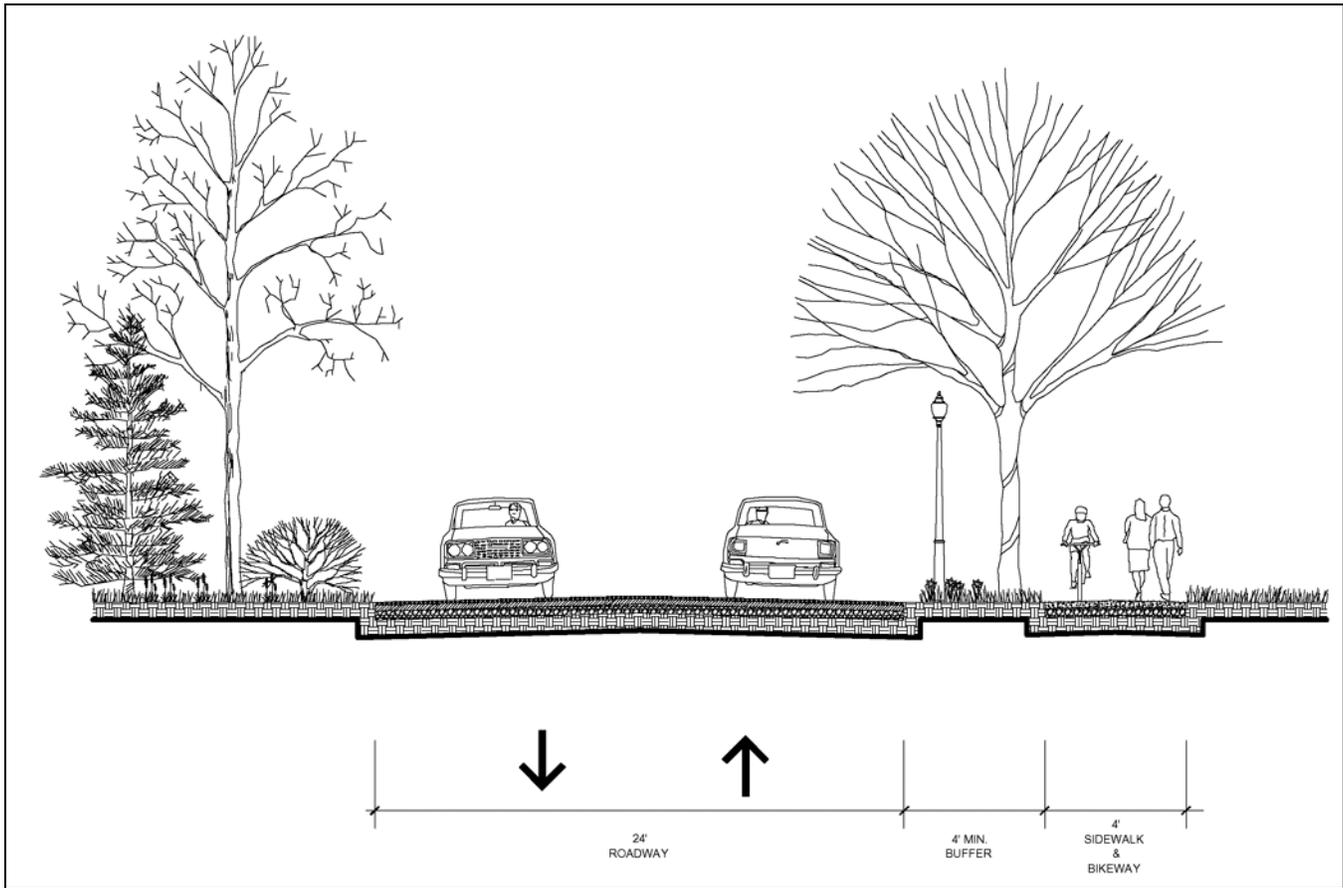


**Figure 9-6** Tertiary Roadway

### 9.3.4 Tertiary Roadways

Tertiary roadways provide access to individual facilities, parking and service areas. They are designed to handle low speed, low volumes of traffic, with one lane in each direction (Figure 9-6). Tertiary roadways make use of “T” intersections and cul-de-sacs to reduce through traffic, promote safety, and limit noise impacts from truck traffic. Design characteristics include:

- Alignments designed to discourage through-traffic.
- Alignments are relatively short straight or curvilinear keeping with topography, land use, and slow speed nature of traffic.
- Generally a maximum of two moving traffic lanes, one in each direction.
- On-street parking allowable on an infrequent overflow basis by the addition of a parallel parking lane or bay.
- Curbs, gutters, and sidewalks provided in all cantonment area and other residential areas with densities greater than two dwelling units per acres.
- Sidewalks maybe limited to only side, depending upon need.
- Street lighting, signing, and planting in character with slow speed nature of traffic and the land use area within which the road is located.

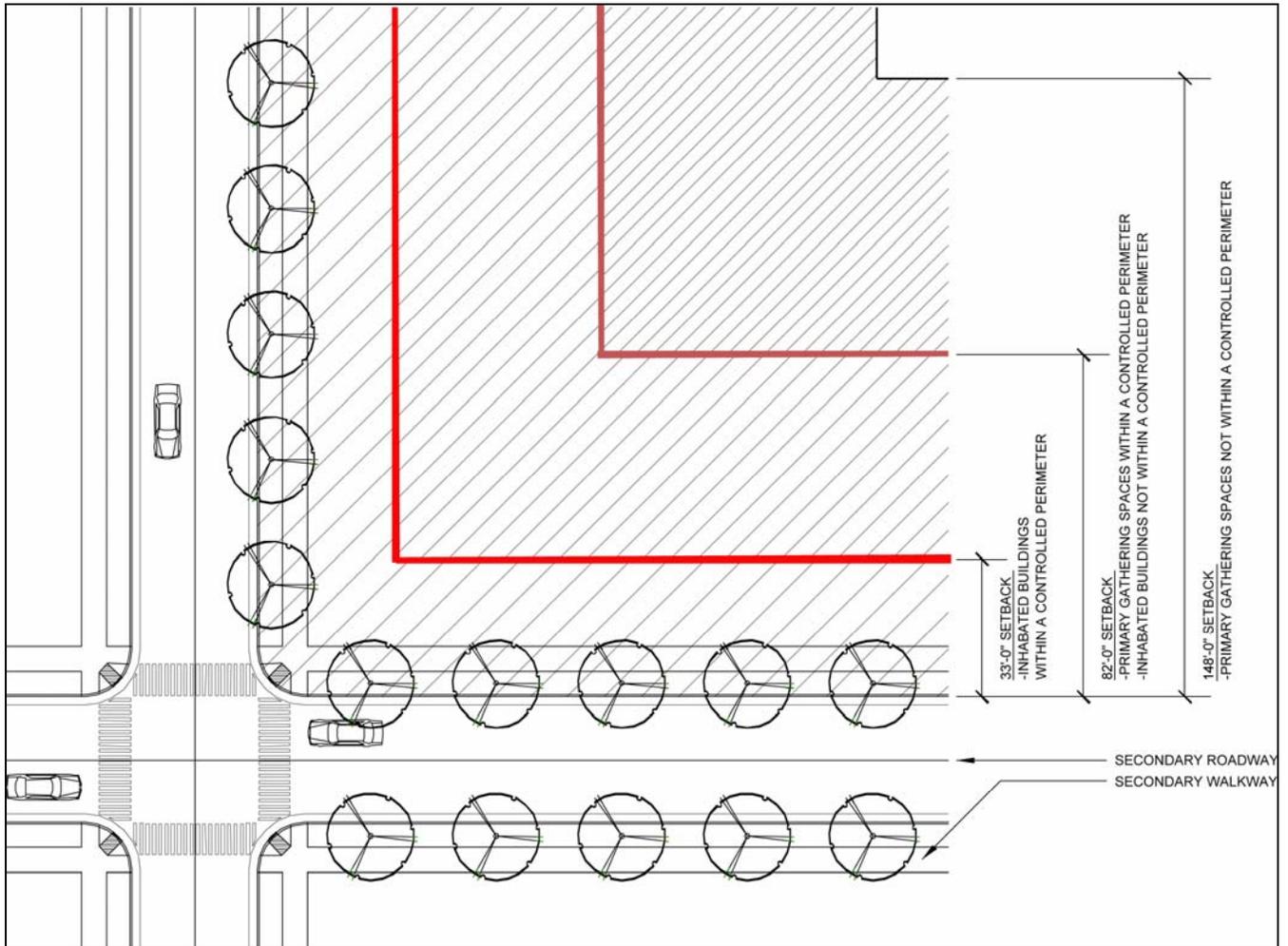


**Figure 9-7** Cul-de-sac

### 9.3.5 Cul-de-sacs

Cul-de-sacs are short dead-end tertiary streets located primarily in residential areas (Figure 9-7). They connect at one end to a tertiary or secondary street and have a turnaround at the other end, providing direct access to an abutting property while preventing through traffic. Design characters include:

- Short, straight, or curvilinear alignment to serve abutting property.
- Generally a maximum of two traffic lanes, one in each direction.
- Generally a maximum length of 600 feet, or less, except in areas where terrain and low density justify a longer length.
- Turnarounds must include a diameter to accommodate fire and garbage trucks.
- Turnarounds can be either symmetrical or offset.
- Turnarounds should have center planting islands to reduce the expanse of paved area.
- Overflow parking can be provided on street in parking bays or within center of turnarounds.
- Sidewalks, if any, are generally limited to one side of the road.
- Street lighting, signing, and planting is character with the slow speed nature of traffic and the land use area being served.



**Figure 9-8** Roadway Setbacks

## 9.4 ROADWAY SETBACKS

Department of Defense Antiterrorism standards state that all inhabited buildings within a controlled perimeter will be setback a minimum of 10 meters (33 feet) from roadways, and that troop billeting and primary gathering spaces shall be setback a minimum of 25 meters (82 feet) from roadways. Inhabited buildings not within a controlled perimeter the minimum setback distance is 25 meters (82 feet) and for primary gathering places and troop facilities the minimum distance is 45 meters (148 feet) (Figure 9-8). (See, [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, Table B-1](#)). If set backs cannot be accomplished in this manner, the goal is to mitigate the negative results of the blast. Blast mitigation can be accomplished through a variety of alternative means including earthen berms, water features, etc.

### 9.4.1 Emergency Vehicles

When designing within setback areas, consideration must be given to emergency vehicle access.

## 9.5 ROADWAY SYSTEM DESIGN

### 9.5.1 Circulation Design

The location and design of new circulation system alignments as well as improvements to the existing system should be prepared to promote development sustainability. They should be designed to minimize impacts, relieve driver monotony, and provide a positive visual experience for the user, without compromising safety. The following design techniques should be applied to circulation system design.

### 9.5.2 Circulation and Natural Landform

Blend circulation with natural landform. The horizontal and vertical alignment of roads, walkways, and bikeways should minimize landform disturbance and blend with the natural setting.

- Minimize cut and fill by avoiding steeping terrain and aligning roadway, walkway, or bicycle system to cross slopes diagonally or parallel to the contours rather than perpendicular to the contours.
- Mold cut and fill slopes to blend into the natural landform.
- Blend road drainage ditches, swales, or channels into the natural landform.
- Use cluster development wherever possible to limit the lengths and required intersections of roadway and other circulation system elements and to preserve land. Consideration should be given to meeting antiterrorism requirements when developing cluster type facilities.
- Minimize pedestrian, railroad, and bikeway crossings of highway, primary, and secondary roads.
- Use natural topographic conditions to create grade separated pedestrian, railroad, and bikeway road crossings wherever possible especially on highways and primary roads.

### 9.5.3 Adapt Circulation to Preserve Vegetation

Design roads, walkways, and bike paths to minimize disturbance to existing vegetation, encourage re-vegetation in disturbed areas, and reduce the visual impact of landscape disturbance.

- Align roads through open areas rather than forested areas.
- Minimize cut and fill to reduce the limits of clearing.
- Clear only for sight distances rather than uniform right-of-way clearing.
- Utilize tree wells or retaining walls to preserve specimen trees or significant vegetation areas.
- Provide optimum conditions for re-vegetation by following proper planting and maintenance techniques.
- Restore vegetation to disturbed areas using naturalistic plantings of native plant material.

### 9.5.4 Minimize Adverse Impacts on Adjacent Land Uses

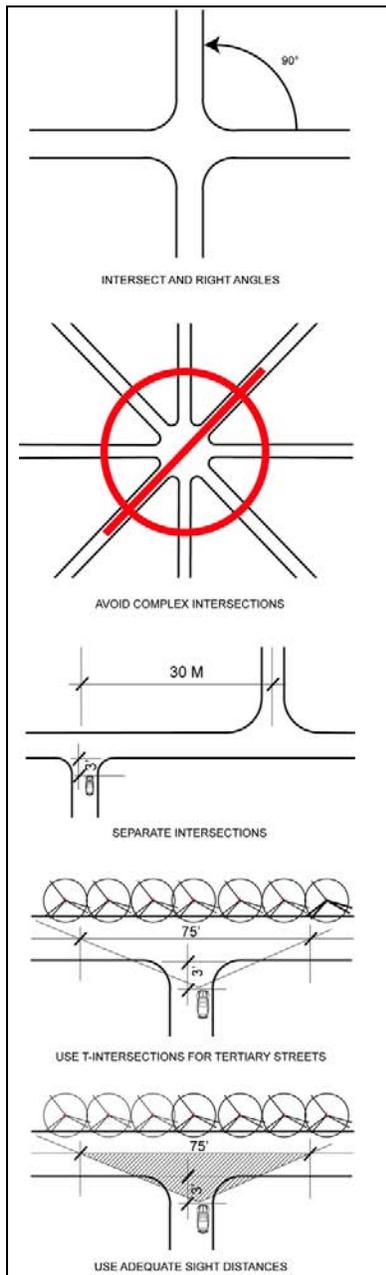
#### Air Pollution

Locate roadway alignments to minimize the impact of traffic-emitted pollutants on adjacent development. This can be accomplished by the following:

- Locate roads adjacent to land uses that are minimally affected by traffic-emitted air pollutants.
- Reduce the impact of traffic-emitted pollutants on more sensitive land use areas by locating the roadways downwind and/or providing planted buffers.

#### Noise Pollution

Design and locate roadways to reduce the impact of traffic noise on adjacent development.



**Figure 9-9** Intersection Design

- Roads should be physically separated from sensitive land uses including residential, medical, education, recreation, administration, religious, library, community, or child care facilities.
- Utilizing noise abatement techniques such as berms, sound barrier walls, and plant material to reduce noise levels.

## 9.6 INTERSECTIONS

Intersections are the most dangerous areas of the installation circulation system. They should be planned or improved to provide safe and efficient traffic flow for both pedestrian and vehicular traffic. The following design techniques should be used to plan or improve intersections (Figure 9-9):

- All roadways should intersect at right angles (90 degrees), although 85-95 degrees is acceptable.
- Avoid dangerous, complex intersections of more than two streets intersecting at one point or offset intersections.
- Eliminate intersections that are in close proximity to one another. They should be no closer than a minimum distance of 30 meters (100 feet).
- Use T-intersections for tertiary road intersections with secondary or primary roads to reduce conflict and promote safety.
- Provide turning lanes at all intersections along primary roads to eliminate interference with through traffic flow.
- Minimize intersections along primary roads to reduce points of conflict and increase safety. Existing intersections with secondary and tertiary streets can be eliminated by the use of cul-de-sacs with traffic routed along parallel streets to primary and secondary streets.
- Include adequate sight distances to meet minimum standard requirements at all intersections. The location from where the driver is waiting to cross or enter a traffic lane to a point 23 meters (75 feet) down the centerline to the right and the left forms the sight triangle.
- Minimize pedestrian and bicycle intersections with primary streets.
- Provide crosswalks at all intersections where necessary, marked with paint or vinyl strips or identified with a different paving surface.
- Provide pedestrian access to persons with disabilities in accordance with the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#) and the Uniform Federal Accessibility Standards (UFAS). In the event of a conflict the most stringent standards will be applied.
- Create local service drives or access roads to parallel highways and primary roads to provide access to properties fronting the primary road avoiding a direct curb cut from the primary road to each individual property.
- Intersections between railroad track and high-speed roads must be signaled, well marked and have a smooth transition. All other road crossings must be well marked and have clear line of sight down the tracks.

**9.6.1 Emergency Vehicles**

Consideration must be given to access for emergency vehicles and trucks when designing roadways. A 55' foot truck needs a minimum turning radius of 50' when making a U-Turn (Figure 9-10) or when making a turn (Figure 9-11).

**9.7 ENTRANCE GATES**

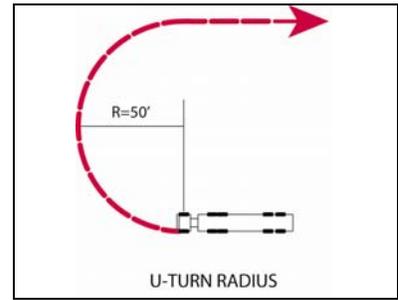
The location and design of the installation entrance gates is a primary component of the installation circulation system. Entrance gates must be designed to be functional, while providing security protection not only for the installation itself, but also for personnel and others waiting to be admitted to the installation. Gates should also be designed as a visual amenity to provide an aesthetically pleasing entrance to and exit from the installation. See [Section 12, Force Protection](#), paragraph 12.7 for information on the design standards for installation gates.

**9.8 PARKING REQUIREMENTS**

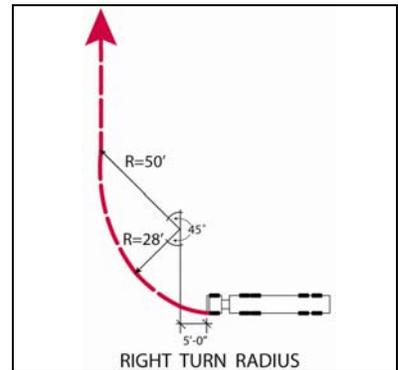
The total quantity of parking in any one location will vary with the needs of the facility. The following are general considerations considering parking requirements.

All parking lots will be accessible to persons with disabilities in accordance with the requirements of the [UFAS, paragraph 4.1.1\(5\)\(a\)](#) or the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#) (whichever is more stringent), and/or in accordance with the labor agreements with the installation. If parking spaces are provided for employees or visitors, or both, then accessible spaces shall be provided in conformance with the required minimum number of accessible spaces shown in Figure 9-12.

- For initial planning and programming, allocate 400 square feet of parking lot area per car. The total provides adequate minimum space for the parking spaces, access drives, and planting islands that make up a parking lot. This allocation is not withstanding tactical military vehicles.
- Minimize parking space requirements of a facility by selecting a site that will allow the sharing of parking with related activities.
- Small parking lots are usually preferable to large lots because they enhance the visual environment by increasing the percent of landscaped area to paved area and allow more conformance to natural topography.
- The monotony of large parking areas can be altered by the use of designs such as curvilinear parking or the introduction of large planting islands.
- Promote means of access other than vehicular by providing alternative means of access such as walkways and bikeways.



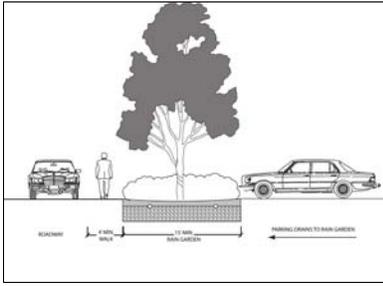
**Figure 9-10** Necessary U-Turn Radius - 50' Truck



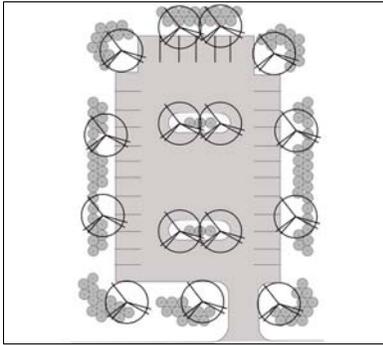
**Figure 9-11** Necessary Turn Radius - 50' Truck

Total Spaces in Parking Area	Required Minimum Number of Accessible Spaces
1-25	1
26-50	2
51-75	3
76-100	4
101-150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1000	2% of total
1000 and up	20 + 1 Additional for Each 100 over 1000

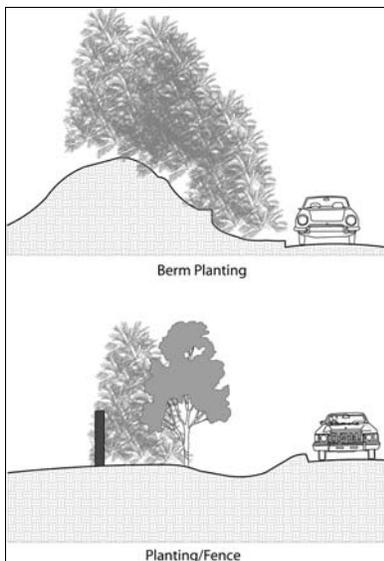
**Figure 9-12** Required Minimum Number of Accessible Parking spaces



**Figure 9-13** LID Practices in Parking Lot Design



**Figure 9-14** Provide Islands with Trees to soften Visual Expanse



**Figure 9-15** Trees/Berms/Walls Screen Parking Lot

## 9.9 PARKING LOT LOCATION AND DESIGN

### 9.9.1 Design Techniques

Parking areas can be designed and enhanced to provide a more pleasing impact and a more comfortable physical experience for the user. The following design techniques should be used to create more aesthetically pleasing, physically comfortable parking lots. The following design techniques should be used to create more aesthetically pleasing, physically comfortable parking lots. When choosing landscaping techniques, be sure to choose plantings that do not block desired surveillance opportunities and do not provide hiding places for inappropriate items or people.

- Parking lots are potential crime areas. They should be located in conjunction with the force protection strategy that allows surveillance and is part of the overall access control plan. Locate parking lots between and behind buildings to reduce the visual impact from the circulation system.
- Locate parking lots on relatively level areas to avoid excessive cut and fill.
- Use LID practices in parking lot design. Minimize containment of water from parking areas (Figure 9-13). Planted Islands should be used to collect stormwater, and allow it to percolate into the ground. See <http://www.epa.gov/nps/lid/index.html> for further information into LID practices. When possible, use permeable pavements.
- Design parking lots to be efficient in the design and placement of access drives and parking spaces. All drives providing direct access to parking spaces should provide spaces on both sides of the drive.
- Provide planting areas at the ends of all rows of parking spaces. Provide islands with trees within the main parking lot to soften the visual expanse of the parking lot, provide shade and/or wind breaks (Figure 9-14). These trees should not interfere with surveillance or illumination at any point within their growth cycles. Choosing trees that will not drop berries, petals, etc. will reduce the risk of damage to vehicles and irritation to the vehicle's owners. The plantings will serve to improve safety by more clearly delineating the desired paths of travel, thus reducing accidents.
- Use natural topography and existing trees to visually screen parking areas from adjacent facilities and other parking bays (Figure 9-15).
- Design parking lots to preserve significant existing trees. Provide a planting area around the tree that is large enough to allow water to the root system.
- On street parking along primary and some secondary streets should be avoided because it reduces the vehicular carrying capacity of the street, is visually unattractive, and is unsafe, providing the potential for unauthorized surveillance for an attack.
- Parking lots should be paved with concrete, asphalt, or other paving material.
- Parking structures, both below grade and above grade, provide for greater parking capacity in densely developed areas where available land is scarce. Parking structures are expensive, but they provide a number of benefits including efficient land use, reduced visual impact and protection of vehicles from inclement weather. If parking structures are built they shall be designed to meet antiterrorism requirements, and fit into the overall force protection plan.

### 9.9.2 Parking Area Design Guide

A comprehensive parking area design guide which includes siting, parking area types, geometry (parallel, perpendicular, angled), access, and maintenance consideration is located at the following website: [U. S. Air Force Landscape Design Guide, Section 14, Parking Areas.](#)

### 9.9.3 Antiterrorism Setback Requirements

Parking lots within a controlled perimeter shall be located a minimum of 10 meters (33 feet) from inhabited structures, and 25 meters (82 feet) from troop billeting and primary gathering structures. Parking lots without a controlled perimeter shall be located a minimum of 25 meters (82 feet) from inhabited structures, and 45 meters (148 feet) from troop billeting and primary gathering areas (UFC 4-010-01, Table B-1). Designated parking for family housing located within secured perimeters with access control is excluded from the 25-meter (82 feet) setback requirement.

At Detroit Arsenal, the base perimeter is the controlled perimeter. Parking is never allowed closer than 33 feet from inhabited structures, however, if it is a “primary gathering” place (e.g., Building 230 – 50 or more DOD people) parking must be 82 feet away from the building within a controlled perimeter (per [UFC4-010-01 B3](#)).

## 9.10 SERVICE AREAS

Facilities that require pickup and deliveries should have a service area that allows for easy access to a loading dock exclusively for service vehicles. These areas should be designed to provide direct, easy access for vehicles and not conflict with railroad operations. They should be screened from public view to reduce negative visual impacts. Service areas shall meet all antiterrorism requirements. Design these areas so that desired surveillance is built in. Surveillance can be natural, organized or technical, but should communicate that loading docks, the vehicles and people using them are watched over.

## 9.11 DROP-OFF AREAS

Facilities that include a high percentage of persons arriving by vehicle should include a vehicle drop-off area for users. Included are buildings such as headquarters, child development centers, schools, dining facilities, and clubs. Antiterrorism standards state that the access drive must be clearly defined and marked and that their intended use is clear to prevent parking of vehicles in those areas and that drop-off lanes will not be located under any inhabited portion of a building ([UCF 4-010-01](#), para B-1.4) It is recommended that physical barriers be used to define the area. These barriers may include curbing, planters, or other barriers together with signage to identify and restrict access. The driveway shall be configured so that vehicles can be restricted during times of high alert. Access to the driveway shall be located outside the standoff area with the initial approach parallel to the building, or a barrier must be directed to prevent direct vehicular movement toward the building.

## 9.12 WALKWAYS AND PEDESTRIAN CIRCULATION

### 9.12.1 Walkways

Walkways provide connections for pedestrians between buildings and ancillary facilities such as parking lots and other areas. Well designed and located pedestrian walkways also provide a desirable alternative to total dependence on motor driven vehicles. The walkways also generate an expectation of behavior – pedestrians are supposed to walk on them, making those that do not, stand out. Those that stand out can be questioned.

### 9.12.2 Goal

The goal is to encourage the use of walkways as an alternative means of circulation. Pedestrian walkways should be designed and located to provide a comfortable, enjoyable experience for the user. The use of walkways within the installation promotes development sustainability by conserving energy, reducing air pollution, and decreasing the land requirement for parking. These walkways as well provide a means to increase physical fitness.

### 9.12.3 Objectives

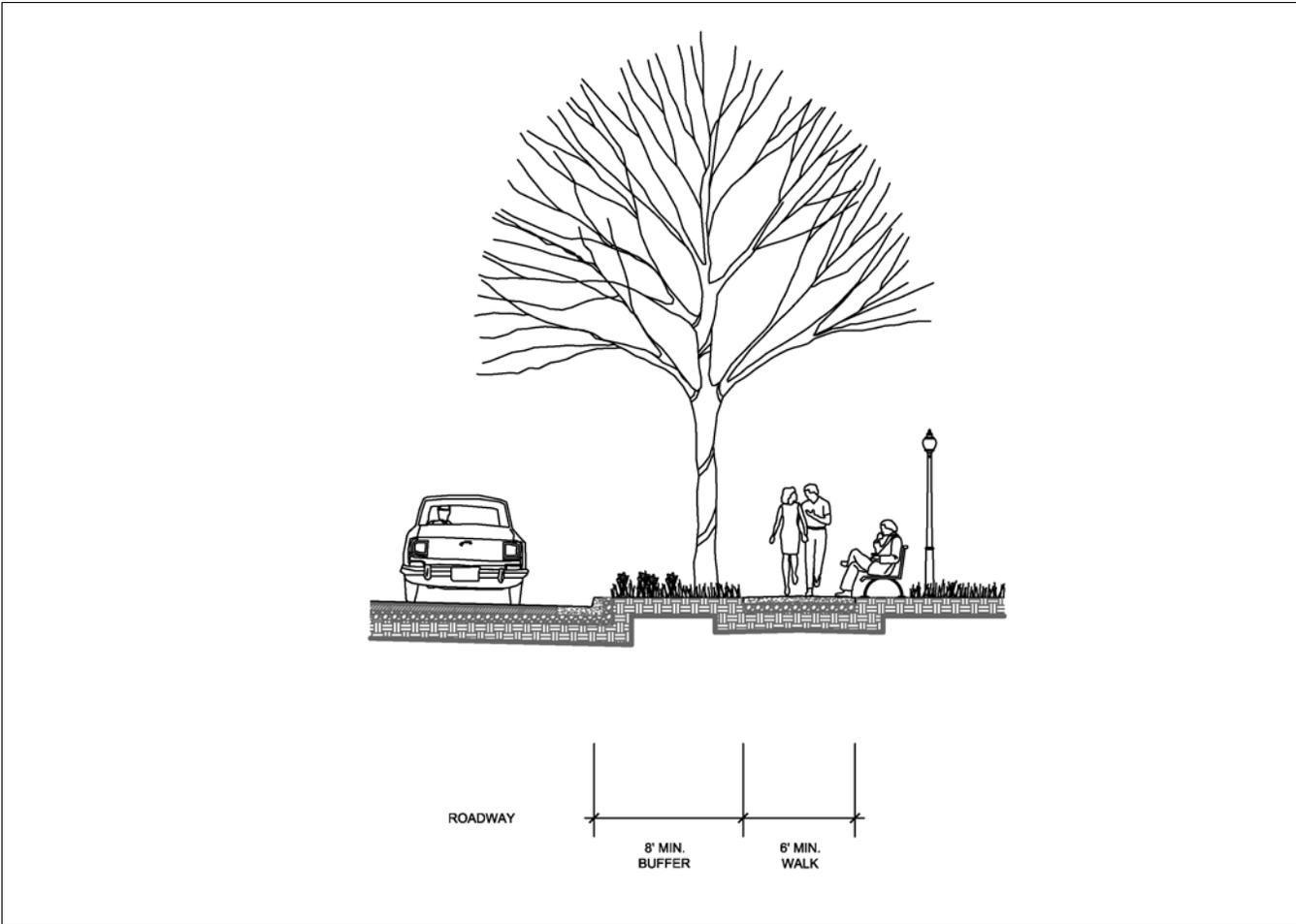
In order to achieve this goal the following objectives must be met:

- Provide walkways that are designed at a pedestrian scale to be comfortable and pleasant.
- Provide safe and secure pedestrian facilities that are separate from vehicular and railroad traffic.
- Provide amenities for pedestrians.
- Provide accessibility to all users, including physically impaired or challenged persons. All street and driveway crossings shall be ramped, marked, and accessible to persons with disabilities in accordance with requirements of the UFAS. See the following UFAS paragraphs for the respective standards: [Curb Ramps, paragraph 4.7](#); [Ramps, paragraph 4.8](#); [Stairs, paragraph 4.9](#).
- Provide links to major attractions and generators of pedestrian traffic.
- Provide consistency of design throughout the walkway.
- Provide adequate drainage.

### 9.12.4 Walkway Network Hierarchy

Walks are classified to conform to the hierarchy roadway system - primary walkways, secondary walkways, and tertiary walkways. Non- roadway oriented walks should be sized and placed where people will use them rather than creating worn "shortcut" paths. Railroad track crossing should be avoided, but where necessary, they should be well marked and have

good line of sight. Walkways through railroad track ballast should be maintained with small, well-drained rock.

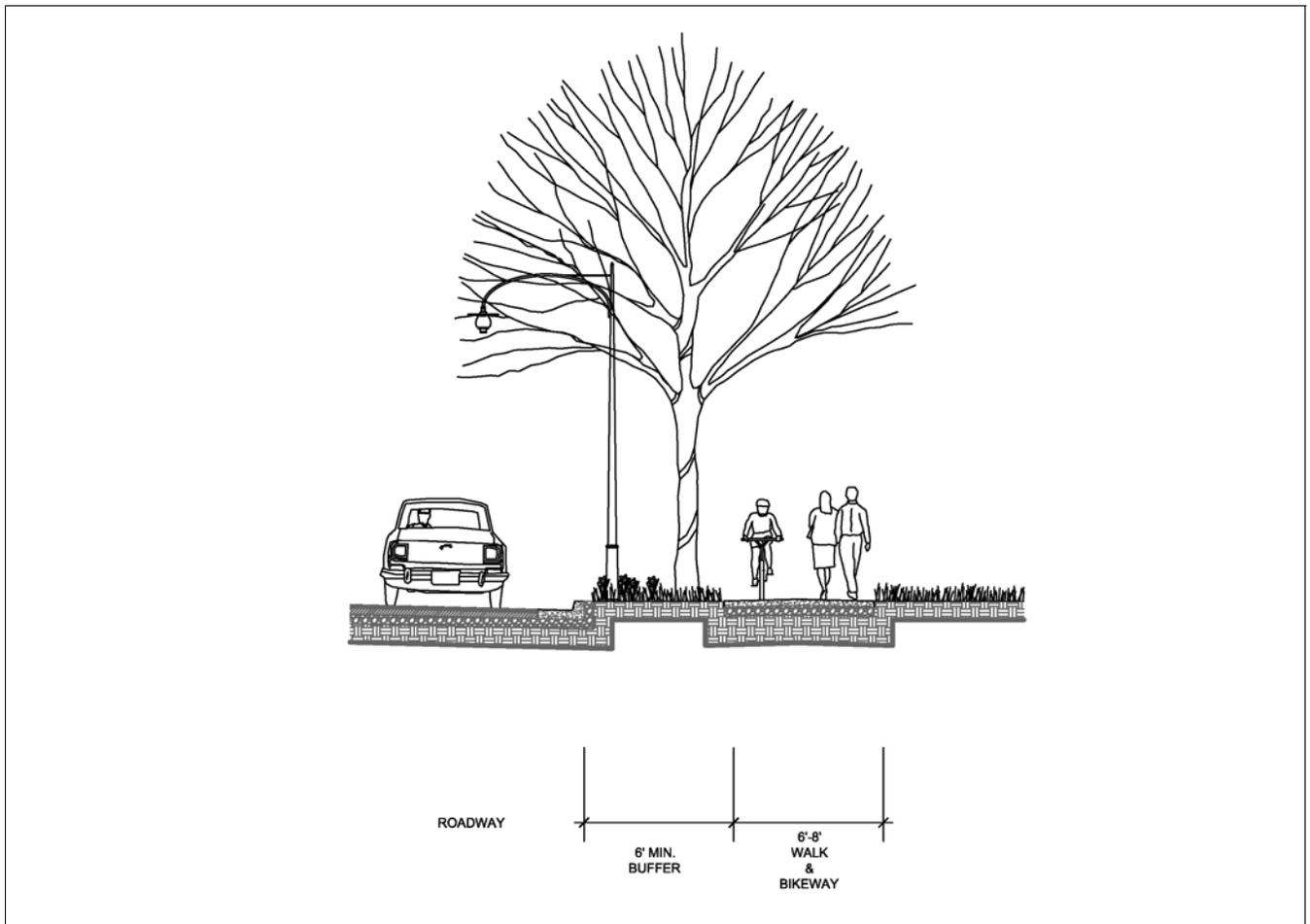


**Figure 9-16** Primary Walkway

### Primary Walkways

Primary walkways (Figure 9-16) should be placed along both sides of primary roadways, wherever possible, within the cantonment areas. These walkways are also used for high volume pedestrian routes to facilities and should be designed along axis lines relating to adjacent building entries, plazas, or streets. They should be paved with concrete, brick, or other pavers.

Primary walkways should be sized to accommodate anticipated pedestrian use. They should have a minimum width of 1.8 meters (6 feet), and a maximum width should be 3-3.5 meters (10-12 feet) in high use areas (Figure 9-16).

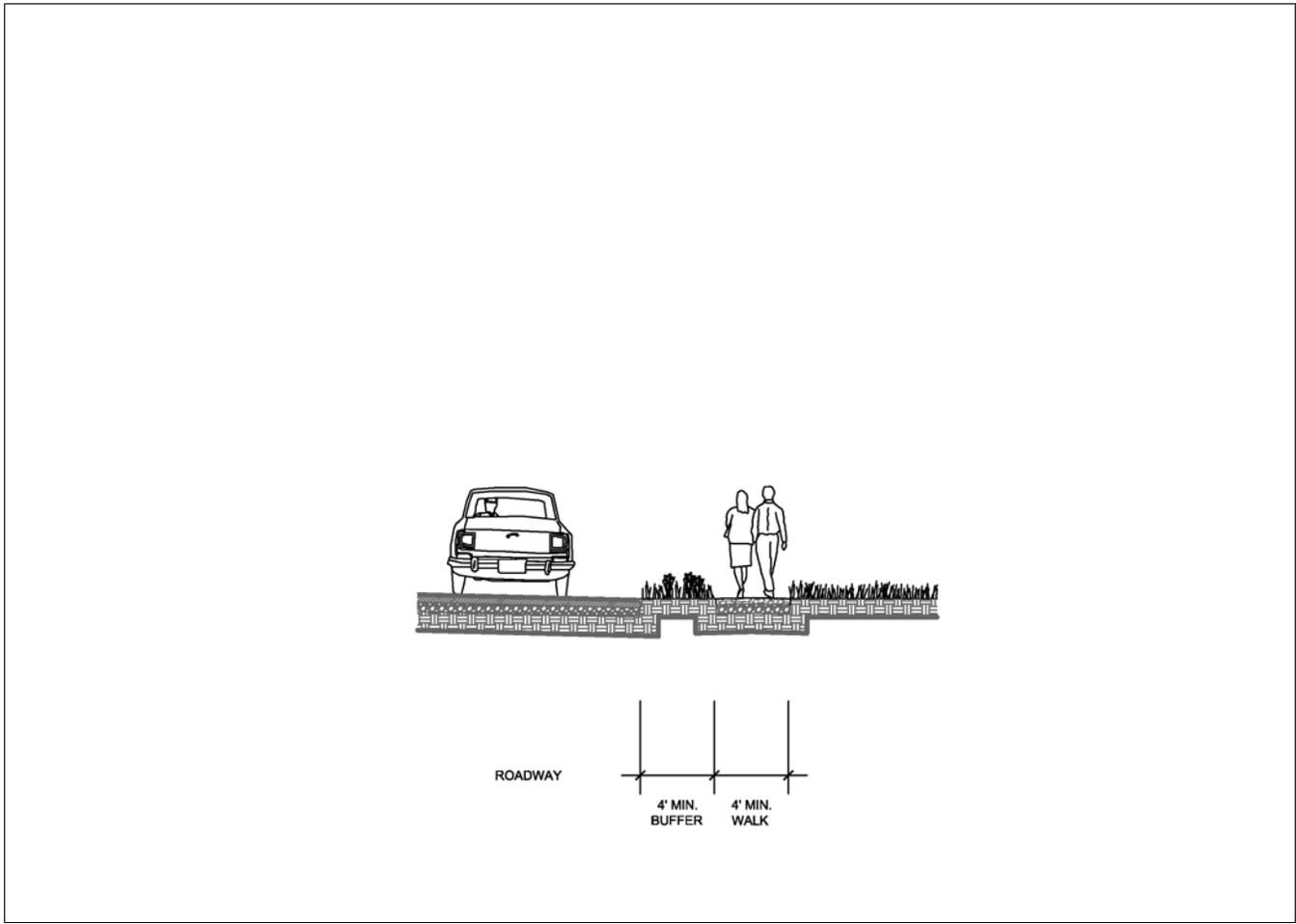


**Figure 9-17** Secondary Walkway

#### Secondary Walkways

Secondary walkways (Figure 9-17) should be provided along one or both sides of secondary and tertiary streets. They are designed to carry moderate volumes of pedestrians between activity centers and housing areas. They should provide access to building entrances, plaza areas, or streets. They should be paved with concrete, brick, or other pavers.

These walkways should be sized to accommodate anticipated pedestrian use, but not less than 1.2 meters (4 feet), and a maximum of 3-3.5 meters (10 - 12 feet) in high use areas (Figure 9-17).



**Figure 9-18** Tertiary Walkway

### Tertiary Walkways

Tertiary walkways (Figure 9-18) provide pedestrian walkways in recreational and scenic areas for casual walking and hiking. They can be paved with concrete or bituminous asphalt or constructed with woodchips. The layout of the walkway should have a meandering and curvilinear alignment. Paved walkways should have a minimum width of 1.2 meters (4 feet). Wood chip trails should have a minimum width of 1 meter (3 feet). Where paths are designated for use by bicyclists and pedestrians, these widths should be increased an additional three feet for each bike lane.

#### **9.12.5 Troop Running Trails**

Not Applicable to Detroit Arsenal.

#### **9.12.6 Troop Movement Paths**

Not Applicable to Detroit Arsenal.

### **9.12.7 Site Amenities at Walkways**

Utilize site furnishings to reinforce the walkway system hierarchy. Provide directional and informational signage, where appropriate. Locate site furnishings, such as benches, tables, waste receptacles, drinking fountains, and signage in response to travel distance and traffic volume, but off set them from the path so they do not interfere with other users and do not pose a threat.

Site furnishings should be placed at regular intervals along walkways, parallel to the walk and facing the flow of pedestrian traffic.

### **9.12.8 Landscaping at Walkways**

Use a combination of canopy and ornamental trees along sidewalks to provide shade, define the path, provide visual interest, and discourage the creation of “shortcuts”. Utilize evergreen buffer plantings to screen harsh winds and undesirable views, but trim up from the base 2 feet so that the trees do not provide concealment areas. Discourage the use of flowering/fruit bearing trees and shrubs along walkways because of threat of insects or other problems.

## **9.13 BIKEWAYS**

### **9.13.1 Cycling**

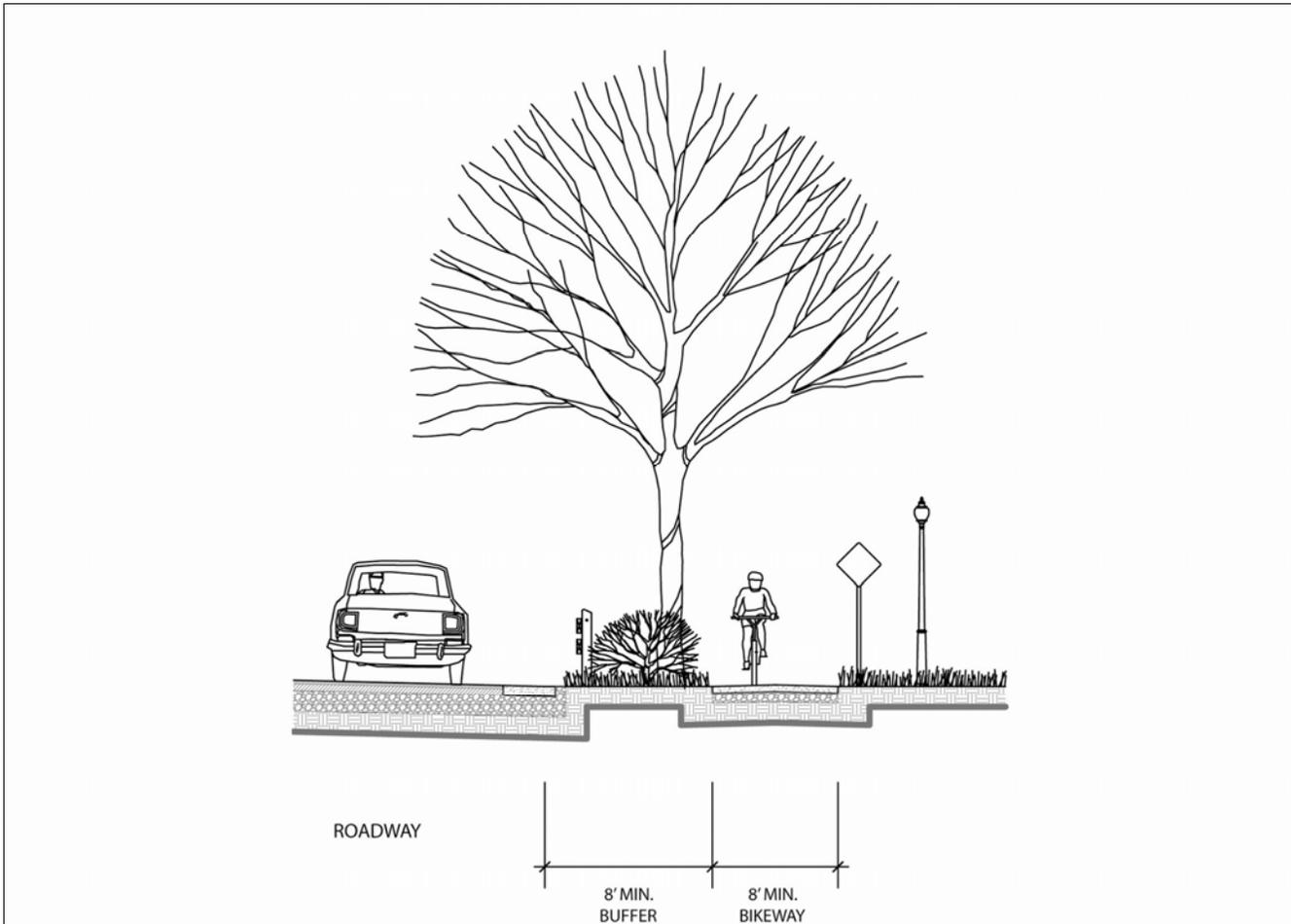
The use of bicycles as alternatives to the automobile has become more acceptable to installation personnel. This trend is encouraged as a method of reducing the automobile vehicle trips within the installation and reduce the need for greater carrying capacity. Also, cycling is a popular recreation activity that is enhanced by the availability of a safe and well planned system of bike trails.

### **9.13.2 Bikeway System**

A bikeway system should provide direct routes between primary traffic and destination within the installation. This network should be continuous and minimize conflicts between bikes, pedestrians, and vehicles. Bikeways should be planned and designed according to the classifications that define the level of separation they maintain from roadways and walkways. The ideal solution for the development of bikeways is to physically separate them from both roadways and walkways.

### **9.13.3 Bikeway Classifications**

Bikeways are design according to the following classifications:



**Figure 9-19** Class I Bikeway

#### Class I Bikeway

A Class I Bikeway is intended for the exclusive use of bicycles. While it may parallel a roadway, it is physically separated by distance or a vertical barrier (Figure 9-19). Class I Bikeway considerations include:

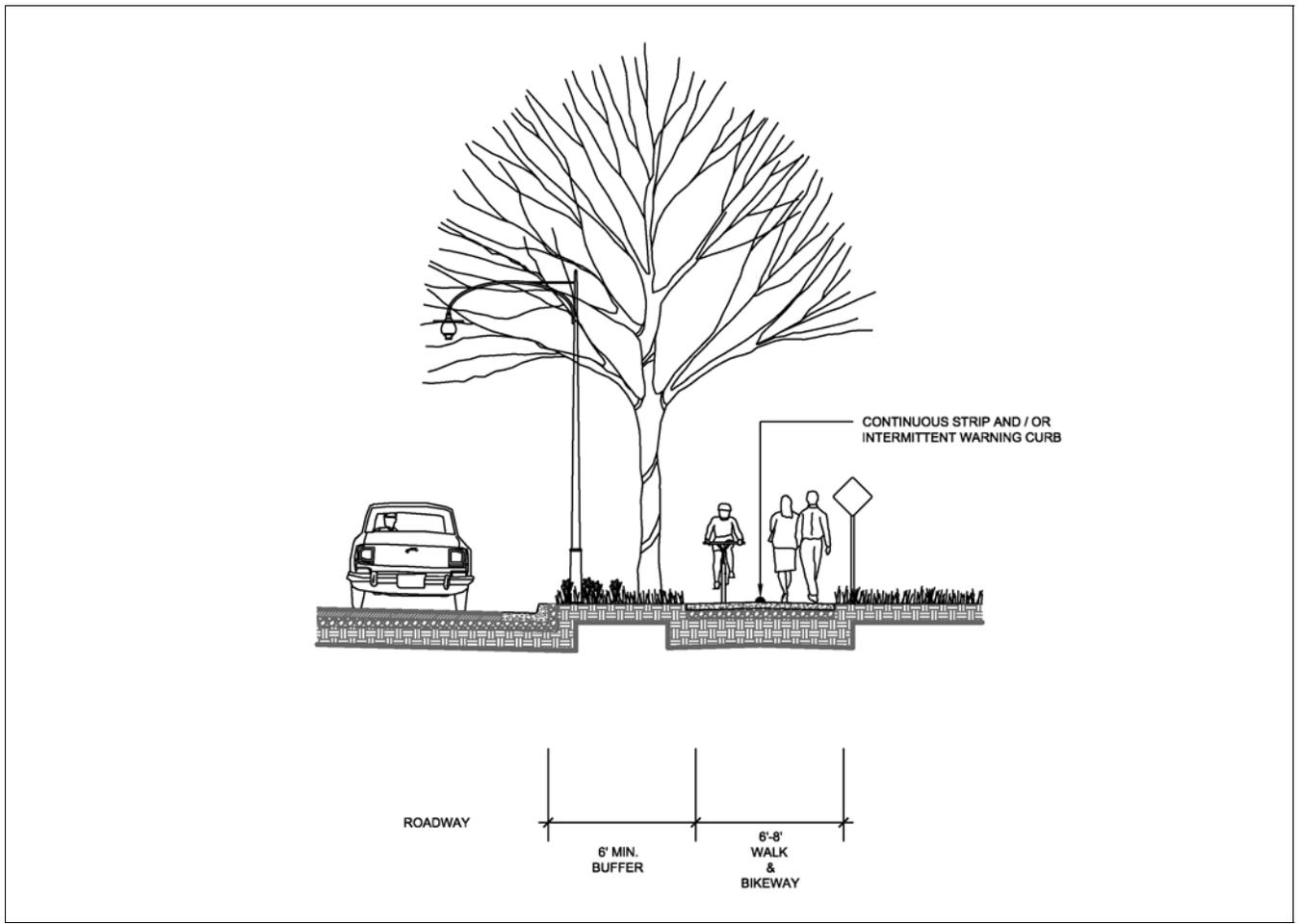
A class I Bikeway provides the safest and most efficient means of bicycle travel and is the preferred option for bikeway development.

Crossing of a Class I Bikeway by pedestrians, train, or automobile should be minimized.

If a Class I Bikeway does not closely parallel a roadway, it should be designed to provide appropriate bikeway gradient and curvature.

Class I Bikeways require the greatest amount of space and advance planning to reserve land and assure appropriate routing.

Railroad crossings should be well marked, with proper operating signals and clear sighting down the tracks. Road crossing transitions should be smooth and well drained.



**Figure 9-20** Class II Bikeway

#### Class II Bikeways

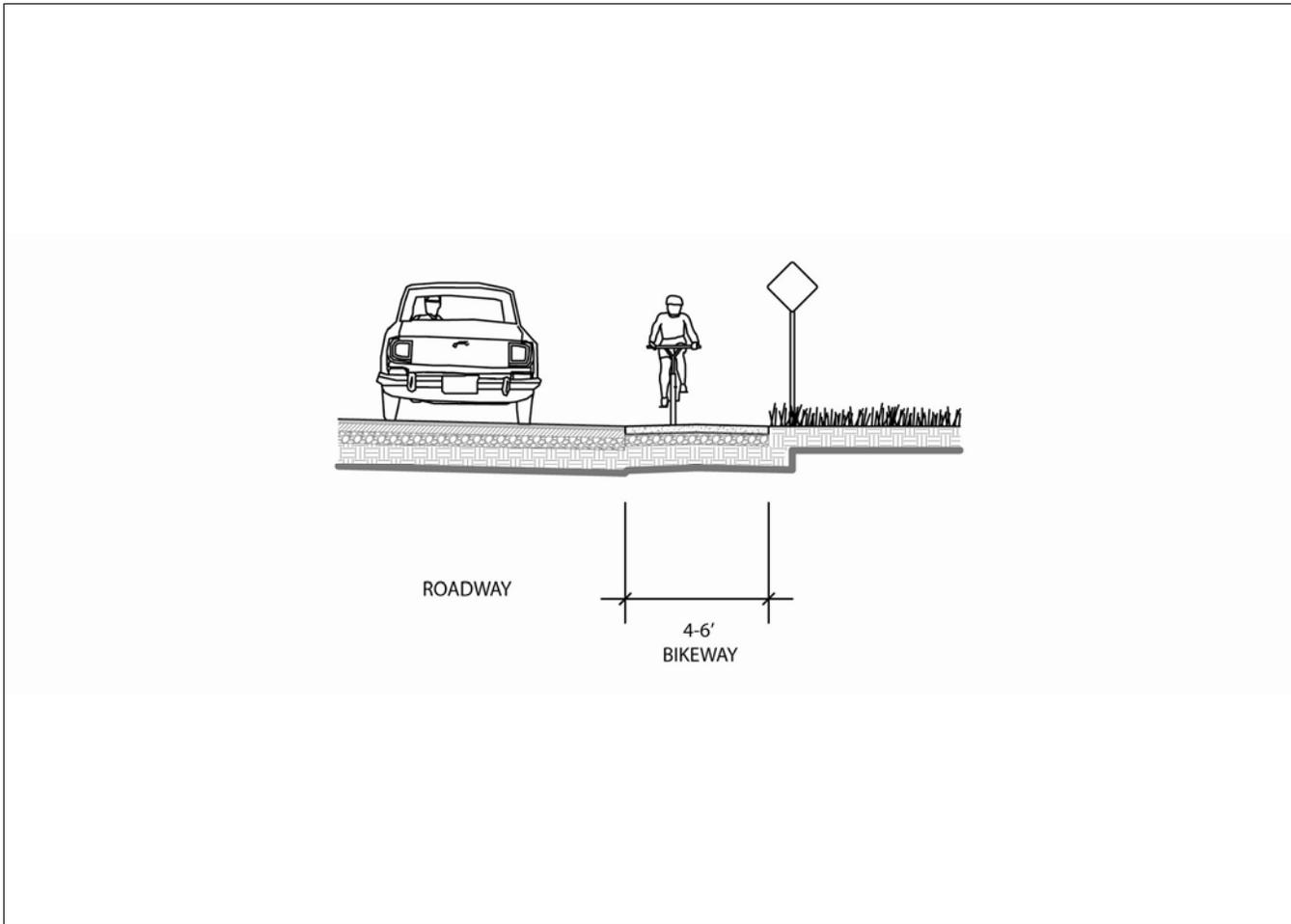
A Class II Bikeway shares the right-of-way with a roadway or walkway. It is indicated by a bikeway pictograph on the pavement and a continuous strip on the pavement or separated by a continuous or intermittent curb or other low barrier (Figure 9-20). Class II Bikeway considerations include:

Because some separation is provided for bicycle travel, a Class II Bikeway provides some level of safety for the bicyclist and pedestrian.

While crossing by pedestrians or automobiles are discouraged, they are not as controllable as they are on a Class I Bikeway because the Class II Bikeway is adjacent to the walkway or roadway.

Because Class II Bikeways are tied to the adjacent roadway or walkway, route selection is important to maintain appropriate bikeway gradient and curvature.

Class II Bikeways generally require less space than Class I Bikeways because they follow the alignment of and share the right-of-way with a roadway or walkway.



**Figure 9-21** Class III Bikeway

### Class III Bikeways

A Class III Bikeway shares the right-of-way with a roadway or walkway. It is not indicated by a continuous strip on the pavement or separated by any type of barrier, but it is identified as a bikeway with signs (Figure 9-21). Class III Bikeway considerations include:

Because no separated is provided, there is a higher potential for safety conflicts between automobiles and bicycles and between bicycles and pedestrians.

Class III Bikeways provide continuity within the bikeway network and designate preferred shared routes to minimize potential conflicts. To maintain safety for bicyclist and pedestrians, Class III Bikeways should be developed, if possible, only where automobile and pedestrian traffic is moderate to light.

Because Class III Bikeways share the roadway or walkway, route selection is important to maintain appropriate bikeway gradients and curvature.

Class III Bikeways require the least space because they share the pavement with a roadway or walkway.

#### 9.13.4 General Guidelines

Wherever possible, provide a designated right-of-way for bike traffic, separate from vehicular and pedestrian routes.

Locate bikeway crossings away from vehicular intersections with crossings marked on the street pavement.

When separate bicycle right-of-ways are not feasible, designate bikeway lanes with paint on the right-hand side of roadways.

Bikeways should never share undesignated space with roadways except at crossings.

#### 9.13.5 Bikeway Furnishings

Encourage use of the bicycle system by making trails visually attractive and providing pedestrian amenities in appropriate locations. Provide site furnishings such as benches, tables, waste receptacles, drinking fountains, and signage along paths. Location of these amenities should be in response to travel distance and traffic volume.

#### 9.13.6 Bicycle Storage

Provide bicycle storage racks in areas that can be visually supervised and in close proximity to building entrances, high activity areas, major workplaces, and recreational facilities, while avoiding conflicts with pedestrian circulation. Racks must be bolted down for FPAT purposes.

#### 9.13.7 Landscaping

Use a combination of canopy and ornamental trees along bicycle paths for shade, route definition, and visual interest. Provide evergreen buffers to screen harsh winds and undesirable views.

#### 9.13.8 Crosswalks

Provide crosswalks at all intersections of roads and walkways/bikeways. When laying out the crosswalk, consider the following:

Extend walk's paving across the road in heavily used areas. Raised crosswalks eliminate the need for curb ramps in sidewalks.

Provide a clear line of sight for motorist and pedestrians. Do not plant in sight lines. Walkways should meet the road at 90 degree angles.

Adequate light should be provided.

Provide barrier-free access at all intersections or used raised crosswalks.

#### 9.13.9 Walkway and Bikeway Lighting Design

Roadway lights and building exterior lights can serve also as walkway and bikeway lights. Maximum use will be made of multi-purpose lighting systems. Paragraph 10.4 of [Technical Manual \(TM\) 5-811-1, Electric Power Supply and Distribution](#) directs the following walkway and bikeway lighting standards.

##### Intensities

Values are dependent upon whether walkways and bikeways are adjacent to roadways or are isolated from vehicular traffic, but will be no greater than a 1:6 ratio.

### Adjacent to Roadways

Walkways and bikeways will be illuminated to not less than one-half the maintained illumination required for adjacent roadways. Areas having in grade, such as stairs and ramps, will require special treatment. Crosswalks in the middle of the block will be illuminated to 1.5 to 2 times the normal roadway lighting level.

### Remote from Roadways

Walkways and bikeways remote from roadways will have a minimum of 5 lux (.5 foot-candle) average illumination measured in 10-foot levels. Pedestrian tunnels will have 40 lux (4.0 foot-candles), stairways will have 6 lux (0.6 foot-candles), and overpasses will have 3 lux (0.3 foot-candles) illumination.

### Pole Design

Where pole mounted lights illuminate only walkways or bikeways, shorter poles are most suitable, but luminaire height will not be less than 10 feet. Construction will be such as to minimize vandalism by use of break-resistant lenses, tamperproof screws, and sturdy poles.

### **9.13.10 Signs**

The federal Manual of Uniform Traffic Control Devices (MUTCD) provides standards signs and markings for bicycle lanes and related bicycle facilities. See the [MUTCD, Chapter 9](#) and any applicable amendments for traffic controls for bicycle facilities standards.

## **9.14 ARMY STANDARDS**

The cited Army Standards shall be met.

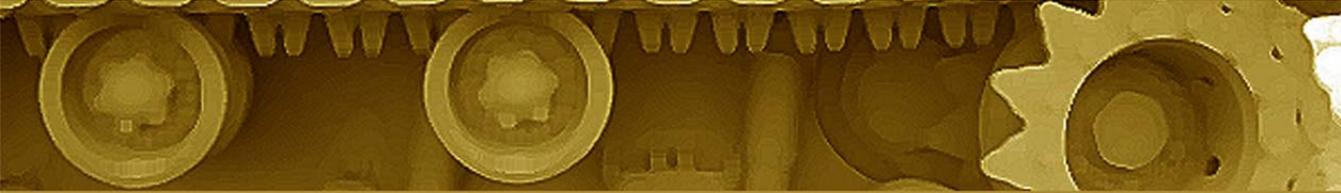
- [Army Regulation \(AR\) 420-72, Transportation Infrastructure and Dams](#)
- [Unified Facilities Criteria \(UFC\) 3-210-02, Design: POV Site Circulation and Parking](#)
- [Unified Facilities Criteria \(UFC\) 3-230-18FA, Design: General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas](#)
- [Unified Facilities Criteria \(UFC\) 3-260-02, Design: Pavement Design for Airfields](#)
- [Technical Manual \(TM\) 5-811-1/Air Force AFJMAN 32-1080, Electric Power Supply and Distribution](#)
- [Technical Manual \(TM\) 5-850-2/Air Force AFJMAN 32-1046, Railroad Design and Rehabilitation](#)
- [Manual For Railway Engineering](#)
- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)
- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Manual of Uniform Traffic Control Devices \(MUTCD\)](#)

## 9.15 REFERENCES

The following references are provided for guidance.

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 9](#)
- [U.S. Air Force, Landscape Design Guide, Parking Area](#)
- [U.S. Air Force, Landscape Design Guide, Walkways and Bikeways \(Provides a comprehensive walkways and bikeways planning guide including sections on paving materials and gradients and curvature data\).](#)
- [Chicago's Bike Lane Design Manual \(Provides a comprehensive series of technical drawings and design specifications for bike lanes\)](#)

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## Section 10 Landscape Design Standards

### 10.1 INTRODUCTION

The landscape design standards includes the selection, placement, and maintenance of plant material on the installation. Landscape plantings provide a simple and cost effective enhancement to the general appearance of the installation.

The visual image conveyed by a military installation is defined not just by architectural character and site organization, but also by an attractive, organized landscape design. The presence of plant material on the installation greatly enhances the visual character and environmental quality of the installation.

Plantings add an element of human scale to open spaces and can be used functionally to screen undesirable views, buffer winds, reinforce the hierarchy of the circulation system, or provide a visual transition between dissimilar land uses and can enhance force protection measures.

### 10.2 LANDSCAPE OBJECTIVES

#### 10.2.1 Overall Objective

Use plantings to create or limit access control, support surveillance, strategies and create a sense of territoriality and ownership.

Landscaping Standard. The first step is to decide what the desired force protection strategy is. What do we want to have seen and by who? Do we wish to have those outside of the site see internal traffic patterns, parking lots, or troop movements? The landscaping can support these choices.

Coordinate plantings with the lighting strategy. We do not want to have plantings block illumination from lighting fixtures (keep in mind the future growth of the plantings as well).

Trimming dense foliage 2-3 feet up from the base allows the legitimate population to see under the trees. When we can see under the trees we can be relatively certain that inappropriate people are not hidden amongst the trees.

Position trees far enough away from the buildings, walls and fences so that they cannot be used as a climbing aid.

Position trees so that they do not block desired surveillance from windows and doors of facilities.

Position trees and shrubs far enough back from walkways, bike paths and parked vehicles so that droppings from the trees do not interfere with planned use or create additional maintenance.

Use landscaping to guide users to desired areas of the property and discourage traveling in undesirable areas.

The overall objective of the use of plant material within the installation is to improve the physical and psychological well being of the people who live and work on the installation. This is achieved through the following objectives:

- Preserve and enhance urban trees, forest lands, and detailed planting features such as shrubs and groundcovers.
- Improve the overall visual quality of the installation through the use of materials native to Michigan to:
  - Blend to built environment with the natural environment.
  - Provide scale and comfort to pedestrian environments .
  - Reinforce the hierarchy of the circulation system.
  - Screen unsightly views or elements, making sure to provide alternate means of surveillance and access control to these locations.
  - Buffer incompatible land uses.
  - Minimize maintenance through the use of native plant materials that require less maintenance to survive.
  - Enhance Antiterrorism capabilities through placement of plantings. Careful placement can help unusual or undesirable activities stand out and allow them to be questioned. Through the use of berms, water features and other landscaping features, we are able to redirect blast should an explosive be detonated. Beautification of areas draws visual attention. This tactic can be used to get authorized personnel watching sensitive areas and will be more likely to notice those things out of the ordinary and report them.

### 10.3 PRINCIPLES OF LANDSCAPE DEVELOPMENT

#### 10.3.1 Landscape Design Principles

Landscape design is based on the following principles (Figure 10-1).

##### Unity

The selection and placement of plant material can be used to blend, screen, and soften incompatible architectural or other unattractive visual impacts where surveillance has been created through alternative means. Plant material as a unifying element can be placed in front of a building or view to frame and enhance the visual impact.

##### Balance

Plant material can be selected and placed to provide visual equilibrium or balance through the use of either a symmetrical or asymmetrical planting scheme. Symmetrical plantings are generally more formal while asymmetrical plantings are informal.

##### Contrast

Plant material can be selected and placed to provide differences in size and shape that add interest to the environment. Plants can be located to provide a backdrop for other plants such as a hedge behind a bed of annuals or perennials, leaving space to reduce the opportunity for hiding places.

##### Rhythm

Repetition of a single plant or a mass of plants provides visual interest and formality to the landscape. Rhythm produces emphasis and unity and is especially effective in articulating main circulation routes. It also communicates to the potential perpetrator that the site is cared for and about and when one is going from an uncontrolled environment to a controlled environment.

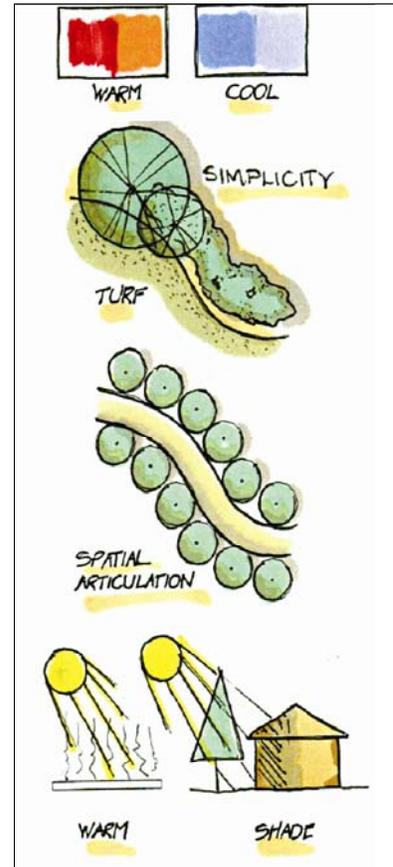
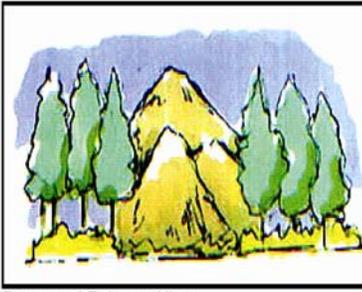


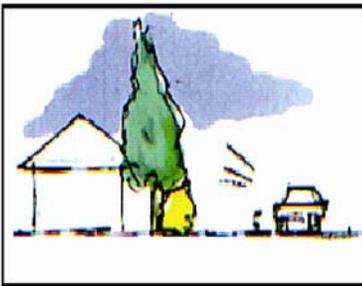
Figure 10-1 Principles of Design Illustrated



Frame and Enhance View



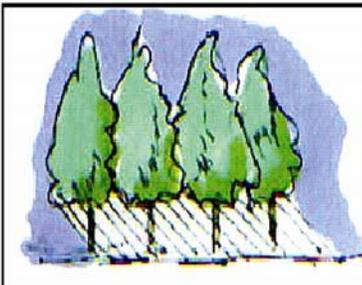
Energy Conservation



Noise Control



Wind Protection



Shade Provides Temperature Modification

**Figure 10-2** Plant Material Promotes Sustainability

### Color and Texture

Plants can be selected and placed to provide visual interest according to their color and texture. Colors are classified as either warm (red, orange, yellow) or cool (violet, blue, green). Texture is classified as either coarse or fine.

### Simplicity

Landscape plans should be broad and simple in form to limit excessive maintenance. Plant material should be grouped in beds with simple edges that are easy to mow. Small turf areas should be avoided because of the difficulty of mowing. The use of annuals should be minimal because of the high maintenance involved.

### Ultimate Effect

The landscape plan should be prepared with consideration for the mature size of all plants. The spacing of all material should utilize nursery industrial standards for mature material to account for spread as well as height. The ultimate height of the material should also be considered in relation to windows and other visual and surveillance concerns.

### Spatial Articulation

Plants can be selected and placed to create enclosed spaces or to separate spaces from one another. They can also be used to direct people by visually defining and reinforcing patterns of movement. The degree of enclosure, separation, or movement is dependent upon the density, form, and type of plants used.

Plants will be selected and placed to create a combination of physical barriers.

## **10.4 SUSTAINABLE LANDSCAPE DEVELOPMENT**

The use of plant material on the installation promotes the sustainability of the development. Trees, shrubs, groundcover, and vines provide aesthetic appeal as well as preservation of fauna and flora, energy conservation, climate modification, erosion control, air purification, and noise abatement (Figure 10-2). The use of non-native species will not be permitted without the permission of the DPW.

## **10.5 LANDSCAPE DESIGN GUIDELINES**

### **10.5.1 Proposed Plantings**

Proposed plantings must be reviewed to ensure that site conditions (soil, topography, adjacent uses, and architecture) and climatic criteria (sun, shade, and moisture requirements) are considered in the desired plant design and selection (i.e., form, texture, color, size). The uses and users of the site must also be considered. Landscape planting plans should be approved by qualified personnel to provide quality assurance and promote design consistency within each visual zone. Landscape planting plans will take force protection and anti-terrorism into consideration.

### **10.5.2 Landscaping Guidelines**

The following paragraphs present landscaping guidelines for the various locations of plant material use:

#### Foundation Planting

Foundation planting provides a green background for additional plantings, adds scale and character to the building, helps to integrate the building with its surroundings, screens HVAC and other utilities and helps create a sense of arrival. When developing foundation planting plans consideration should be given Antiterrorism measures (see [Antiterrorism Measures](#)).

- Focal and seasonal plantings should be located at building entries for pedestrian interest. These plantings should not be large enough to hide behind.
- Use the architecture of the building to evaluate the planting design and selection of plants.
- Plant materials should not block windows and views from interior spaces. If located outside of windows where children are inside, do not use prickly foliage as it may hold a child attempting to escape from a harmful situation such as a fire.
- Trees shall be setback from the building walls to provide space for mature growth, prevent climbing aids, and to prevent root systems from damaging the foundation.
- A symmetrical foundation planting design should be used for a symmetrical building.
- Due to the possibility of insect problems (bee stings, etc.) do not plant flowering plants near entrances.

### Screening

All landscape screens should be designed in context and concert with the force protection and anti-terrorism strategy.

### Windscreens

Use a combination of evergreen and deciduous trees to provide windbreak protection from prevailing winds. Windbreak plantings should be irregular in form, rather than straight and evenly spaced, in order to provide more effective wind control and to visually blend with the natural character of the installation.

### Screening of Dumpsters

Landscape planting should be used to supplement wood fence and masonry wall dumpster enclosures. Ensure trees are set back far enough as not to provide a climbing aid into the surround.

### Buffer Planting

Use a mixture of evergreen and deciduous trees and shrubs to visually separate land uses and to help separate visual zones.

### Open Space Planting

Enhance open space areas with planting. Use a mix of evergreen, deciduous, and flowering trees. Plant the same kind of trees in massive groupings to impact the vast open areas.

### Street Trees

Street tree plantings should be used to reinforce vehicular hierarchy, orient and direct traffic, upgrade views, and to visually de-emphasize on-street parking. Also, in the design of a street tree planting, separate plant species may be used to identify distinctive details or areas of the installation, for example, a particular land use relationship, historical district, community area, or other similar entity.

- Use formal street trees in single rows to visually reinforce primary and secondary roads. Use regularly spaced and uniformly shaped deciduous trees to provide a regimented appearance.
- Use informal groupings of street trees along tertiary routes. Utilize medium size deciduous trees to screen on-street parking along roadways. Set trees 1 to 2 meters (3 to 6 feet) from the back of curbs. Spacing should be uniform, except where curb cuts interrupt regular spacing.
- As a general rule, street trees should be deciduous species, resistant to salt and root pressure, and should have a 10' to 12' high clearance between the

street pavement and branch height to allow adequate clearance for pedestrian and vehicle traffic to pass unimpeded by lower branches.

- The street tree layout should be coordinated with the layout of proposed street lighting.
- Appropriate plant heights should be used within sight triangles to ensure safe views from intersections.
- Weeping trees should not be used in locations where they may hang over the roadway or block views.

#### Parking Lot Planting

Parking lots are often the least attractive elements on a military installation. The use of landscape plant material and earth berms can greatly improve the appearance of these areas as well as help define circulation and reduce heat gain during summer months.

- Use shade tree plantings at parking lots to reduce glare and moderate ambient air temperatures on the lot. Optimum spacing of parking lot shade trees is 10 to 12 meters (35 to 40 feet) on center.
- Choose trees and shrubs that require minimum maintenance and will not litter the parking area with leaves, fruit, or nuts.
- Consider sight distances and sight lines near entrances and exits when selecting and placing plant material.
- Select trees, shrubs, and ground covers that can withstand harsher conditions, such as sun, glare, heat, extended periods of freezing temperatures, and reduced water supply.
- Use a mix of evergreen and deciduous plant material to screen parking areas from adjacent uses.

#### Environmental Control Planting

When properly placed, plants can provide environmental benefits, as well as address visual concerns.

- Use deciduous trees and shrubs at courtyards, buildings and along streets to provide shade, moderate temperatures and reduce glare during the summer months while allowing solar exposure in the winter.
- Locate deciduous plantings on the southeast and southwest corner of buildings or courtyards to mitigate solar radiation and glare due to heat build-up and lower sun angles in the mid-morning and late afternoon hours.
- Use mixed massings of deciduous shrubs and evergreen trees and shrubs to provide sound control along primary and secondary roads.

#### Image Planting

The image of the installation is formed by the visual impressions that exist within the installation. The primary locations of highly visible images are the main gate, along primary circulation systems, and at areas of high concentrations of people. Features such as signs, statues, static displays, and other primary visual images can be improved by the use of trees, shrubs, and ground cover. Image planting is equally important in less utilized areas as those areas are more often where crimes take place. When more secluded, clearly demonstrate that they are cared for and about, they leave the potential predator with a greater sense that they will be seen and or caught if they misbehave in such areas.

#### Entrances to the Installation

The entrances and streetscapes into the installation are areas to place landscaping that will develop a strong visual image and provide visual interest during all four seasons. The entrance to the installation creates the first visual impression for the visitor.

- The landscape materials and planting areas should be proportional in scale to the hierarchy of the street on which they are located.
- Landscaping must be integrated with the Force Protection requirements of Section 12. Low shrubs, groundcover, annual/perennial plants and canopy trees provide seasonal interest as well as maintain views required to ensure force protection measures. Large evergreen trees are discouraged in these locations because they may obstruct sightlines and impact the need for force protection. Adequate lines of sight must be maintained for guard personnel to observe vehicular and pedestrian traffic approaching the gate.

#### Zeroscape

Where appropriate, to conserve water and lower maintenance consider zeroscaping.

#### Xeriscape

Xeriscape is the conservation of water and energy through creative and adaptive landscape design. Xeriscape landscapes provide attractive solutions that save money, water, and maintenance. The following website provides guidance on specific design principles of the xeriscape design process and xeriscape design application:

- [USAF Landscape Design Guide, Xeriscape.](#)

## 10.6 PLANT MATERIAL SELECTION

### 10.6.1 Elements

Trees, shrubs, ground cover and turf are the major elements of a planting composition. Basic plant selection criteria should consider creating a unified composition utilizing native materials for low maintenance and sustainability, avoiding incompatible colors, textures and forms, and matching the appropriate plant to the land use, situation, and environmental condition.

### 10.6.2 Selection

The ability of plant material to provide lasting benefit is dependent upon the plant's hardiness and its appropriateness to the site use. Major factors affecting plant hardiness are soil type and organic content, temperature, moisture and light. These climatic conditions can be modified to an extent by specific site conditions, such as wind protection, solar orientation, and planting design, to create microclimates.

### 10.6.3 Arrangement

Selecting appropriate plants for a given condition is only one aspect of planting design. Compositional arrangement to provide texture variety and to accent site and building features is another. The selection and composition of a planting design requires an understanding of each plant's characteristics, form, and environmental needs as well as how each plant can relate to and complement other plants in the design. Plants are used in four basic design categories (Figure 10-3):

- Canopy
- Barrier
- Screen (or Baffle)
- Groundcover

## 10.7 PLANT PALETTE AND PLANT CATEGORIES

### 10.7.1 The Plant Palette and Categories

The Plant Palette and categories are designed to help the designer choose the best plant for each particular set of design requirements. The plants that

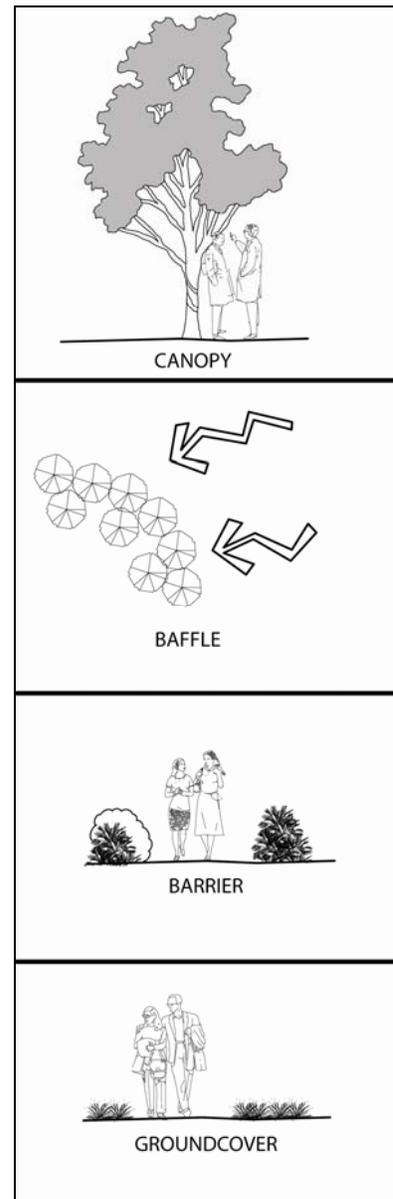
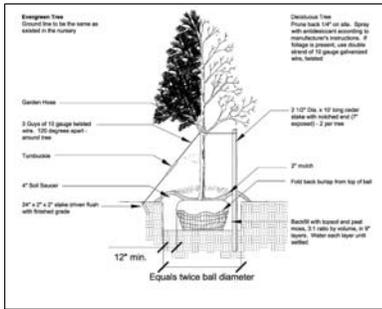
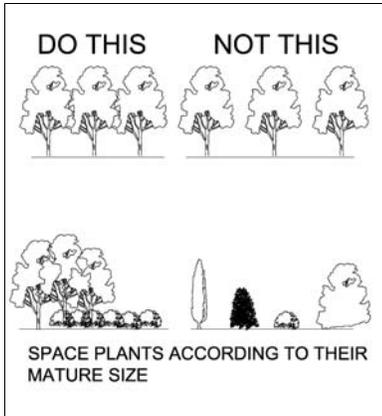


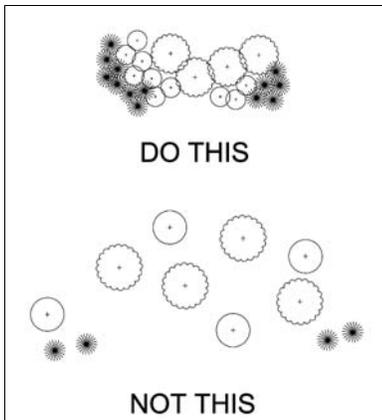
Figure 10-3 Design Categories



**Figure 10-4** Install Plant Material According to Industry Standards



**Figure 10-5** Space Plants according to their Mature Size



**Figure 10-6** Grouped Plants Have Greater Impact

appear on the palette and in the categories were selected for their hardiness and their ability to survive in this geographical area. To use them effectively, the design requirements must be well defined for the specific site.

### 10.7.2 The Plant Palette

A select group of plant materials has been divided into the following six categories:

- deciduous trees
- coniferous trees
- deciduous shrubs
- coniferous shrubs
- broadleaf evergreen shrubs
- groundcover and vines

On the palette, the plants appear in alphabetical order by their botanical name, followed by their common name, design characteristics, cultural information, recommended use, and miscellaneous notes. The plant palette is presented in a matrix format in [Appendix O](#).

### 10.7.3 The Plant Categories.

Plants from the plant palette with similar characteristics have been cataloged in the Plant Categories. These characteristics could be cultural (e.g., upright, narrow form), environmental (e.g., shade tolerant), ornamental (e.g., red fall color), or functional (e.g., screening plant). Characteristics include: Cultural Conditions (mature height and spread, form and growth rate, disease and pest resistance), Environmental Conditions (sun/shade, pH range, soil moisture required, and wind/sun), and Ornamental Characteristics (flower color, autumn color, fruit color, and/or summer leaf color).

Each category describes a list of plants that share a similar quality. For example, materials that are shade tolerant would be placed in the Shade Tolerant group under the "Environmental Conditions" heading. To further explain the Categories, under the "Environmental Conditions" heading, in the Shade Tolerant group, all shade tolerant deciduous trees would be listed under "Deciduous Trees"; all shade tolerant Coniferous trees would be listed under "Coniferous Trees"; and so on.

## 10.8 PLANT MATERIAL INSTALLATION

### 10.8.1 Quality

A key step in assuring successful planting is to select plants of the highest quality. Plant material should be of the size, genus, species, and variety to comply with the recommendations and requirements of the "American Standard for Nursery Stock" ANSI Z60.1 (Figure 10-4).

### 10.8.2 Review

As part of the design process and prior to plant installation, review the installation's Master Plans, Basic Information Maps, or As Built Drawings for utility locations and verify with the Directorate of Public Works or equivalent.

### 10.8.3 Planting

The planting and establishment of trees, shrubs, ground covers, and vines is detailed in [TM 5-803-13](#), Chapter 3.

### 10.8.4 General Guidelines for Plant Installation

- At planting time, thin plants by removing one-third of the vegetative material.
- Spray all evergreens with an antidesiccant within 24 hours of planting.
- Water all plants thoroughly during the first 24-hour period after planting.
- Site all plants and stakes plumb.

- Space plants according to their mature size (Figure 10-5).
- Install plant materials in groups for greater impact (Figure 10-6).
- Installation of lawn areas.
- Installation techniques for turf are detailed in [Unified Facilities Criteria \(UFC\) 3-210-05FA, Design: Landscape Design and Planting Criteria, Chapter 4](#). The details include site evaluation, site preparation, selection of turf, and maintenance requirements.

## 10.9 MAINTENANCE OF PLANT MATERIAL

### 10.9.1 Goal

The ease of maintenance should be one of the primary goals when considering the success of any planting design.

### 10.9.2 Pruning

In general plant material should be allowed to conform to its natural shape. This practice allows the plant to mature in a health manner, and saves the time and energy required for trimming. The pruning of trees and shrubs is done to maintain overall plant health, direct plant growth, maintain a desired shape, and increase flower or fruit development.

#### Pruning Shrubs

- Do not prune shrubs flat across the top (Figure 10-7).
- Prune branches yearly on thick-branched shrubs and at the base of the shrub.
- When pruning deciduous shrubs prune shrub stems as close to the ground as possible and shrub branches as close to the stem as possible.
- When "thinning out" deciduous shrubs prune about one-third of all branches where they meet their main stem.

#### Pruning Trees

- Remove a large limb by making three cuts as follows:
- Make the first cut at the bottom of the branch 12-24" from the branch attachment (Cut A, Figure 10-8).
- Make the second cut on the top of the branch within 1" of the undercut (Cut B, Figure 10-8).
- Make the final cut just beyond the outer portion of the branch collar (Cut C, Figure 10-8). The first two cuts were necessary to remove the weight of the branch to allow cut #3 to be clean without ripping the bark.
- Never cut the central leader of the tree.
- Coniferous evergreens trees should be pruned, during the spring, by snipping off new growth. Avoid geometrically shaping plant material while pruning.

### 10.9.3 Mulching

Use mulch around the base of plant material to provide for greater moisture and help inhibit the growth of weeds and grasses. Mulch should be maintained at a depth of two (2) to four (4) inches. Avoid the use of artificially colored or treated mulch.

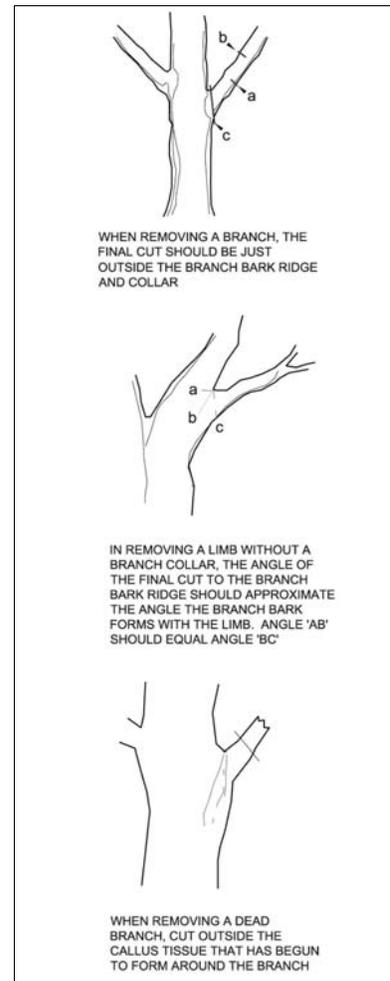
The best time to mulch for water conservation is in the late spring. Apply mulch immediately to new fall plantings.

### 10.9.4 Ground Cover Maintenance

Although ground covers do not require pruning, they may be periodically dug up in the spring or fall for propagation and to prevent overcrowding in their beds.



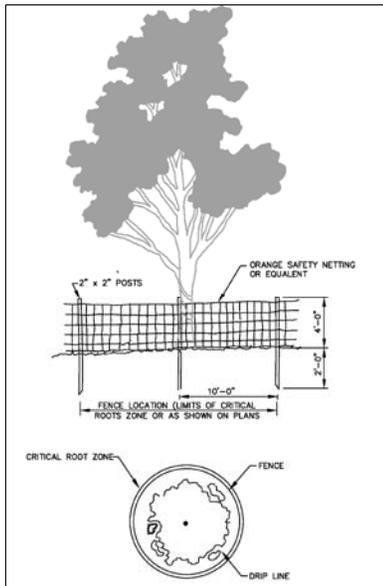
**Figure 10-7** Proper Shrub Pruning Technique



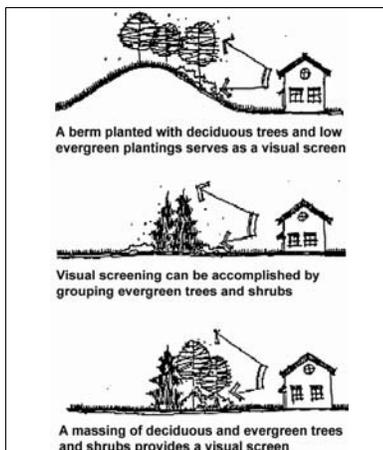
**Figure 10-8** Proper Tree Pruning Procedure

**10.9.5 Landscape Maintenance Schedule**

The general objective of a landscape maintenance schedule is to ensure an orderly and efficient care of the grounds. The landscape maintenance schedule included in the Army Installation Design Guide ([See Appendix F](#)) identifies times throughout the year when specified maintenance should be undertaken. Use of the landscape maintenance schedule will improve all aspects of landscape on the installation. Materials and supplies can be ordered in a timely fashion, manpower needs can be calculated and anticipated, and a correlation between the level of maintenance and appropriate cost can be derived.



**Figure 10-9** Construct a Barrier at Drip Line During Construction to Maintain Grade



**Figure 10-10** Use Trees to Obscure Sight Lines

## 10.10 TREE PROTECTION AND PRESERVATION

### 10.10.1 Preservation

Existing urban trees and forest should be preserved if they are in good health. Construction should be planned to provide for the preservation of significant trees.

### 10.10.2 Protection

During the clearing and construction process, trees should be protected from damage (Figure 10-9). Construction barricades should be erected to protect the existing trees to be preserved. The barricades should be no closer to the trunk of the tree than one-half the distance from the trunk to the drip line. Existing trees that cannot be preserved should be considered for transplanting to a different location on site or to a different site.

### 10.10.3 Topography

Changes in the grade of the soil around trees can cause extensive root damage and eventually death of the tree. To prevent damage to the tree, it is important to maintain the existing grade for least the size of the tree's canopy (the drip line).

## 10.11 ANTI-TERRORISM/FORCE PROTECTION CONSIDERATIONS

### 10.11.1 Plants and Security Impacts

The presence of vegetation on an installation can have both beneficial and detrimental impacts on security. The selection and placement of landscape plant material on Army installations is an integral element in the provision of protective measures to reduce the threat of terrorism as well as the general safety of those on base.

### 10.11.2 Selection

Proper selection and placement of trees and shrubs can be utilized to provide visual screening without creating concealment for covert activity. The landscape architect responsible for tree placement should work closely with installation force protection experts to design a landscape plan that provides visual screening without compromising Antiterrorism measures.

### 10.11.3 Design Aspects

The plant material must support the chosen surveillance strategy. The landscape architect should incorporate the following aspects into the design (Figure 10-10):

- Avoid conditions within 10 meters (33 feet) of inhabited structures that permit concealment of aggressors or obscure the view of objects or packages 150-millimeters (6 inches) in height from the view of security personnel. This results in the placement of shrubs and trees that are loose rather than dense in growth habit and possess multiple small stems rather than a single trunk that will obscure a 150 mm (6 inch) package.
- Vegetation groupings provide reduction of blast effect.
- Plant material selection and placement shall minimize potential hiding places for bombs and aggressors.
- Provide vegetation screens for play areas and outdoor recreation areas to obscure from off-installation view.
- Use trees to obscure sight lines of on-installation buildings from off-installation buildings.
- Certain species of plants are thorny and can be used as an access control tactic

## 10.12 ARMY STANDARDS

The cited Army Standards shall be met.

- [Army Regulation \(AR\) 420-70, Buildings and Structures](#)
- [Unified Facilities Criteria \(UFC\) 3-210-05FA, Design: Landscape Design and Planting Criteria](#)
- [Technical Manual \(TM\) 5-630, Natural Resources Land Management](#)
- American Standard for Nursery Stock, ANSI Z60.1
- Overseas (Host Nation Standards)

## 10.13 REFERENCES

The following references are provided for guidance.

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 10](#)
- [USAF Landscape Design Guide](#)
- C. Brickell and D. Joyce. Pruning and Training, 1996.



## Section 11 Site Element Design Standards

### 11.1 INTRODUCTION

#### 11.1.1 Site Elements

Site elements include all visual elements of the installation that are considered utilitarian in use. These elements include the following four categories of utilitarian amenities:

- Site Furnishings
- Signs
- Lighting
- Utilities

#### 11.1.2 Sub-Components

The four sub-components provide dominant visual impacts within the installation. The specific site element features and equipment should, to the extent possible, reflect the local or regional design standards. This allows for ease of maintenance and blending into the local community. The four sub-components and their visual impacts are discussed in detail in this chapter.

#### 11.1.3 Overseas Installations

Overseas installations should reflect consideration of local design standards.

### 11.2 SITE ELEMENT OBJECTIVES

#### 11.2.1 Sustainability

The site element plans for existing and future installation use should be prepared and the site elements selected to enhance the sustainability of the installation. To this end, site elements should meet the following objectives:

- Provide site elements that are appropriate to their intended function.
- Establish a coordinated system of site elements that provide consistency and continuity throughout the installation to convey a sense of organization.
- The design and location of the various site elements should express an image, character, and scale appropriate to the installation.
- Design and locate all site elements to meet AT/FP requirements.
- Use recycled/salvaged materials wherever possible.
- Minimize maintenance and repair through the use of efficient products that are vandal-proof.
- Minimize negative visual impacts of all utility systems while ensuring alternative means of surveillance.
- Minimize environmental impacts of all utility systems.

## 11.3 SITE FURNISHINGS

### 11.3.1 Accessibility

Site furnishings include all of the utilitarian outdoor amenities found on an installation. These outdoor furnishings should be located in coordinated clusters to provide areas of multi-furnishing amenities, and avoid the haphazard proliferation of furniture elements around the installation. All furnishings shall be accessible to, and usable by, persons with disabilities, in accordance with the requirements of the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#) and the [Uniform Federal Accessibility Standards \(UFAS\)](#)<http://www.ccb.org/ufgs/ufgs.htm>, with the most stringent standards to apply in the event of conflicts.

### 11.3.2 Types

Site furnishings include the following:

- Seating
- Tables
- Telephone Booths & emergency phones
- Shelters
- Kiosks
- Walls and Fences
- Trash Receptacles
- Dumpsters
- Flagpoles
- Movable Planters
- Bicycle Racks
- Tree Grates
- Bollards
- Play Equipment
- Mailboxes
- Monuments, Memorials, Military Equipment Static Displays
- Drinking Fountains

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Powder coated cast aluminum</p> <p><b>Finish:</b> Black</p> <p><b>Size:</b> 72" Length</p> <p><b>Manufacturer:</b> Landscape Forms (or equal) 1.800.521.2546</p> <p><b>Model:</b> Scarborough (or equal)</p>	<p><b>Material:</b> Powder coated cast aluminum</p> <p><b>Finish:</b> Black</p> <p><b>Size:</b> 72" Length</p> <p><b>Manufacturer:</b> Landscape Forms (or equal) 1.800.521.2546</p> <p><b>Model:</b> Scarborough (or equal)</p>	<p><b>Material:</b> Pre-cast Concrete</p> <p><b>Finish:</b> Weatherstone B2-French Grey</p> <p><b>Size:</b> 72" Length</p> <p><b>Manufacturer:</b> Wausau Tile (or equal) 1.800.388.8728</p> <p><b>Model:</b> Terra Form (or equal)</p>

### 11.3.3 Seating

Seating includes benches and walls, as well as tables and movable chairs.

#### Benches

- Bench Location

Benches should be located in areas of high pedestrian use, and arranged to encourage socialization within a pleasant outdoor setting. This includes pedestrian nodes along primary walkways, courtyards, and at bus stops.

- Bench Siting

Benches should be sited on and secured to concrete pads adjacent to walkways. Provide proper clearance around benches, a minimum 2'0" setback from adjacent sidewalks and a minimum of 5'0" between front of bench and any stationary obstacle. Provide appropriate planting treatment for visual definition and seasonal shade.

- Bench Design

Standard bench size should be 6'-0" long. Metal support base should have a dark brown factory finish to match standard trim color. Bench dimensions should meet specifications presented in the [Technical Manual \(TM\) 5-803-5. Installation Design Manual](#), Fig. 2.5, page 8. Wall mounted benches should be similar in style and color to free standing benches.

#### Seating Walls

- Seating Walls Location

Wherever possible, seating should be incorporated into planter boxes or retaining walls, particularly at building entrance area. Seating walls should be integrated into the overall area design and the pedestrian circulation system.

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Pre-Cast Concrete <b>Finish:</b> Weatherstone B2-French Grey (or equal)</p> <p><b>Size:</b> 66" Diameter <b>Manufacturer:</b> Wausau Tile (or equal)</p> <p><b>Model:</b> 1.800.388.8728 Terra-Form – TF3035 (or equal)</p>	<p><b>Material:</b> Pre-Cast Concrete <b>Finish:</b> Weatherstone B2-French Grey (or equal)</p> <p><b>Size:</b> 66" Diameter <b>Manufacturer:</b> Wausau Tile (or equal)</p> <p><b>Model:</b> 1.800.388.8728 Terra-Form – TF3035 (or equal)</p>	<p><b>Material:</b> Pre-Cast Concrete <b>Finish:</b> Weatherstone B2-French Grey (or equal)</p> <p><b>Size:</b> 66" Diameter <b>Manufacturer:</b> Wausau Tile (or equal)</p> <p><b>Model:</b> 1.800.388.8728 Terra-Form – TF3035 (or equal)</p>

Seating Wall Design

Seating walls should generally be between 18" and 22" high, and 12" to 18" wide and constructed of textured concrete or brick in a manner to complement or match the materials of the adjacent buildings.

**11.3.4 Tables**

Locate tables together with seating that is oriented to the user needs of socializing, relaxing, or eating in less formal spaces with a pleasant setting and attractive view. Design tables so that they are either secure to their base or securable to one another so they cannot be moved by unauthorized persons. Commonly tables are moved to provide climbing aids.

- Table Location

Small groupings of tables in high visibility areas should be placed within proximity of recreation or food service facilities. These groupings should be located on hard pavement areas adjacent to walkways. Pavement should be constructed of exposed aggregate or broom finish concrete. Incorporate tree plantings and overhead trellis structures within these areas to provide shade and spatial definition.

**11.3.5 Telephone Booths**

Telephone booths should be incorporated into building architecture, utilizing building recesses and overhangs, or integrated into bus or other shelters. Provide a minimum 3'0" clearance between booths and the edge of walkways. All service line wiring should be underground or concealed. Booths should be equipped with lighting for nighttime use. In sheltered areas, use standard wall-mounted phone enclosures.

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Aluminum Frame and Steel Posts</p> <p><b>Finish:</b> Graphite</p> <p><b>Size:</b> Approx. 10' L x 10' W</p> <p><b>Manufacturer:</b> Landscape Forms (or equal) 800.521.2546</p> <p><b>Model:</b> Kaleidoscope (or equal)</p>	<p><b>Material:</b> Aluminum Frame and Steel Posts</p> <p><b>Finish:</b> Graphite</p> <p><b>Size:</b> Approx. 10' L x 10' W</p> <p><b>Manufacturer:</b> Landscape Forms (or equal) 800.521.2546</p> <p><b>Model:</b> Kaleidoscope (or equal)</p>	<p><b>Material:</b> Steel Frame and Roof</p> <p><b>Finish:</b> Sierra Tan (roof); Traffic White (frame) (or equal)</p> <p><b>Size:</b> 10' x 20"</p> <p><b>Manufacturer:</b> Classic Recreation (or equal) 800.697.2195</p> <p><b>Model:</b> Orlando (or equal)</p>

### 11.3.6 Shelters

There are many different types of shelters on military installations. Shelters are provided for those waiting for buses, and in areas where people congregate to socialize or eat such as in courtyards or picnic areas.

#### Picnic Shelters

- Picnic Shelter Location

Picnic shelters should be strategically located and sized for shared use to discourage the proliferation of small shelters scattered throughout the installation.

- Picnic Shelter Design

Picnic shelters can be open on all sides. The minimum size should be 20 feet square with a minimum 8-foot vertical clearance.

#### Bus Shelters

- Bus Shelter Location

Bus shelters should be located at major facilities along the bus route such as Commissary/Post Exchange areas, barracks areas, Hospital, and Library. Bus stops should relate to major pedestrian walkways, and be placed on concrete pads. Provide a minimum 3'0" clearance between shelters and the edge of walks. Ensure that these bus stops and their paths do not provide outsiders with undesirable surveillance over the site.

- Bus Shelter Design

Bus shelters should provide protection from wind, rain, and sun with an overhead roof with enclosure on three sides. Side enclosures should be a transparent, unbreakable type material to allow for adequate visibility. Bus shelter design typically should be simple and consistent throughout the post, matching the existing units in terms of materials, scale, and detail. Shelter design should have similar character as that for kiosks and vending machine shelters. Bus shelters should have a minimum size of 5' by 8' with a minimum height of 6'-6" from floor to underside of roof. The shelters should include an

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Aluminum Frame and Face Panel Extrusions</p> <p><b>Finish:</b> Silver</p> <p><b>Size:</b> 15' width and 5' depth</p> <p><b>Manufacturer:</b> Forms + Surfaces (or equal) 800.451.0410</p> <p><b>Model:</b> Arcus (or equal)</p>	<p><b>Material:</b> Aluminum Frame and Face Panel Extrusions</p> <p><b>Finish:</b> Silver</p> <p><b>Size:</b> 15' width and 5' depth</p> <p><b>Manufacturer:</b> Forms + Surfaces (or equal) 800.451.0410</p> <p><b>Model:</b> Arcus (or equal)</p>	<p><b>Material:</b> Steel Roof</p> <p><b>Finish:</b> Sierra Tan (roof); Traffic White (frame)</p> <p><b>Size:</b> 6' x 8'</p> <p><b>Manufacturer:</b> Classic Recreation (or equal) 800.697.2195</p> <p><b>Model:</b> Orlando Kiosk (or equal)</p>

integral bench. A trash receptacle, and ashtray should be located nearby but not attached to the bus stop to create a standoff distance from an area where potentially large numbers of people may gather.

### 11.3.7 Kiosks

- Kiosks Location

Kiosks can be used as information centers at pedestrian nodes within the town center. Provide kiosks only where they are needed on a concrete base adjacent to walkways. Allow a minimum of 3' clearance on all sides.

- Kiosks Design

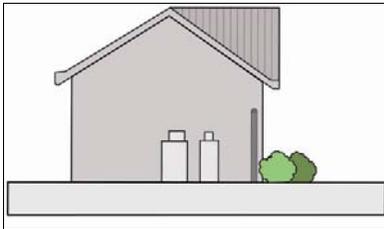
Kiosk design should blend compatibly with other site furnishings and with the architectural character of the zone in terms of form, scale, and materials. A similar design treatment should be established for kiosks and shelters.

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Metal</p> <p><b>Finish:</b> Polyester Powdercoat, Black</p> <p><b>Size:</b> As Appropriate</p> <p><b>Manufacturer:</b> Monumental Iron Works, Inc. (or equal)</p> <p><b>Model:</b> Estate K, Flat Top Pickets (or equal)</p>	<p><b>Material:</b> Metal</p> <p><b>Finish:</b> Polyester Powdercoat, Black</p> <p><b>Size:</b> As Appropriate</p> <p><b>Manufacturer:</b> Monumental Iron Works, Inc. (or equal)</p> <p><b>Model:</b> Estate K, Flat Top Pickets (or equal)</p>	<p><b>Material:</b> Hot Dipped zinc Coated Steel Plus Optional PVC or Polyester Coating Black or Green</p> <p><b>Finish:</b> As Required</p> <p><b>Size:</b> As Required</p> <p><b>Manufacturer:</b> Riverdale (or equal) 800.762.6374</p> <p><b>Model:</b> Wire Wall (or equal)</p>

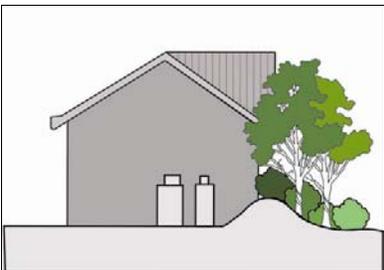
### 11.3.8 Walls and Fences

#### Location and Use

Walls and fencing should be used to provide visual screening, define pedestrian plaza areas, wind screening, direct pedestrian and vehicular access, security, and to retain soil. The design of walls and fences should fulfill their function in harmony with the character and appearance of their setting and within the context of the force of protection strategy.



**Figure 11-1** Screen Wall Hides Mechanical Equipment



**Figure 11-2** Berm and Shrubs Hide Mechanical Equipment

#### Walls

Low walls should be used to define pedestrian court areas and provide informal seating. Screening walls can be used where appropriate to screen building service areas. Walls adjacent to walkways should be free of any projections, such as signs or drain pipes that would pose a hazard to passing pedestrians. Construction of walls should incorporate either brick to match adjacent buildings, with stone or concrete cap, or concrete with a textured finish and stone or concrete cap. Retaining walls may be constructed of brick, native stone, versa-lock modular stone with a light tan finish, or concrete block with a light tan stucco finish, concrete block planters, or other appropriate material (Figure 11-1). Walls used to screen service areas or trash enclosures should incorporate landscape plantings to help reduce the negative visual impact (Figure 11-2).

#### Fences

Fences should be utilized as a movement indicator, showing when someone has passed from one area into another with different expectations, to support access control, to create territoriality and for selective screening of service areas and site utilities, such as dumpsters. Fencing design and construction should be coordinated with the ATFP plan; supporting surveillance, access control. Territoriality, maintenance, receptivity, communication and community buy-in. Chain link fencing can be easily climbed over, cut through or crawled under. For this reason, when chain link is used, its limitations must be understood and coordinated with support elements such as positive surveillance, diligent maintenance, etc. Screen fencing should consist of square tubular metal posts and rails with vertical wood fence boards. All fence posts

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Powder Coated Cast Aluminum</p> <p><b>Finish:</b> Black</p> <p><b>Size:</b> 30 Gallon</p> <p><b>Manufacturer:</b> Landscape Forms (or equal) 800.521.2546</p> <p><b>Model:</b> Scarborough (or equal)</p>	<p><b>Material:</b> Precast Concrete</p> <p><b>Finish:</b> WEatherstone B2 - French Grey (or equal)</p> <p><b>Size:</b> 20 Gallon</p> <p><b>Manufacturer:</b> Wausau Tile (or equal) 800.388.8728</p> <p><b>Model:</b> Terra Form – TF2085 (or equal)</p>	<p><b>Material:</b> Precast Concrete</p> <p><b>Finish:</b> WEatherstone B2 - French Grey (or equal)</p> <p><b>Size:</b> 20 Gallon</p> <p><b>Manufacturer:</b> Wausau Tile (or equal) 800.388.8728</p> <p><b>Model:</b> Terra Form – TF2085 (or equal)</p>

should be securely anchored with concrete footings. All metal posts and framework should be painted standard dark brown and wood fencing should be western cedar. Hardware shall be stainless steel to prevent rust. Chain link fences should be screened with trees and shrubs. The use of chain link fence should be held to a minimum in the cantonment area.

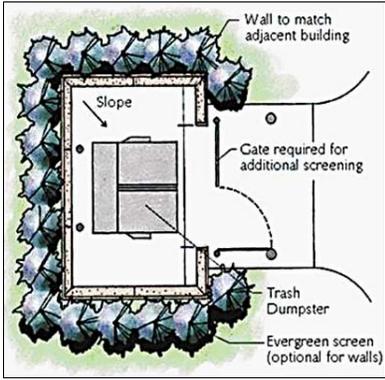
### 11.3.9 Trash Receptacles.

#### Trash Receptacle Location

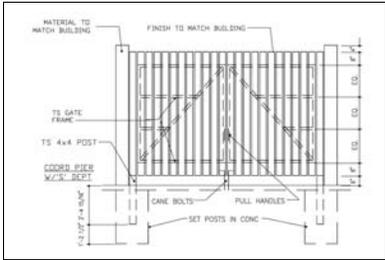
Trash containers should be highly visible and accessible for effective litter control. Containers should be located conveniently, but set back from walkways, major pedestrian intersections, building entrances and seating and eating areas. Antiterrorism/force protection requirements restrict the location of dumpsters to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas (*Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, Table B-1*).

#### Trash Receptacle Design

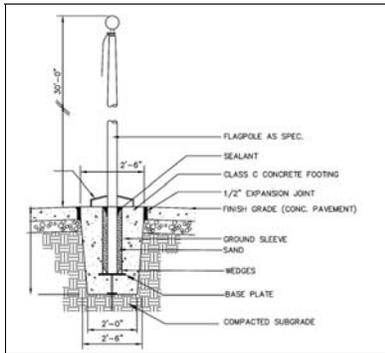
Container should be of a design that is compatible and in harmony with other site furnishings, be securable to the surface it is mounted on, and have a securable lid. Blast resistant trash cans are also available for locations immediately outside of entrances and in other gathering areas.



**Figure 11-3** Dumpster Enclosure Plan



**Figure 11-4** Dumpster Enclosure Elevation



**Figure 11-5** Standard Flagpole

**Dumpsters**

• **Dumpster Location**

The location of dumpsters can have a significant visual impact and should be addressed as part of an overall building design and incorporated in site planning. To the greatest extent possible, incorporate dumpster placement into areas screened with walls, fencing, or plant material (Figure 11-3 and Figure 11-4) provide alternative means of surveillance for these areas. Avoid locating dumpsters along major circulation or use areas. Dumpsters should be directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles. Antiterrorism/force protection requirements restrict the location of dumpsters to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas (*Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, Table B-1*)

• **Dumpster Site Design**

Incorporate plantings to buffer the visual impact of screen walls. Walls or fencing should be a maximum 6’ in height and provide a securable enclosure. Provide a minimum 3’ clearance on each side between screen walls and dumpsters to allow adequate pedestrian and truck access. All dumpsters should be placed on concrete pads with aprons large enough to encompass the bearing points of the service vehicle. If the enclosure is not designed to be securable, the dumpsters themselves should be maintained secure.

**11.3.10 Flagpoles**

The standard flagpole for Detroit Arsenal will be tapered mill finish aluminum, fitted with a gold anodized finish “ball” finial. The mounting detail should be simple with a concrete base flush at grade. A concrete pad should be used when poles are located in lawn areas. In plaza areas, flagpole locations and mounting detail should be integrated into the paving pattern. Flagpoles should include lighting and may be accented with planting beds around the base of the flagpole (Figure 11-5).

Administration		Research and Development		Industrial/Warehouse	
					
<b>Material:</b>	Polyethylene	<b>Material:</b>	Polyethylene	<b>Material:</b>	Precast Concrete
<b>Finish</b>	Polyethylene	<b>Finish</b>	Polyethylene	<b>Finish</b>	WEatherstone B2 - French Grey
<b>Size:</b>	Varies	<b>Size:</b>	Varies	<b>Size:</b>	Varies
<b>Manufacturer:</b>	Landscape Forms (or equal) 800.521.2546	<b>Manufacturer:</b>	Landscape Forms (or equal) 800.521.2546	<b>Manufacturer:</b>	Wausau Tile (or equal) 800.388.8728
<b>Model:</b>	Rosa (or equal)	<b>Model:</b>	Rosa (or equal)	<b>Model:</b>	Terra Form – TF4144 (or equal)

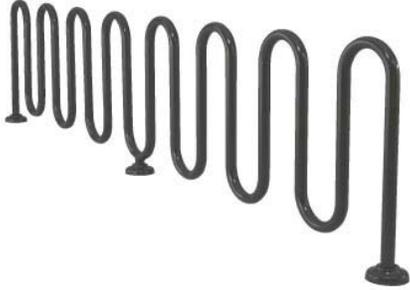
### 11.3.11 Planters

#### Location

Movable pre-cast concrete planters may be used outside building entrances to provide seasonal color and interest, and function as physical barriers to cars and most small trucks. Planters should be located so they block uninterrupted vehicular access to a building, but not so they excessively impede pedestrian movement. Several planters of various sizes should be grouped together to produce an aesthetically pleasing display.

#### Planters Sizes and Design

Planters and the plants within them should not provide areas of concealment, either in or behind.

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Powder Coated Metal  <b>Finish</b> Silver  <b>Size:</b> 55" Height  <b>Manufacturer:</b> Landscape Forms (or equal)              800.521.2546  <b>Model:</b> Pi Bike Rack              (or equal)</p>	<p><b>Material:</b> Powder Coated Metal  <b>Finish</b> Silver  <b>Size:</b> 55" Height  <b>Manufacturer:</b> Landscape Forms (or equal)              800.521.2546  <b>Model:</b> Pi Bike Rack              (or equal)</p>	<p><b>Material:</b> Structural Steel  <b>Finish</b> Mesa Tan  <b>Size:</b> 7' Long  <b>Manufacturer:</b> Madrax (or equal)              608.831.9040  <b>Model:</b> Circa 2000 – CIR-6              (or equal)</p>

**11.3.12 Bicycle Racks**

Bicycle racks should be provided at key destination locations. They should be located on a concrete surface where they will not impede pedestrian movement or block building entrances.

A ribbon type tubular aluminum bike rack with an anodized dark bronze finish is the post standard. Bicycle storage areas near barracks should be covered.

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Cast Iron</p> <p><b>Finish</b> Black Powder Coat</p> <p><b>Size:</b> 60" x 60"</p> <p><b>Manufacturer:</b> Ironsmith (or equal) 800.338.4766</p> <p><b>Model:</b> Market Street (or equal)</p>	<p><b>Material:</b> Cast Iron</p> <p><b>Finish</b> Black Powder Coat</p> <p><b>Size:</b> 60" x 60"</p> <p><b>Manufacturer:</b> Ironsmith (or equal) 800.338.4766</p> <p><b>Model:</b> Market Street (or equal)</p>	<p><b>Material:</b> Cast Iron</p> <p><b>Finish</b> Black Powder Coat</p> <p><b>Size:</b> 60" x 60"</p> <p><b>Manufacturer:</b> Ironsmith 9or equal) 800.338.4766</p> <p><b>Model:</b> Market Street (or equal)</p>

**11.3.13 Tree Grates**

Tree grates should be used when installing trees in large paved areas such as pedestrian plazas, walks, and ceremonial entrance courts. Tree grates and planting pits should be a minimum of 5' x 5'.

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Structural steel with Cast Aluminum</p> <p><b>Finish:</b> Black</p> <p><b>Size:</b> 12" Diameter</p> <p><b>Manufacturer:</b> Landscape Forms (or equal) 800.521.2546</p> <p><b>Model:</b> Annapolis (or equal)</p>	<p><b>Material:</b> Stainless steel</p> <p><b>Finish:</b> Brushed Stainless Steel</p> <p><b>Size:</b> 6 1/8" x 38 3/8"</p> <p><b>Manufacturer:</b> Bega (or equal) 805.684.0533</p> <p><b>Model:</b> 8216P (or equal)</p>	<p><b>Material:</b> Precast Concrete</p> <p><b>Finish:</b> Weatherstone B2-French Grey</p> <p><b>Size:</b> 12" Diameter</p> <p><b>Manufacturer:</b> Wausau Tile (or equal) 800.388.8728</p> <p><b>Model:</b> Terra-Form – TF6005 (or equal)</p>

**11.3.14 Bollards**

Bollards are utilized to separate vehicular and pedestrian traffic, to direct access, or as decorative elements in pedestrian areas. Be careful that bollard placement does not pinpoint sensitive areas of weakness to the potential perpetrator.

**11.3.15 Playgrounds and Tot/Lots**

Not Applicable to Detroit Arsenal

**11.3.16 Mailboxes**

Location

All mailboxes should be located in close proximity to the facility they serve. However, when locating mailboxes consider the potential for the site element being used as a container for the concealment of explosive, etc. Consider Antiterrorism/force protection requirements for locating similar container types i.e. trash receptacles which are located a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas ([Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, Table B-1](#)).

The location should be coordinated with the Postal Services. Consider installing the mailboxes on the inside of semi-controlled or controlled spaces.

If group mailboxes are required, provide central locations for them adjacent to hard-surface walkways but not to impede pedestrian movement.

Erect a central mail screening area prior to distributing mail to those on site. This site should be maintained some distance from other inhabited areas and should have appropriate ventilation and access control support.

### 11.3.17 Monuments, Memorials, and Military Equipment Static Displays

#### Monuments and Static Displays

Monuments and static displays should be carefully designed and placed in prominent locations to serve as visual focal points within the installation. Static displays of equipment should be consolidated in one location to create a central museum or exhibition facility within the installation. Building names should not give away the building purpose. Knowing that a building serves telecommunications, for example, can allow a terrorist to strike that building first, potentially limiting communications during the remainder of an attack.

#### Memorials

Memorials will conform to the guidance set forth in [Army Regulation \(AR\) I-33, Memorial Programs](#).

### 11.3.18 Drinking Fountains

Outdoor drinking fountains should not be provided, except to support larger playgrounds, outdoor recreation facility complexes, and outlying recreation areas if convenient to a potable water supply line. Steps should be provided for children and meet the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#) and [Uniform Federal Accessibility Standards \(UFAS\)](#)<http://www.ccb.org/ufgs/ufgs.htm> standards.

## 11.4 SIGNS

### 11.4.1 Purpose

Signs are used to visually communicate information. They are highly visible features that should be attractive and compatible with their surroundings. Careful consideration must be given to what a sign says, how it is said, its visual appearance and organization, its location, structural support system, and relation to other signs within the installation. Standardized signage systems facilitate movement, provide a sense of orientation, and reinforce standards of excellence. Signage creates a unifying element throughout the installation that visually ties the installation themes together and builds a reference and continuity that translates into confidence and reassurance when traveling throughout the installation. The standards to apply for signage color, type, and sizing is found in [Technical Manual \(TM\) 5-807-10, Signage](#).

Signs should specify the expected and acceptable behaviors, i.e., no parking. The purpose of such signage is to make those not following the expected and acceptable behaviors stand out so they can be addressed.

### 11.4.2 Sign System Characteristics

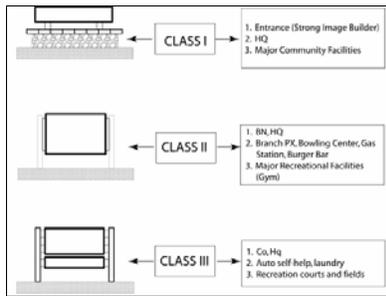
There are several basic design characteristics that, by serving to convey necessary information clearly and attractively, are an integral part of any successful signage system.

#### Simplicity

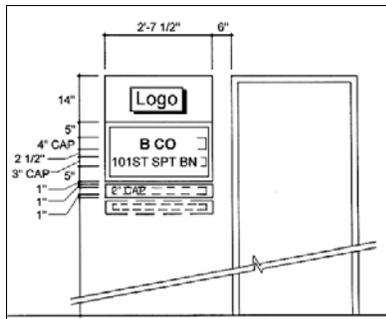
An effective strategy provides only needed information, avoids redundancy, and eliminates over-signing with resultant clutter and visual confusion. Sign messages must be clear, simple, and easy for motorists to process quickly.

#### Continuity

It is essential that the system be applied uniformly and consistently throughout the entire installation. The importance of consistent implementation extends from the larger issues of sign type and size down to accurate color continuity and matching typestyles.



**Figure II-6** Signs can be Organized Into Classes Within the Visual Hierarchy



**Figure II-7** Building Mounted Information Sign

### Visibility

Sign location is a very important ingredient within the system. Signs must be located at significant decision points and oriented to provide clear sight lines for the intended user. Close coordination of locations with respect to landscaping, utilities, adjacent signage, and various other street design elements is important to ensure long-term maximum visibility.

### Legibility

Sign typestyle, line spacing, color, and size all combine to create the crucial design characteristics of legibility. This aspect of sign design should take into consideration users such as motorist, pedestrians, or bicyclists, and the relative travel speed at which each type of user will be traveling when viewing the signs.

### **11.4.3 Vocabulary-Communications**

A common language has been created for establishing a signing system. The different components that create the sign package have been named and referred to within the total signing system.

The creation of a "signing language" helps generate a unified bond within sign types that make up a signing family.

- Reference
- Information/Message
- Presentation
- Architectural Influence
- Graphic Architecture

### **11.4.4 Visual Hierarchy**

The entire signing system must communicate, through a range of sign and typestyle sizes, the relative importance of the individual activity that the sign identifies. The system should follow a logical progression from a point of origin to the desired destination.

A stated ranking method (Figure II-6) supports the visual standard of hierarchy within the signing system. Signs can be organized within assigned classes with emphasis on the function and image of the installation.

Within each class, the level of architectural influence evokes the importance of the sign to the installation. This is also critical to the idea of progression. The importance of a sign must be presented in its size and level of detail.

As individuals move closer to their destination on the installation, the scale of the sign becomes progressively smaller and the level of the message more detailed.

### **11.4.5 Types of Signs**

#### Information / Identification Signs

These are signs that identify entrances to the installation, areas within the installation, major tenants, buildings, and organizational or functional components (Figure II-7). They identify a location, and greet the visitor to that location. They should be compatible in scale and character with the architecture and also blend with the natural surroundings. These signs are designed to include the following:

- **Typeface**  
Lettering is self-adhesive backing material.  
Building Title: Helvetica Medium, Upper and lower case  
Building Numbers: Helvetica regular  
Building Addresses: Helvetica Medium, Upper and lower case

- **Color:**  
Panel: Dark Brown  
Lettering: White  
Post: Dark Brown  
Exposed panel backs and edges: Dark Brown  
All paint: Semi gloss

- **Materials:**  
Panel: Double-face 1/8" thick aluminum  
Post: Steel Pipe  
Foundation: Concrete pier or direct burial

- **Building Identification**
  - **Street Addresses (Figure 11-8)**  
The addressing procedures prescribed in [DoD 4525.8-M, DoD Official Mail Manual](#) are mandatory for use by all DoD components. DoD 4525.8-M, Chapter 3 prescribes the following:

All DoD address shall be assigned so they are compatible with the United States Postal Services automated delivery point sequencing (C3.3).

The DoD installation is responsible for assigning city-style, street address on the installation (C3.3.2.2).

Street addresses shall be assigned and used even though a DoD activity may deliver the mail to the addressee (C3.3.2.2.1).

Only geographically locatable civilian-style street address (such as 4102 Cindy Avenue,) shall be used (C3.3.2.2.4).

Installations shall not use one street address for the entire installation and then use secondary unit designators such as "Building 123" to designate the delivery addresses on the installation (C3.3.2.2.5).

Addresses such as "Building 123 Roberts Street" are not a valid address format and shall not be used (C3.3.2.2.6).

#### Address Placement

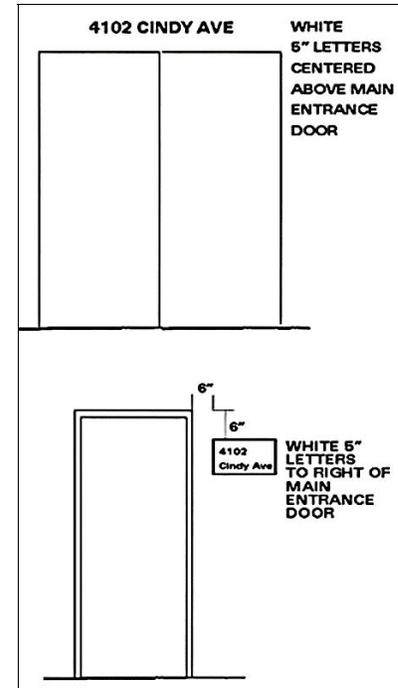
Place addresses by the front entrance of the building so they can be seen (C3.3.2.3.1) (Figure 11-9).

Place both the street name and address number on the building if both the building number and street address are visible from the street.

Building identification signs will use street addresses.



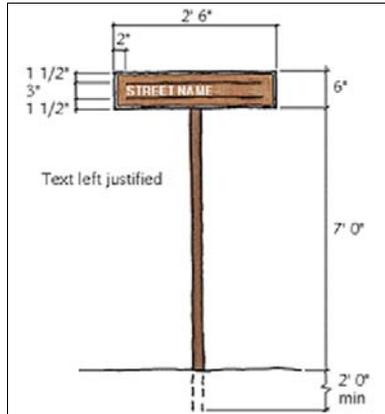
**Figure 11-8** Use of Street Addresses on all Building Identification Signs



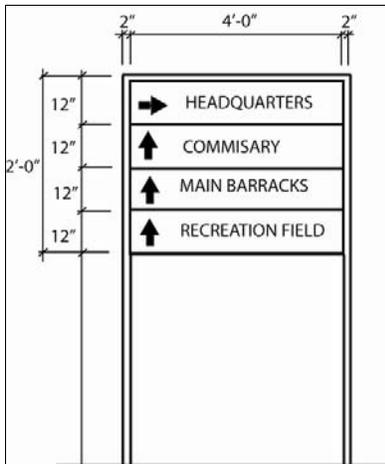
**Figure 11-9** Street Address Location at Entrance Doors



**Figure 11-10** Installation Entrance Signs



**Figure 11-11** Typical street Signs



**Figure 11-12** Direction Sign

Buildings without identification signs shall have the address number and street name centered above the main entrance or located to the right side.

- Housing Areas

The sign should be complimentary to the architectural setting of the housing area and approved by the installation Real Property Planning Board.

Housing numbers should be placed on the curb in front of the respective house and on the house where lighting will effectively light the numbering.

- Installation Identification Signs

Installation identification signs name the installation and display the official US Army plaque. The designation "United States Army" must appear at the top of the sign in accordance with [AR 420-70, para 2-7h](#). Every installation entrance shall have an installation identification sign displaying only the US Army plaque, with the words "United States Army, Fort (Name of Fort), and gate name as indicated in Figure 11-10. The placement of Senior Mission Commander logo, unit crest, and other installation identification signs, monuments, or displays shall be located inside the installation beyond the cleared area of the Access Control Point (ACP) of entry. When used service-wide, these signs convey a uniform image of strength and stability to the public. Emblems, branch colors, unit mottos, names, and titles of individuals are not to be displayed.

Installation identification signs consist of three types:

Sign type A1, main entrance sign, identifies the principal visitor entrance (Figure 11-10).

Sign type A2, secondary entrance sign, identifies entry points with relatively high volumes of visitor traffic.

Sign type A3, limited access entry gate signs, identifies entry points with limited public access.

See Technical Manual (TM) 5-807-10, Signage, paragraph 3-3, for sign specifications and paragraph 3-11 for sign placement guidelines.

- Street Signs

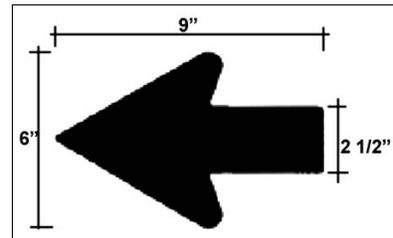
Street name identification signs should be designed with the same lettering, color, and materials as other information signs (Figure 11-11).

- Wheeled Electrical Signs

Wheeled electrical signs will have an attractive presentation. Temporary landscape elements should be used whenever possible. The siting of this type of sign will be approved by the RPPB. No sign of this type will be left in place for longer than six (6) months. After which time, the sign will be removed or turned into a permanent sign.

### Directional Signs

These signs guide the motorist or pedestrian in, around, and out of the installation (Figure 11-12). The legibility and placement of these signs, as well as the ordering of information, is critical to their effectiveness. These signs should be placed in central locations and at major decision points along circulation routes. “ The guidelines for design, fabrication, and placement of warning signs are found in [Technical Manual \(TM\) 5-807-10, Signage](#), para 3-10.



**Figure 11-13** Typical Arrow for Use On All Destination Signs

### Regulatory Signs

These signs provide the rules for travel and parking on the installation. They include speed signs, turning and lane use signs, warning signs, parking control signs, etc. (Figure 11-14). Related to these signs are pavement markings and traffic signals. The guidelines for design, fabrication, and placement of warning signs are found in [Technical Manual \(TM\) 5-807-10, Signage](#), para 3-9.

#### Traffic Control Signs

- CONUS Installations

National highway standards will be used for signs to regulate vehicular traffic on CONUS installation (AR 420-72, Transportation Infrastructure and Dams, Para 2-15f). These standards are described in the [Manual of Uniform Traffic Control Devices \(MUTCD\)](#). Also see [MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings](#). This pamphlet clarifies existing standards and provides definite guidelines for installation officials to conform to the MUTCD. These standards shall be used installation wide to include installation Access Control Points.

- OCONUS Installations

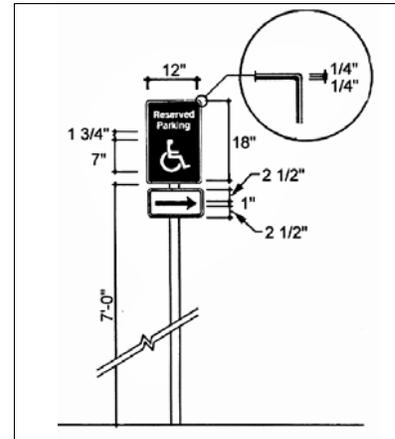
OCONUS installation streets and roads are to be considered extensions of the road system of the host nation and shall use traffic control device standards and criteria of the host nation ([AR 420-72, Transportation Infrastructure and Dams, Para 2-15e](#)).

#### Prohibitory (Warning) Signs

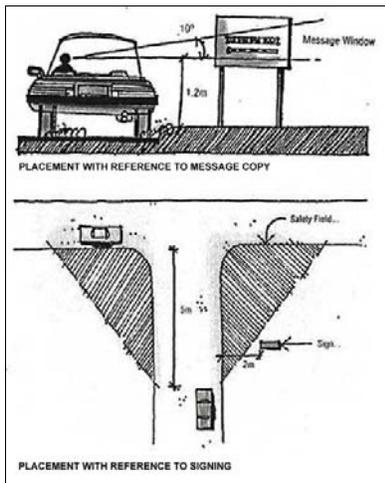
This category of signage is intended to maintain security and safety on the installation perimeter and at other specific secure areas. These signs notify visitors of restrictions, as well as other security procedures. The guidelines for design, fabrication, and placement of warning signs are found in [Technical Manual \(TM\) 5-807-10, Signage](#), para 3-9.

#### **11.4.6 Electronic Exterior Signs**

All exterior flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.



**Figure 11-14** Regulatory Sign



**Figure II-15** Placement is Critical to Ensure Easy Readability

#### 11.4.7 Sign Placement

Placement of signs differs according to the type of sign and the specific site constraints. The following guidelines apply to placement of the majority of signs.

Do not place more than one sign at any location. Traffic rules are the exception to this rule.

Place signs in areas free of visual clutter and landscape materials.

Place signs in locations that allow enough time for the user to read and react to the message.

Signs should not be placed to block sight lines at intersections.

Place signs approximately 1.2 meters (4 feet) above ground level to be within 10 degrees the driver's line of vision (Figure II-15). Provide proper placement to avoid a hazard to children.

#### 11.4.8 Sign System Typography.

##### Military Emblems

The Army has a rich tradition of military heraldry. Military emblems are an important part of the soldiers' identity and the emblems have been carefully crafted over the years to express unit pride and unique history and function of the unit. The care and use of organizational emblems in a signage system can add visual interest as well as build pride and a sense of history. However, the overuse of miscellaneous emblems can lead to clutter and a dilution of their importance. Colors for military emblems must be in accordance with the Institute of Heraldry.

##### Department of the Army Plaque

The plaque should be displayed on installation identification signage to emphasize the heritage and professionalism of the United States Army. The design of the plaque must be in accordance with [Army Regulation \(AR\) 840-1](#), [Department of the Army Seal](#), and [Department of the Army Emblem and Branch of Service Plaques](#), and must be reproduced in full color.

##### Insignias

The use of branch insignia, shoulder sleeve insignia, coat of arms and/or distinctive insignia on headquarters signs is permitted. All military emblems must appear in full color. Motivational symbols or motifs will not be used.

#### 11.4.9 Reduce Visual Clutter

Over-signing detracts from a uniform sign system and if left uncontrolled will eventually destroy the integrity of the system.

Clutter creates confusion and ineffectiveness. Often motorist and pedestrians are confused by the bombardment of messages that have no relationship to each other, or the communication is on such a minimal level that the sign serves no purpose.

#### **11.4.10 Location Maps**

The location map is an integral element of an installation entrance. The location map display provides information and sense of place to the viewer. The design and construction should be of compatible architectural materials found throughout the installation. Do not place these maps on open bases as they communicate where an attack can be made.

The location map should contain the following characteristics within the design.

- Plexiglas covered map for protection
- Architectural compatible materials used for the base
- Paved walk-up area
- Litter receptacle
- Provide parking adjacent
- Provide current takeaway maps

## 11.5 EXTERIOR LIGHTING

### 11.5.1 Lighting Types

Lighting is a functional requirement of installations that also impacts the visual environment. The installation lighting system conveys a sense of order and organization. There are five primary types of lighting on military installations. They are:

- Roadway Lighting
- Pedestrian Lighting
- Parking Lot Lighting
- Outdoor Architectural Lighting
- Security Lighting

### 11.5.2 Coordination

The primary visual problem that exists with exterior lighting on most military installations has been the lack of overall coordination of a lighting system.

### 11.5.3 Lighting Systems

A lighting system provides the proper type of lighting for different lighting requirements and locations. A system is composed of six primary components – fixtures, light height, type of pole, light spacing, type of lamp, and level of intensity of lamp.

### 11.5.4 Lighting Design Matrix

The proper type of lighting for various locations is shown in the Lighting Design Matrix (Figure 11-16).

LIGHT DESIGN MATRIX		TYPICAL AREAS OF USE																		
		Entry Gates*	Primary Roadways	Secondary Roadways	Tertiary Roadways	Primary Walkways/Bikeways	Secondary Walkways/Bikeways	Tertiary Walkways/Bikeways	Courtyards	Playgrounds	Ball fields	Basketball Courts	Tennis Courts	Buildings	Landscaping	Fence Parameters	Signs & Monuments	Large Parking Lots	Small Parking Lots	Training areas
LAMP	Incandescent													•						
	Halogen	•	•																	
	Mercury Vapor		•	•	•	•	•		•	•	•	•	•		•					
	Florescent																			
	Metal Halide		•	•	•	•	•		•	•	•	•	•	•	•		•			
	High Pressure Sodium	•	•							•	•	•	•			•		•	•	•
LEVEL	Lux (lx)		20	15	10	10	2		50		200	200	50							
	Foot-candles (fc)		2	1.4	0.9	0.9	0.2		5		10	20	5.6			0.2		1	1	1
HEIGHT	40' Max	•							•					•	•	•		•		
	25' Max	•				•	•	•						•	•				•	
	15' Max			•	•															
	Varies		•							•	•	•	•				•			•
FITTURE	Cutoff		•	•	•													•	•	
	Utility	•														•				•
	Bollard																			
	Spot												•				•			
	Wall Mount																			
POLE	Metal		•	•	•													•	•	
	Wood														•					
SPACED	120' Max		•	•	•										•		•			
	90' Max																		•	
	Varies												•			•				•

Figure 11-16 Lighting Design Matrix

\*Provide Quartz (Instant) Restrike Feature

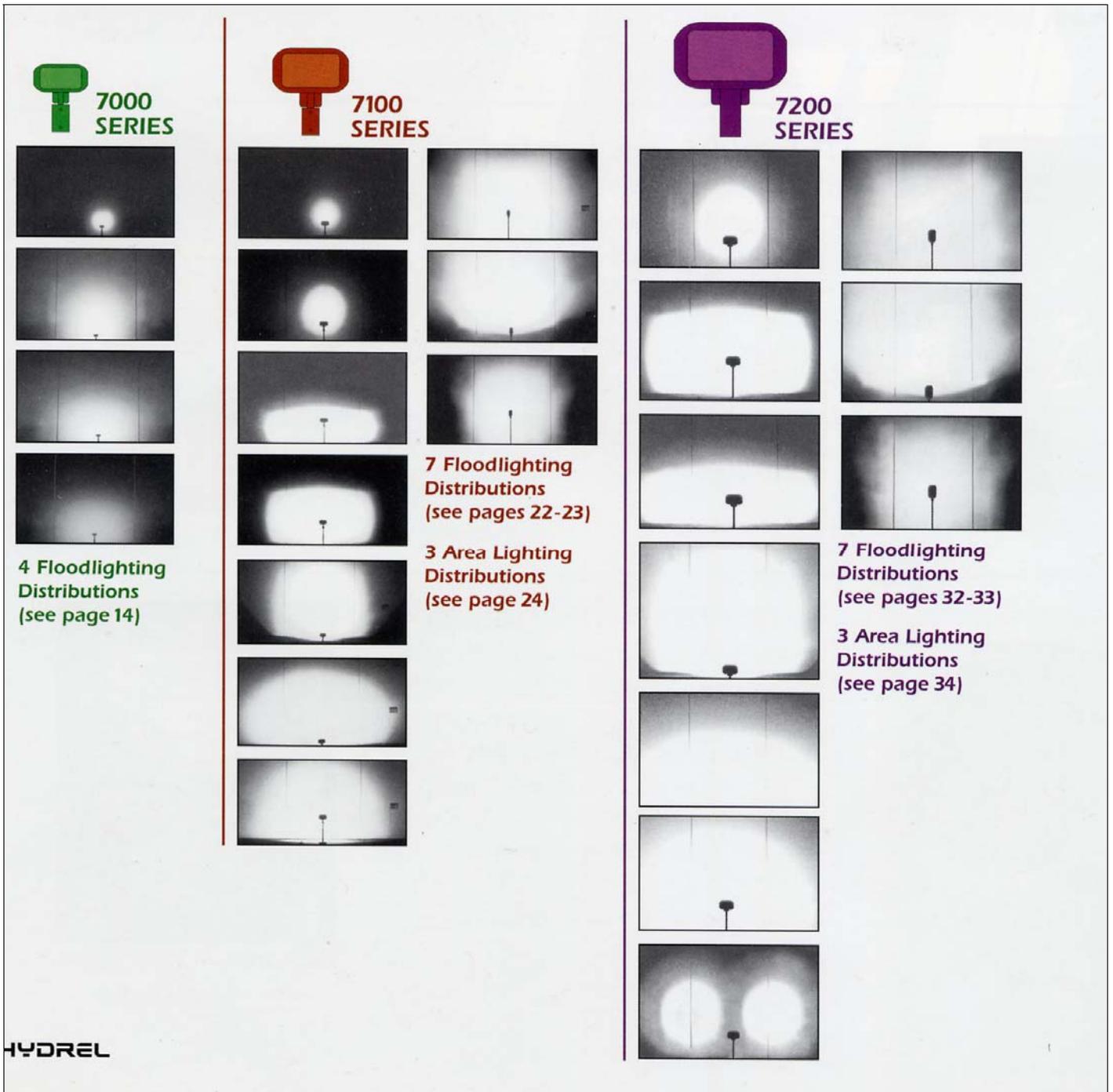


Figure 11-17 Lighting Distributions

**11.5.5 Spillover**

All lighting should be located or designed to prevent undesirable spillover of light into other areas. Spotlights in particular should be aimed or screened to prevent glare that could blind motorists or pedestrians or light sleeping areas.

**11.5.6 Light Fixtures**

A lighting fixture is the frame or housing for holding the lamp in position and for protecting it from damage. Light fixtures should be selected and located to maintain the minimum foot-candle requirements for safety and security purposes. Beyond that, aesthetic considerations should take precedence (Figure 11-17).

Lighting fixtures are grouped into five general categories as defined below.

#### Cutoff Lighting

Refers to the large shoebox-shaped fixtures placed on tall poles and used to illuminate streets and parking lots. They are designed to cut off light traveling to the top and sides of the fixtures, concentrating it down onto the parking lot. The fixtures reduce the spillover of light where it is not wanted.

#### Utility Lighting

Refers to simple, inexpensive fixtures that are used in industrial areas of low visibility.

#### Bollard Lighting

Refers to fixtures that are mounted on or in a short post to illuminate pedestrian areas. They can also be used as physical barriers between pedestrian and vehicular traffic.

#### Spotlighting

Refers to high intensity fixtures that concentrate light into a narrow beam and are used to highlight signs and other important objects. Spotlights should be screened by landscaping or other methods so they are inconspicuous during the day.

#### Wall-Mounted Lighting

Refers to fixtures attached to the wall of a building or a wall bordering a walkway or stairway. Consider cut-off shades where appropriate (areas adjacent to trafficways).

### **11.5.7 Light Poles**

The light fixture size should be proportional to the intended pole height (Figure 11-18).

### **11.5.8 Light Fixtures and Poles**

Light poles should be consistent and provide uniformity throughout the installation. The pole height shall be determined by their intended function as shown in tables below.

### **11.5.9 Lamp Characteristics**

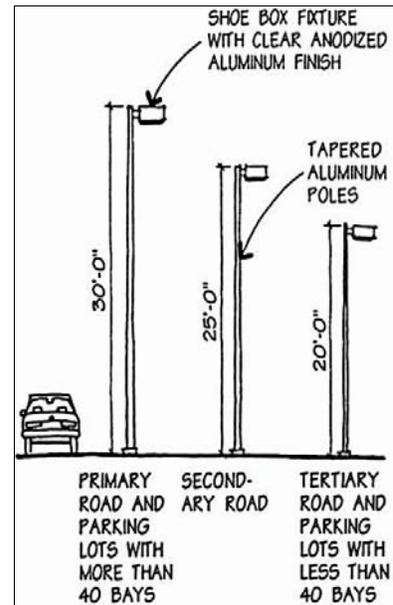
Selection of a lamp involves evaluating its optical control, efficiency, lamp color rendition, lamp life, cost, and maintenance. The following is a summary of the characteristics of typical lamp types.

#### Incandescent

- Superior color rendition
- Inexpensive
- Good optical control
- Short life span
- Lowest efficiency

#### High Pressure Sodium

- Poor color rendition
- Broad application
- Low maintenance
- Superior optical control
- Superior life span
- Excellent efficiency
- Expensive



**Figure 11-18** Pole Height Determined By Function

Low Pressure Sodium

- Poor color rendition
- Good efficiency
- Superior life span
- Expensive

Fluorescent

- Good color rendition
- Poor optical control
- Good life span
- Good efficiency in mild climates
- Produces glare

Metal Halide

- Superior color rendition
- Superior optical control
- Efficiency better than mercury vapor but poorer than pressure sodium.
- Expensive

Mercury Vapor

- Good color rendition
- Good foliage lighting
- Good life span
- Good efficiency
- Inexpensive

Halogen

- Relight after power failure is slow

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Aluminum with Tempered Glass Lense</p> <p><b>Finish</b> Metallic Grey</p> <p><b>Size:</b> Approximate 15' Ht.</p> <p><b>Manufacturer:</b> Modular International (or equal) 412.734.9000</p> <p><b>Model:</b> 430 Reflector Series (or equal)</p>	<p><b>Material:</b> Aluminum with Tempered Glass Lense</p> <p><b>Finish</b> Metallic Grey</p> <p><b>Size:</b> Approximate 15' Ht.</p> <p><b>Manufacturer:</b> Modular International (or equal) 412.734.9000</p> <p><b>Model:</b> 430 Reflector Series (or equal)</p>	<p><b>Material:</b> Aluminum with Tempered Glass Lense</p> <p><b>Finish</b> Metallic Grey</p> <p><b>Size:</b> Approximate 15' Ht.</p> <p><b>Manufacturer:</b> Modular International (or equal) 412.734.9000</p> <p><b>Model:</b> 430 Reflector Series (or equal)</p>

**11.5.10 Roadway Lighting**

Requires large light patterns that reduce the amount of fixtures used. Locate lights in planted islands or around the perimeter of the area. Avoid spillover light into adjacent uses. There are several primary roads in Detroit Arsenal that should receive the same light treatment.

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Cast Aluminum with Extruded Aluminum</p> <p><b>Finish</b> Silver (SLV)</p> <p><b>Size:</b> 13' Ht.</p> <p><b>Manufacturer:</b> Bega (or equal) 805.684.0533</p> <p><b>Model:</b> 8996 MH (or equal)</p>	<p><b>Material:</b> Cast Aluminum with Extruded Aluminum</p> <p><b>Finish</b> Silver (SLV)</p> <p><b>Size:</b> 13' Ht.</p> <p><b>Manufacturer:</b> Bega (or equal) 805.684.0533</p> <p><b>Model:</b> 8996 MH (or equal)</p>	<p><b>Material:</b> Aluminum with Tempered Glass Lense</p> <p><b>Finish</b> Metallic Grey</p> <p><b>Size:</b> Approximate 15' Ht.</p> <p><b>Manufacturer:</b> Modular International (or equal) 412.734.9000</p> <p><b>Model:</b> 430 Reflector Series (or equal)</p>

**11.5.11 Pedestrian Lighting**

Paths located adjacent to a road will be lit by the street lighting.

Paths not adjacent to roadways require additional lighting.

Light all stairs and entries.

Intersections may require additional lighting.

Administration	Research and Development	Industrial/Warehouse
		
<p><b>Material:</b> Aluminum with Tempered Glass Lense</p> <p><b>Finish</b> Metallic Grey</p> <p><b>Size:</b> Approximate 15' Ht.</p> <p><b>Manufacturer:</b> Modular International (or equal) 412.734.9000</p> <p><b>Model:</b> 430 Reflector Series (or equal)</p>	<p><b>Material:</b> Aluminum with Tempered Glass Lense</p> <p><b>Finish</b> Metallic Grey</p> <p><b>Size:</b> Approximate 15' Ht.</p> <p><b>Manufacturer:</b> Modular International (or equal) 412.734.9000</p> <p><b>Model:</b> 430 Reflector Series (or equal)</p>	<p><b>Material:</b> Aluminum with Tempered Glass Lense</p> <p><b>Finish</b> Metallic Grey</p> <p><b>Size:</b> Approximate 15' Ht.</p> <p><b>Manufacturer:</b> Modular International (or equal) 412.734.9000</p> <p><b>Model:</b> 430 Reflector Series (or equal)</p>

**11.5.12 Parking Lot Lighting**

Parking lot lighting should be used for security purposes. Lighting should be evenly spaced throughout the lot, with no “hot” or “cold” spots.

Lighting should be directional and inform pedestrians of building entrances, and/or locations, and/or crosswalk locations.

## 11.6 UTILITIES

### 11.6.1 Utility Systems

Utility systems provide the basic infrastructure of power, communication, water, and sewer services necessary for the operation of the installation. Utilities play a key role in the visual quality on an installation. Their primary impact on the visual quality is the result of the clutter of overhead utility lines and poorly designed storm drainage systems.

### 11.6.2 Impact

The visual and environmental impact of utilities should be minimized on the installation. Also, the systems should be designed to minimize maintenance and repair. The result is a more sustainable utility system that will promote the overall sustainability of the installation. The primary components of the utility system and recommendations for their location and design are included below.

### 11.6.3 Overhead Transmission Lines

Unightly overhead utilities should be relocated underground wherever possible to reduce negative visual impacts, and reduce maintenance and repair requirements. Underground utilities are also desirable for protection from terrorist or other enemy attack. When underground locations are not possible, the negative visual impacts should be minimized by using the following design techniques:

#### Overhead Transmission Lines Location

Overhead transmission lines should be aligned along edges of land use areas to avoid dividing an area and creating gaps or unusable areas. They should conform to natural landforms that can be utilized to screen them from public view. Hills should be crossed obliquely rather than at right angles. Alignments along hillcrests or steep grades should be avoided.

#### View Screening

Minimize long views or silhouette views of overhead transmission lines from along roads and other public viewing areas. Avoid the “tunnel effect” of long, straight, uninterrupted views along the alignment by clearing vegetation only within the right-of-way that threatens the overhead lines. Jog the alignment at road crossings and periodically undulate and feature plant materials along the edges of the right-of-way.

### 11.6.4 Distribution Lines

Power distribution lines should also be located underground to minimize negative visual impact, reduce maintenance, and protect from terrorist or other enemy attack. If overhead, they should be located out of view from main public visibility areas or screened to be as unobtrusive as possible. Avoid alignments of overhead lines along major circulation corridors. Use minor streets, alleyways, rear lot lines, and vegetation or topography that provide screening and minimize visual impact. Minimize the number of poles and pole height, and use poles that blend into their surroundings to reduce visual impact. Poles should also be multi-functional for power, telephone, cable television, street lighting, etc., to reduce visual clutter.

### 11.6.5 Substations and Transformers

Substations and transformers should be designed and located to minimize their visual impact and be compatible with the character of their setting. Substations are best located in industrial use areas rather than in major public circulation areas. They should be provided an appropriate force protection strategy that considers surveillance, access control, territoriality, maintenance, receptivity and communication.

### 11.6.6 Sewer and Water

All sewer and water lines should be underground.

Sewage treatment facilities should be located 1,250 ft. (0.38 Km) distance and in a downwind direction from all inhabited facilities.

Treatment facilities should be screened from view of major roads and other installation facilities by plant material, berms, walls, and fences.

A water storage tank that has visual strength in its form can be used as a focal point or identifying landmark that can provide a sense of orientation within the installation. Lock all hatches and ladders.

Fire hydrants should be highly visible and free of any screening. They shall be nutmeg brown in color with luminous paint. Caps shall indicate tested water pressure according to AWWA standards for flow at 20 psig. Paint color indicators are as follows:

Hydrant Class	GPM	Color
AA	1500	Light Blue
A	1000-14000	Green
B	500-999	Orange
C	Less than 500	Red

### 11.6.7 Storm Drainage

Installation storm drainage systems should be appropriate to the character of development they serve. Storm drainage systems in densely developed areas require curbs, securable gutters, and underground lines. Storm drainage systems in low-density areas can utilize drainage swales and ditches that are contoured to be compatible with the natural landform. Where retention ponds are required, they should be designed to appear as a natural amenity that is part of the natural contour of the land, rather than a square or rectangular hole in the ground. Retention ponds that are designed to be dry most of the time can be utilized for recreational purposes or as open space. In either case, the areas should be designed to conform to the natural contours of the land.

Large hard surfaced parking lots should have covered drainage at the entry to prevent water draining into adjacent streets.

Storm water should, as much as possible, be managed using LID practices. See <http://www.epa.gov/nps/lid/index.html> for LID information.

## 11.7 ARMY STANDARDS

The cited Army Standards shall be met.

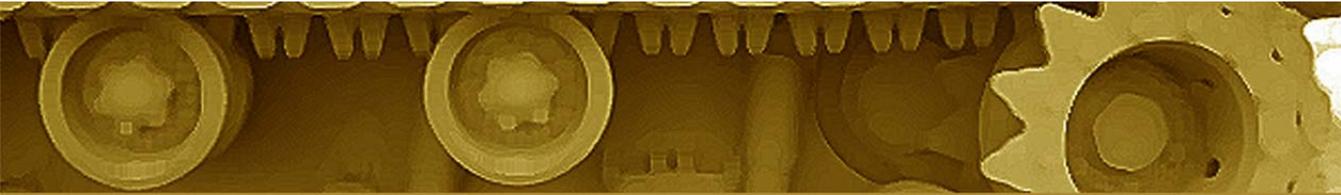
- [DoD 4525.8-M, DoD Official Mail Manual](#)
- [Army Regulation \(AR\) 420-49, Utility Services](#)
- [Army Regulation \(AR\) 420-70, Buildings and Structures](#)
- [Army Regulation \(AR\) 420-72, Transportation Infrastructure and Dams](#)
- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Technical Manual \(TM\) 5-807-10, Signage](#)
- [Manual of Uniform Traffic Control Devices \(MUTCD\)](#)
- [MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings](#)
- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)

## 11.8 REFERENCES

The following references are provided for guidance.

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 11](#)
- [Unified Facilities Criteria \(UFC\) 3-210-04, Design: Children's Outdoor Play Areas](#)
- [Army Regulation \(AR\) 1-33, Memorial Programs](#)
- [Army Regulation \(AR\) 840-1, Department of the Army Seal, and Department of the Army Emblem and Branch of Service Plaques](#)
- [Technical Manual \(TM\) 5-663, Child Development Center, Play Area Inspection and Maintenance Program](#)
- [Technical Manual \(TM\) 5-803-5, Installation Design Manual](#)

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## Section 12 Force Protection Design Standards

### 12.1 INTRODUCTION

Accommodating the need for security and antiterrorism is a significant concern for all military facilities design. The security and antiterrorism requirements must be integrated into the total project. Design of protective elements should seek to visually enhance and complement the design of a facility. Site elements such as fences, courtyards, screen walls, swales, berms, planters, and retaining walls can be used effectively for facility protection. These design elements should be designed to provide visual harmony with the main facility, producing architectural compatibility through consistent use and application of materials, forms, and colors.

Final design decisions to meet security and antiterrorism requirements and resolve conflicts will require coordination among the design disciplines and appropriate functional areas to include land planners, landscape architects, architects, intelligence personnel, security personnel, Force Protection Officer, facility users, and engineers. The designers must work to balance force protection requirements with all other requirements that impact design and development. These include the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#), the [Uniform Federal Accessibility Standards \(UFAS\)](#), [National Fire Protection Codes \(NFPA\)](#), and all applicable local building codes and ordinances. The design team will also consult security personnel to determine whether portions of the design documents are subject to access limitations.

#### 12.1.1 Service Secretaries and Agency Heads

The heads of DoD Components shall ensure compliance and issue guidance to implement these standards. That guidance will include direction requiring the installation commander to notify or seek approval from a major command or claimant, higher headquarters level if a new construction or renovation project, or a leased facility, will not meet any one or more of the standards. Heads of DoD Components will establish plans and procedures to mitigate risks in such situations. If non-compliance is chosen, make sure that Command has reasonable alternatives based on protection science principles.

Legal Non-compliance can be obtained by approaching the Adjutant General (TAG) or Commanding Officer and accepting the risk. However, in resolving a compliance conflict it is necessary that the team offer an appropriate alternative that can demonstrate that the same or higher level of protection is achievable. Blast mitigation (the real goal) is a system of tactics that works together to meet the goal of maximum force protection as defined in a threat assessment. From a blast science point of view, distance and building hardening are simply a couple of available tactics. While the modified protection measures may not read according to the outlined guidelines, keep in mind that the use of the multiple force protection techniques outlined in this chapter may actually provide a higher level of protection than the recommended methods. For example, if a 148 foot set back is required, but can not be obtained given the location of adjacent structures, a berm designed appropriately and combined with a 70 foot set back can actually exceed the recommended standards.

## 12.2 BUILDING SITING AND DESIGN STANDARDS

A primary concern for Army installations throughout the world is the threat of terrorist attack. To minimize the likelihood of mass casualties from terrorist attacks against DoD personnel in the buildings in which they work and live DoD has developed the [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#).

UFC 4-010-01 establishes the minimum building antiterrorism standards for all DoD components.

Mandatory DoD minimum antiterrorism standards for new and existing inhabited buildings are contained in [Appendix B](#).

Mandatory DoD minimum antiterrorism standards for expeditionary and temporary structures are contained in [Appendix D](#).

Additional recommended measures for new and existing, inhabited buildings are contained in [Appendix C](#).

Implementation of the mandatory standards is obligatory for all new construction regardless of the funding source. These standards apply to FY 2004, and all subsequent fiscal years, for projects involving new construction and major renovations for inhabited structures. The standards will be reviewed before any site planning or design is initiated.

### 12.2.1 Minimum Standoff Distances and Separation for Buildings:

The minimum standoff distances and separation for new and existing buildings are found in Table B-1 of [UFC 4-010-01](#).

The minimum standoff distances and separation for expeditionary and temporary structures are found in Table D-1 of [UFC 4-010-01](#).

The DoD minimum standards, when applicable, may be supplemented by more stringent force protection building standards to meet specific threats inherent in the geographical area where the facility is to be constructed. Those additional requirements may be established by either standards for specific Combatant Commanders or based on Risk and/or Threat Analysis.

When the minimum standoff distances can not be achieved because land is unavailable, the standards allow for building hardening to mitigate blast effects. Costs and requirements for building hardening will be addressed in the DoD Security Engineering Manual. (See para 12.2.2 below for information regarding the DoD Security Engineering Manual).

### 12.2.2 Implementing Design Guidance

Additional guidance on applying the *DoD Minimum Antiterrorism Standards for Buildings* will be found in UFC 4-010-02, *DoD Security Engineering Manual*. Currently, this document is in draft form. Until the *DoD Security Engineering Manual* is published, see the guidance provided on the [Security Engineering Working Group](#) website.

#### Website Access for Military and Government Users

This is a password protected website. To enter the site you must be accessing the site from either a ".mil" or ".gov" address. Upon initial entry, you will be prompted with instructions on how to acquire your password.

#### Website Access for Non Military and Government Users

Currently, the Protective Design Center is developing a procedure for e-mailing the network administrator to receive procedures to enter the site. If upon initial entry into the site there are no instructions on this procedures,



**Figure 12-1** Fences Offer Various Force Protection Measures

contact the Protective Design Center (CENWO-ED-S) at (402) 221-3151 for instructions.

### 12.2.3 Orientation of Buildings on a Site

The following will be given consideration when determining the orientation of a building.

Deny aggressors a clear "line of sight" to the facility from on or off the installation where possible. Protect the facility against surveillance by locating the protected facility outside of the range or out of the view of vantage points.

Protect against attack by selecting perimeter barriers to block sightlines such as obstruction screens, trees, or shrubs. Non-critical structures or other natural or man-made features can be used to block sightlines.

Create "defensible space" by positioning facilities to permit building occupants and police to clearly monitor adjacent areas.

If roads are nearby, orient building so there are no sides parallel to vehicle approach routes.

Design vehicular flow to minimize vehicle bomb threats, avoid high-speed approach into any critical or vulnerable area.

Avoid siting the facility adjacent to high surrounding terrain, which provides easy viewing of the facility from nearby non-military facilities.

## 12.3 FENCING

Fences are used as protective measures against project-specific threats. They are most appropriately used to define boundaries and to deter penetration of a secure area (Figure 12-1). A fence will assist in controlling and screening authorized access to a secured area. Fences also serve the purposes listed below.

As a platform for the Intrusion Detection System.

As a screen against explosive projectiles.

To stop moving vehicles if they are reinforced to do so.

The most common defense style fence is a chain link style. Generally speaking this type of fence should be constructed of nine gauge or heavier wire, twisted barbed wire top and bottom. Most of these run between seven and eight feet tall. The bottom of the fence should be no more than 2 inches from the ground. The bottom of the fence can be stabilized against crawling under or lifting up by tying it to a rigid metal pole or concrete sills. If the ground is sandy or subject to erosion the bottom edge of the fence should be installed underground. The top portion of the fence should be left without a support bar as this makes it more difficult to climb. The fence should be stretched and fastened with rigid metal poles set in concrete. The mesh openings for this type of fence should be no more than 2 inches square. There should be barbed wire with 45° angle outriggers on top facing out from the facility. In general this type of fencing is not very attractive, nor does it provide the maximum level of security as it is easily cut. Security monitoring is key for this type of fencing to be effective.

For issues of privacy and for compliance with line of sight requirements in the DOD standards it is possible to use slats with chain link fences (Figure 12-2). Often the slats can be far more decorative and even incorporate graphics and important messages to the viewers. Some of these messages may include signage concerning the appropriate entrance points, notification that motion detection technology is in use, that anti-RAM techniques are in place and guard forces are on site. This can be done in a number of decorative ways such as using graphic depictions or signs on the fence slats. By communicating a well designed and designated perimeter that is aesthetically pleasing we demonstrate to an attacker that the facility is cared for and watched over.

Wrought iron is being used more and more as it is more decorative, thus creating a positive visual atmosphere (Figure 12-3). Given today's technology, it can be designed to stop vehicles, and minimize climbing and cutting. However, despite these benefits, wrought iron fencing is significantly more expensive, and as a result is often used sparingly.

## 12.4 LANDSCAPE CONSIDERATIONS

Landscaping guidelines for buildings should not be ignored because of standoff distances. The landscape design should enhance the overall attractiveness of the facility while still providing or enhancing the objective level of security level of security.

Establish clear zones along both sides of security fencing. Vegetation in the clear zone should not exceed four inches in height. (DoD 0-2000.12-H, *Protection of DoD Personnel and Activities Against Acts of Terrorism and Political Turbulence*, Appendix EE, Table EE-4).

Strategically locate trees and planters to prevent penetration of an attack vehicle into the secure area perimeter.

Vegetative groupings and earth sheltering berms provide inherent blast effect reduction from external blast forces.

Plant material that can provide concealment will not be used adjacent to high security structures or fence lines.

Use dense, thorn-bearing plant material to create natural barriers to deter aggressors.

Screen play and outdoor recreation areas from public (off-installation) view.

Designers need to balance the need for signs that identify, locate, and direct residents and supported personnel to installation assets, versus the need to discourage and frustrate hostile intelligence gathering and access. One method of achieving this balance could be to direct people to a community support or information center to obtain directions to high security activities. Another could be "All incoming personnel and visitors report to building number 232".

Place trash containers as far away from the facility as possible. Antiterrorism/force protection requirements restrict the location of dumpsters to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas ([Unified Facilities Criteria \[UFC\] 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#), Table B-1).

### 12.4.1 Unobstructed Space

Ensure that vegetation and site features within 10 meters (33 feet) of inhabited buildings do not conceal form observation objects of 150mm (6 inches) in height. ([UFC 4-010-01](#), Appendix B, Para B-1.3). This does not preclude



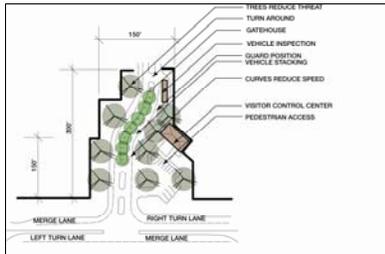
**Figure 12-2** Chain Link Fencing With Slats



**Figure 12-3** Decorative Wrought Iron Fencing



**Figure 12-4** Berms Can Serve Many Force Protection Functions



**Figure 12-5** Conceptual Entrance Gate to Meet AT/FP Requirements

landscaping within the unobstructed space, but it will affect the design and may affect plant selection.

## 12.5 LIGHTING

Lighting systems for security operations provide illumination for visual and closed-circuit television (CCTV) surveillance of boundaries, sensitive inner areas, and entry points. When CCTV is used as part of security operations, the lighting system will be coordinated with the CCTV system. The specific installation environment and the intended use determines lighting system requirements. Often two or more types of lighting systems are used within a single area. Guidance on the use of security lighting may be obtained from TM 5-81 I-1, Electrical Power Supply and Distribution.

## 12.6 BERMS

Use of berms for force protection can fulfill one or more of the following functions (Figure 12-4).

- Define boundaries of property or boundary limits.
- Provide a barrier to moving vehicles.
- Hinder pedestrian movement.
- Intercept projectiles.
- Obstruct lines of sight.
- Absorb blast fragment and divert wave pressure.
- Used as response markers

Berms used to block lines of sight or projectiles must be high enough to achieve those objectives or may be combined with landscaping or other construction elements. Detailed design guidance is contained in Army Technical Manual (TM) 5-853-3/AFMAN 32-1071, Vol. 3, *Security Engineering Final Design*.

**NOTE:** This Army Technical Manual is a "For Official Use Only" document and is not accessible on the Army Corps of Engineers publications website. A copy of the manual can be acquired by ordering it through your standard publications account.

## 12.7 GATES AND ENTRANCES (ACCESS CONTROL POINTS [ACP])

Installation entry points are key components in the force protection security program. The most effective entrances accommodate the functions of observation, detection, inspection, access control, and disablement of hostile personnel and vehicles, while containing the vehicles and pedestrians until access is granted. These areas are one of the most important installation features in the creation of a sense of arrival for both installation personnel and visitors. It is important that these areas present a positive public image (Figure 12-5).

The Headquarters Department of the Army, Deputy Chief of Staff for Operations and Plans, DAMO-ODL, office in coordination with the Protective Design and Electronic Security Centers of Expertise have developed standards for Army Access Control Points (ACP). See HQDA Definitive Design Standards for ACP ([UFC 4-022-01](#)).

### 12.7.1 Canopies for ACPs

ACPs will have a canopy, which will cover the full width of incoming lanes at the Guard Booth. The canopy shall have a minimum clearance of 14.5 feet and shall have a minimum length of 50 feet. Supporting structure of roof will consist of columns sized and located to create peripheral vision for the guards with minimal obstructions. Lighting will provide a minimum of 10 ft-candles with a Color Rendition Index of 65. Measures will be taken to protect the canopy from the threat of an over-height vehicle.

- [The Interim Army Standard for Canopies at Army Installation Access Points, Feb. 2004.](#)

### **12.7.2 Physical Security Equipment**

The Product Manager, Physical Security Equipment (PM-PSE) under DoD Directive 3324.3 is assigned the mission of developing, fielding, and supporting Physical Security Equipment (PSE) throughout its life cycle for the Army, Joint Services, and other Government agencies.

The DoD Directive assigns specific areas of responsibility which include: interior PSE, Command and Control Systems, security lighting, force protection systems, barrier and systems, and interior and exterior robotics. The PM-PSE homepage and the DA-approved equipment Blank Purchase Agreements (BPAs) are listed below.

- [Product Manager - Physical Security Equipment Homepage](#)
- [DA-approved PSE Equipment Blanket Purchase Agreements \(BPAs\)](#)

## **12.8 MASS NOTIFICATION STANDARDS**

### **12.8.1 Base Requirements.**

If the base has established an implementation plan for mass notification, select a mass notification system in accordance with that plan. If the base has not established an implementation plan, use the guidance provided in Chapters 2 and 3 to select an appropriate type of mass notification system. For many buildings, this should be an individual building mass notification system that could be later connected to a base-wide control system for mass notification. See DOD Mass Notification Standards ([UFC 4-021-01](#)) for further information.

### **12.8.2 Base Implementation Plan**

Each DOD base or facility should prepare an implementation plan that establishes a comprehensive approach to mass notification that is acceptable to security, communications, and engineering personnel. Elements of an implementation plan should include a needs assessment, requirements definition,

### **12.8.3 Applicability**

Criteria in this UFC apply to most DOD facilities as specified in UFC 4-010-01. Facilities include leased, temporary, expeditionary, and permanent structures located on or outside of DOD installations

### **12.8.4 Mass Notification**

Mass notification is the capability to provide real-time Information to all building occupants or personnel in the immediate vicinity of a building during emergency situations. To reduce the risk of mass casualties, there must be a timely means to notify building occupants of threats and what should be done in response to those threats. Pre-recorded and live voice emergency messages are required by this UFC to provide this capability.

### **12.8.5 Inhabited Buildings**

Mass notification capability is required for new inhabited buildings. Most, but not all, DOD buildings will meet the criteria to be considered an inhabited building.

### **12.8.6 Primary Gathering Buildings**

Mass notification capability is required for new primary gathering buildings and for existing buildings with projects meeting the replacement cost threshold specified in UFC 4-010-01. Primary gathering buildings are inhabited buildings that are occupied by larger numbers of DOD personnel.

### **12.8.7 Billeting**

Mass notification capability is required for new billeting buildings and for existing buildings with projects meeting the replacement cost threshold specified in [UFC 4-010-01](#). Billeting buildings are inhabited buildings that are used for sleeping by DOD personnel.

### **12.8.8 UFC 3-600-01**

#### Scope

This UFC, [3-600-01](#), establishes fire protection engineering policy and criteria for Department of Defense (DOD) components. The provisions of this UFC are applicable to all new and existing DOD facilities located on or outside of DOD installations, whether acquired or leased, by appropriated or non-appropriated funds, or third party financed and constructed. Facilities covered by this document include all types of buildings and their contents, structures, whether considered temporary or permanent, mobile and stationary equipment, waterfront facilities, outside storage, and shore protection for ships and aircraft. Matters relating to fire department operations, staffing, and equipment are not covered by this UFC.

#### Purpose

The purpose of this UFC is to establish minimum protection requirements for DOD facilities. These criteria are based on commercial requirements set forth by national insurance underwriters and may exceed minimum national code requirements. The requirements in this UFC reflect the need for the protection of life, mission, and property (building or contents) while taking into account the costs of implementing the criterion and risks associated with the facility.

### **12.8.9 Conversion of Use / Change of Occupancy.**

When any portion of a building is modified from its current use to that of an inhabited building, billeting, or a primary gathering building for one year or more, the building must meet the requirements for new construction.

Note: Examples would include a warehouse (uninhabited) being converted to administrative (inhabited) use; an inhabited administrative building being converted to a primary gathering building or billeting; or a non-compliant primary gathering building/billeting being altered, modernized, modified, rehabilitated, or renovated and converted to billeting/primary gathering building. Definitions of inhabited, uninhabited, primary gather building and billeting are found in [UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings](#).

### **12.8.10 Applications**

Fire alarm reporting systems are the base-wide reporting systems that connect the building fire alarm control panel(s) to the base fire department. Required systems are to be digital, telephonic, radio, or supervised conductor types. Consider compatibility of extensions of fire reporting systems with existing equipment.

#### Building Fire Alarm Systems

The building fire alarm systems must be connected to the fire alarm reporting system as a means for automatically and manually reporting fires to station or base fire departments or to other central alarm locations as required to implement firefighting operations and emergency action.

## 12.9 ARMY STANDARDS

The cited Army Standards shall be met.

- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)
- [Unified Facilities Criteria \(UFC\) 4-010-10, DoD Minimum Antiterrorism Standoff Distances for Buildings](#). (This document is a "For Official Use Only (FOUO)" publication. Users may contact the Point of Contact posted at the noted website for inquires regarding this document).
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Americans with Disabilities Act Accessibility Guideline \(ADAAG\)](#)
- [DoD Instruction 2000.16, DoD Antiterrorism Standards](#)

## 12.10 REFERENCES

The following references are provided for guidance.

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 12](#)
- [DoD Handbook 2000.12-H, Protection of DoD Personnel and Activities Against Acts of Terrorism and Political Turbulence, February 1993 \(This Handbook is a "For Official Use Only \(FOUO\)" publication. Users may contact the Point of Contact posted at the following website to obtain a copy of the Handbook\).](#)  
<http://www.dtic.mil/whs/directives/corres/html/o200012h.htm>
- Army Regulation (AR) 525-13, The Army Force Protection Program (Available only through the [Army Knowledge Online](#) web portal).
- UFC 4-010-02, DoD Security Engineering Manual, (This document is in draft form. See the [Security Engineering Working Group](#) website.
- U.S. Air Force, [Installation Force Protection Guide](#): (Contains information on installation planning, engineering design, and construction techniques that will preclude or minimize the effect of a terrorist attack).

Technical Manuals/Air Force Manual series TM 5-853/AFMAN) 32-1071, Security Engineering, 3 volume series: (Volumes 2 and 3 are "For Official Use Only [FOUO]" and are not available on the Army Corps of Engineers publications website. A copy of the manuals can be acquired via your standard publications account. The three volumes cover, Project Development, Concept Design, and Final Design respectively).



## Appendix A IDG Checklist

A completed Design Team Installation Design Guide (IDG) Checklist should be completed for all projects that impact the appearance of an Army Installation. The Master Planner shall provide the checklist to all teams designing new facilities, additions, or renovations to existing facilities, or maintenance on the installation. The Design Team IDG Design Checklist is to be completed by the design team to assure the guidelines and standards have been considered and complied within the design process, and by the Master Planner in project review.

The Designer of Record or Design Agent will provide a copy of the completed checklist, together with a signed certification statement with each design submittal (10% [pre-concept], 35%, 60%, and 90% for each MILCON project). The Designer of Record will complete the checklist and verify compliance in the space provided. In the case of Design Build, all agents (i.e. the Corps of Engineers, NAF, AFFES, Host Nation, tenants, etc.) shall have the perspective design build contractors submit a completed IDG Checklist as part of their proposal. The completed checklist will be provided to the Master Planner for review with concurrence or denial. Upon a determination of concurrence by the Master Planner, the plan and checklist with signatures will then be provided to the Real Property Planning Board for final acceptance or denial. The accepted checklist will become a part of the project record files.

If plans are denied for non-compliance at the installation or command level (where applicable) of review, an explanation of the denial will be provided to the Designer of Record. The plan and checklist can be resubmitted with revisions as indicated in the explanation of denial.

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**ARMY INSTALLATION DESIGN GUIDE (IDG) COMPLIANCE CHECKLIST**

Title: \_\_\_\_\_

Description: \_\_\_\_\_

Project Justification: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**A.1 SUSTAINABLE DESIGN:**

- a) Has SPiRiT Checklist been attached? (If not, obtain completed checklist)
- b) Does SPiRiT meet or exceed Silver level? ("Silver" is the standard for all FY06 MILCON vertical construction projects currently under design (as of March 18, 2003). For all other FY06 and future-year MILCON projects the minimum SPiRiT rating requirement is "Gold".)
  - Yes \_\_\_\_\_ - Review project as submitted.
  - No \_\_\_\_\_ - Return submittal to design team for revisions to meet SPiRiT.

**A.2 SITE PLANNING AND DESIGN STANDARDS (SECTION 7)**

- a) Was a site plan prepared for the proposed project utilizing the IDG Design Process included in Sections 2, 3 and 5 of the IDG?
  - Yes \_\_\_\_\_ No \_\_\_\_\_
- b) Does the site plan include Site Planning Design Component guidelines of the IDG?
  - Yes \_\_\_\_\_ No \_\_\_\_\_
- c) Does the site plan meet AT/FP requirements identified in Section 12 of the IDG?
  - Yes \_\_\_\_\_ No \_\_\_\_\_
- d) Designer Comments on Site Planning:
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
- e) Does Site Planning comply with the IDG? If not, provide justification.
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

Does Site Planning meet approved installation master plan siting compliance?

  - Yes \_\_\_\_\_ No \_\_\_\_\_ If not, provide justification.
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
- f) Has NEPA been initiated for the construction effort in accordance with AR 200-2?
  - Yes \_\_\_\_\_ No \_\_\_\_\_
- g) Has airspace criteria been consider relative to airfield accident potential zones?
  - Yes \_\_\_\_\_ No \_\_\_\_\_

**A.3 BUILDINGS DESIGN STANDARDS (SECTION 8)**

- a) Does the building exterior design meet the Building Design objectives defined in the IDG?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- b) Is the exterior building designed to meet the Structural Characteristics defined in the IDG?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- c) If the project is a renovation or addition, does the proposed renovation or addition meet IDG building design and structural characteristics?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- d) If the project is a renovation or addition to a historic building, does the renovation or addition maintain the design integrity of the original building or meet Historical Approval Agencies' requirements for any deviations?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- e) Does the building exterior design meet AT/FP requirements (if applicable)?  
Yes \_\_\_\_\_ No \_\_\_\_\_

Designer Comments on exterior Building Design:

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- f) Does Building design comply with the IDG? If not, provide justification.

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**NOTE:** Beginning in FY08, all MILCON vertical construction projects must achieve the SILVER level of LEED NC (New Construction) certification.

**A.4 CIRCULATION DESIGN STANDARDS (SECTION 9)**

- a) If the project includes roadway construction, does the proposed plan meet Federal Highway and/or local guidelines defined in the IDG?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- b) If the project includes roadway construction, does the proposed plan meet AT/FP roadway setback requirements defined in the IDG?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- c) If the project includes roadway construction, does the proposed plan include applicable roadway alignment and intersection guidelines defined in the IDG?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- d) If the project is an entrance gate, does the proposed plan include entrance gate guidelines and standards defined in the IDG?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- e) If the project includes parking, does the proposed plan meet the Parking Lot Location/Design guidelines defined in the IDG?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- f) If the project includes pedestrian circulation, does the proposed plan meet the Walkways and Pedestrian Circulation Guidelines in the IDG?  
Yes \_\_\_\_\_ No \_\_\_\_\_

g) If the project includes bicycle circulation, does the proposed plan meet the Bikeway Guidelines in the IDG?

Yes \_\_\_\_\_ No \_\_\_\_\_

h) Designer Comments on Circulation Design:

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i) Does Circulation Design comply with the IDG? If not, provide justification.

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**A.5 LANDSCAPE DESIGN STANDARDS (SECTION 10)**

a) All projects for new construction should include the planting of trees shrubs and/or groundcover. Does the proposed planting plan include a project plan?

Yes \_\_\_\_\_ No \_\_\_\_\_

b) Does the proposed planting plan meet AT/FP requirements defined in the IDG?

Yes \_\_\_\_\_ No \_\_\_\_\_

c) Does the proposed planting plan include plant material recommended in the selected Plant Palette Matrix included in the IDG?

Yes \_\_\_\_\_ No \_\_\_\_\_

d) Designer Comments on Landscape Design:

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e) Does Landscape Design comply with the IDG? If not, provide justification.

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**A.6 SITE ELEMENT DESIGN STANDARDS (SECTION 11)**

a) If the project includes Site Furnishings, does the proposed plan follow the guidelines in the IDG?

Yes \_\_\_\_\_ No \_\_\_\_\_

b) If the project includes Signs, does the proposed plan meet the Signs standards in the ?

Yes \_\_\_\_\_ No \_\_\_\_\_

c) If the project includes exterior Lighting, does the proposed plan meet the exterior Lighting guidelines defined in the IDG?

Yes \_\_\_\_\_ No \_\_\_\_\_

d) Will all power and other distribution lines to be located underground?

Yes \_\_\_\_\_ No \_\_\_\_\_

e) Will all substations and transformers be designed as to be screened from view?

Yes \_\_\_\_\_ No \_\_\_\_\_

f) Will all sewer and water lines to be located underground?

Yes \_\_\_\_\_ No \_\_\_\_\_

g) Are all storm drain systems designed to meet the guidelines defined in the IDG?

Yes \_\_\_\_\_ No \_\_\_\_\_

h) Designer Comments on Site Elements Design:

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- i) Does Site Elements Design comply with IDG? If not, provide justification.

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**A.7 FORCE PROTECTION DESIGN STANDARDS (SECTION 12)**

- a) Have installation boundary setbacks been included?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- b) Have building setbacks from roads, parking, other buildings been included?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- c) Do site plans and landscape plans include the criteria outlined for AT/FP?  
Yes \_\_\_\_\_ No \_\_\_\_\_
- d) Designer Comments on AT/FP Compliance:

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- e) Does AT/FP Design comply with the IDG? If not, provide justification.

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**I hereby certify that the information provided is in compliance with the guidelines of the installation or applicable IDG, except as justified as non-compliance.**

\_\_\_\_\_  
Designer of Record

\_\_\_\_\_  
Date

**Concur** \_\_\_\_\_

**Deny** \_\_\_\_\_, Explanation of denial is attached.

\_\_\_\_\_  
IDG Coordinator

\_\_\_\_\_  
Date

**Accept** \_\_\_\_\_

**Deny** \_\_\_\_\_, Explanation of denial is attached.

\_\_\_\_\_  
Command Review (Where Applicable)

\_\_\_\_\_  
Date

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Requests for variance from standards found in the Installation Design Guide must be submitted to the USAG-M Master Planning Division using the following form:

**Detroit Arsenal Installation Design Guide (IDG)  
Request for Waiver to IDG Standards**

Forward Requests to:  
US Army Garrison-Michigan  
Master Planning Div (IMNW-MIG-PWM)  
Mail Stop # 117 (Bldg 205)  
Warren, Michigan 48397-5000  
Email: MasterPlanning@tacom.army.mil

**Project Title** \_\_\_\_\_  
**Work Order (DD4283) Number** \_\_\_\_\_  
or  
**DD1391 Number (MILCON)** \_\_\_\_\_

**Project/Work Description:**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IDG Standard Description (include page and paragraph numbers):**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Variance requested :**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

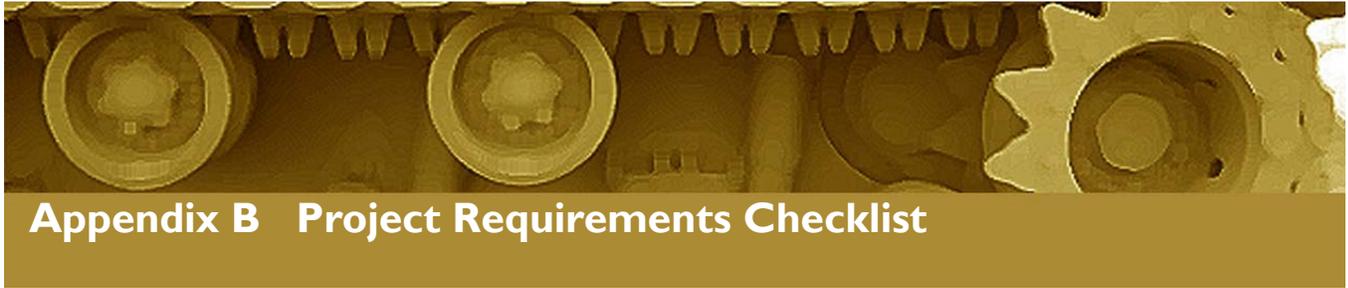
**Reason why project cannot adhere to IDG standards:**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Requestor Name: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
Email: \_\_\_\_\_

- Notes:**
- 1. Requests for waiver to Army-wide standards, if approved locally, will further require a waiver request from the Garrison Commander, through IMA and the ACSIM , to the Army Facilities Standardization Committee (AFSC).**
  - 2. Requestor is responsible for providing all relevant documentation, to include: drawings; sketches; specifications; and any cites of regulations, code or law.**

In accordance with AR 210-20, Master Planning for Army Installations, the installation Real Property Planning Board (RPPB) is the adjudicating body for the Army Installation Design Guide at the installation level. Violations and variances from standards will be reviewed and adjudicated by the RPPB. The Senior Mission Commander will chair an Installation Planning Board (IPB) to review and approve the RPPB's actions.

In addition to this local waiver process, any requests for variances from those Army-wide standards established by the Army Installation Design Standards (IDS) will further require a waiver request from the Garrison Commander, through IMA and the ACSIM, to the Army Facilities Standardization Committee (AFSC). IDS waiver request submittals must provide a clear and concise explanation of the reasons justifying the waiver, including the proposed alternative and the consequences of adherence to the IDS."



## Appendix B Project Requirements Checklist

The following checklist is optional and is designed for use on major projects.

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**Project Requirements Checklist**

For Completion by Installation Personnel for Use in Preparation of the Request for Proposals (RFP).

**PROJECT** \_\_\_\_\_ **LOCATION** \_\_\_\_\_

**DPW/DIS POC** \_\_\_\_\_ **PH#** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_

**E-MAIL** \_\_\_\_\_

**DATE CHECKLIST COMPLETED** \_\_\_\_\_ **BY** \_\_\_\_\_

When completing this form it is important to remember that it is the responsibility of the installation to resolve any conflicts between the different “users” (i.e. DPCA, DPW, etc.) about wants, needs, etc. The A/E that prepares the RFP must have the specific guidance contained herein to get you what you want. If there is information you wish to provide that is not specifically requested or you are unable to make your desires clear within the confines of this checklist, then add those comments at the end. Overseas installations consider compliance with Host Nation codes.

**B.1 GENERAL INFORMATION****B.1.1 Maps and plans available: (Provide copies with completed checklist)**

1. Basic Information Maps (BIMs): (List Drawing Numbers)  
(Maps should be provided in Spatial Data Standards (SDS) compatible GIS format whenever possible.)
  - Site topography
  - Site Sanitary Sewer
  - Site Storm Sewer
  - Site Electrical
  - Site Water
  - Site Plan Extract - from RPMP (Future Development Site Plan)
  - Other
  - Project Location Plans
    - Area Map
2. Site Map
3. Aerial Photograph (Preferred to Topographic)
4. USGS Map
5. Project Siting Plan (Proposed)
6. Environmental
  - Jurisdictional wetlands designation
  - Other historical concerns:

**B.1.2 Project Building Plans: (If renovation/addition or prior design, provide available information and plans)**

- |               |                    |
|---------------|--------------------|
| 1. Foundation | 7. Electrical      |
| 2. Basement   | 8. Mechanical      |
| 3. Floor      | 9. Plumbing        |
| 4. Structural | 10. Site Utilities |
| 5. Roof       | 11. Specifications |
| 6. Elevations | 12. Other          |

**B.1.3 Applicable Codes and Standards:**

List all known applicable codes and regulations. Generally, NAF construction will not follow Federal or Military Specifications.

Department of Defense (DoD) Governing criteria is UFC 1-200-01, Design: General Building Requirements, 31 July 2002

Local Building Codes:

State and County Codes:

Environmental Regulations:

Installation Regulations:

Cultural Regulations:

Other:

National Fire Protection Codes (NFPA), UFC 3-600-01, Design: Fire Protection Engineering for Facilities, 17 April 2003

**B.2 TEMPORARY FACILITIES AVAILABLE TO THE CONTRACTOR**

**B.2.1 Facilities available to contractor during construction:**

- 1. General Site Plan has been annotated to show limits of construction site:  
Yes \_\_\_\_\_ No \_\_\_\_\_

(If the contractor requires the use of additional area, he must obtain written approval from the Contracting Officer.)

- 2. Construction Office available:  
Yes \_\_\_\_\_ No \_\_\_\_\_

- 3. Covered materials storage available:  
Yes \_\_\_\_\_ No \_\_\_\_\_

- 4. Uncovered materials storage available:  
Yes \_\_\_\_\_ No \_\_\_\_\_

NOTE: Security of construction site and materials is the Contractor's responsibility.

- 5. Select fill borrow areas, spoil areas, sanitary fill and haul routes are shown on attached Installation map.  
Yes \_\_\_\_\_ No \_\_\_\_\_

List any restrictions or notes on the use of those areas:

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Disposition of scrap and salvageable materials resulting from construction is the responsibility of the contractor unless otherwise noted and agreed.

**B.2.2 Utilities available to contractor during construction:**

1. Potable Water: Yes \_\_\_\_\_ No \_\_\_\_\_  
 Metering required: Yes \_\_\_\_\_ No \_\_\_\_\_  
 Cost \$ \_\_\_\_\_ per \_\_\_\_\_
2. Non-Potable Water (Irrigation, Machine Washing, etc.): Yes \_\_\_\_\_ No \_\_\_\_\_  
 Metering required: Yes \_\_\_\_\_ No \_\_\_\_\_  
 Cost \$ \_\_\_\_\_ per \_\_\_\_\_
3. Electricity: Yes \_\_\_\_\_ No \_\_\_\_\_  
 Metering required: Yes \_\_\_\_\_ No \_\_\_\_\_  
 Cost \$ \_\_\_\_\_ per \_\_\_\_\_
4. Natural gas: Yes \_\_\_\_\_ No \_\_\_\_\_  
 Metering required: Yes \_\_\_\_\_ No \_\_\_\_\_  
 Cost \$ \_\_\_\_\_ per \_\_\_\_\_
5. Sanitary sewer: Yes \_\_\_\_\_ No \_\_\_\_\_

NOTE: Utilities used at the construction may be metered and/or charged to the contractor. The rate schedule for utilities will be provided as part of this completed checklist and shall be the basis by which the installation will bill the utility usage. Installation of temporary meters, where required, and temporary tie-ins to the utility systems shall be the responsibility and at the cost of the contractor.

**B.3 REQUIREMENTS****B.3.1 Demolition Requirements****Facilities for demolition, relocation, or retention.**

Provide description, size, type construction, and location of any existing facilities on the site that must be demolished, relocated or retained. Consider all structures, foundations, pavements, communications, and utilities (whether active or abandoned). Consider demolition hazards (i.e. lead, asbestos, etc.). Every effort shall be made by the installation to ensure compliance with the clean site policy. Provide the date when the clean site will be available. Recycle building demolition and debris material when ever possible.

**B.3.2 Paving Requirements**

1. Parking area (s) required: Yes \_\_\_\_\_ No \_\_\_\_\_

- Location and brief description:

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- Number of parking spaces for passenger vehicles: \_\_\_\_\_  
(including \_\_\_\_\_ spaces for the handicapped)
- Type of pavement: \_\_\_\_\_
- Perimeter of parking area (s) to have concrete curb:  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Striping of parking spaces required:  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Width of stripes: \_\_\_\_\_
- Type of paint to be used: \_\_\_\_\_
- Special signage required: \_\_\_\_\_
- Concrete wheel stops required:  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Handicapped ramps/depressed curbs required:  
Yes \_\_\_\_\_ No \_\_\_\_\_

2. Service road(s) required: Yes \_\_\_\_\_ No \_\_\_\_\_

- Location: \_\_\_\_\_
- Type pavement: \_\_\_\_\_
- Concrete curbing required on both sides of road:  
Yes \_\_\_\_\_ No \_\_\_\_\_
- Minimum roadway width: \_\_\_\_\_ Feet
- List any other special paving considerations or needs:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Sidewalks required: Yes \_\_\_\_\_ No \_\_\_\_\_

- Type of paving material \_\_\_\_\_
- Location: \_\_\_\_\_
- Minimum width: \_\_\_\_\_
- Minimum thickness shall be 4" with welded wire fabric.

4. Concrete dumpster pads required: Yes \_\_\_\_\_ No \_\_\_\_\_

- Number of pad(s): \_\_\_\_\_ each. See note below.
- Size of each pad: \_\_\_\_\_ feet by \_\_\_\_\_ feet.
- Provide bumper stops at rear of pads: \_\_\_\_\_ Yes, \_\_\_\_\_ No.

- Provide architectural screening of pads: \_\_\_\_\_ Yes, \_\_\_\_\_ No.

Type: \_\_\_\_\_

NOTE: Building orientation or design may eliminate need for screening. Screening shall be in accordance with the Army Installation Design Guide (IDG).

### B.3.3 UTILITIES SERVICE REQUIREMENTS

#### 1. ELECTRICAL SERVICE

- Meter required: Yes \_\_\_\_\_ No \_\_\_\_\_  
Type: \_\_\_\_\_
- Type system to be installed:  
Underground \_\_\_\_\_, Aerial \_\_\_\_\_.
- Type transformer(s) to be installed:  
Pole mtd. \_\_\_\_\_, Pad mtd. \_\_\_\_\_.

NOTE: Screen in accordance with Army Installation Design Guide (IDG).

- Available Voltage: \_\_\_\_\_
- Location of tie-in point: \_\_\_\_\_

#### 2. WATER SERVICE:

- Meter required: Yes \_\_\_\_\_ No \_\_\_\_\_
- Size and location of tie-in point: \_\_\_\_\_
- Additional fire hydrant (s) required: \_\_\_\_\_

#### 3. SANITARY SEWER SERVICE:

- Size and location of tie-in point:  
\_\_\_\_\_  
\_\_\_\_\_

#### 4. STORM DRAINAGE:

- Design for \_\_\_\_\_ year occurrence.
- Type System: \_\_\_\_\_ Surface, \_\_\_\_\_ Underground
- Location of tie-in point for existing underground storm drainage system if incorporated in contractor design: See Site Plan.

#### 5. GAS SERVICE: \_\_\_\_\_ Natural, \_\_\_\_\_ Propane;

- Meter required: Yes \_\_\_\_\_ No \_\_\_\_\_.
- For Heating: Yes \_\_\_\_\_ No \_\_\_\_\_.
- For domestic hot water: Yes \_\_\_\_\_ No \_\_\_\_\_.
- For laundry dryers: Yes \_\_\_\_\_ No \_\_\_\_\_.

- For kitchen equipment: Yes \_\_\_\_\_ No \_\_\_\_\_.
- Size and location of tie-in point: \_\_\_\_\_

**NOTE:** Contractor (Offeror) shall be responsible to determine that all of the existing service utilities are of sufficient capacity to accommodate all of the design loads for this total facility. Should a Contractor (Offeror) determine that one or more of the existing service utilities are not adequate to accommodate the Contractor's (Offeror's) design loads for this total facility, then the Contractor (Offeror) shall submit with his initial and any subsequent proposal (Best & Final Offer), the requirements, design data and the price for increasing the capacity of each existing service utility system or for providing a new service utility system. Design loads for this facility shall be calculated in accordance with the criteria specified in this Request for Proposals (RFP), with the most stringent criteria governing. The responsibility for verification and field location of any and all information provided in the RFP and on any attached or enclosed drawings, or other documents shall be and is the responsibility of the Contractor (Offeror).

6. Coordination and Notification Required for Utilities Tie-in:

- Point of contact for coordination: \_\_\_\_\_  
 Tel. \_\_\_\_\_ Email \_\_\_\_\_
- Road Closing:
  - a) Can both lanes be closed to traffic: Yes \_\_\_\_\_ No \_\_\_\_\_.
  - b) Maximum time road can be closed: Yes \_\_\_\_\_ No \_\_\_\_\_.
  - c) Can road be closed over a holiday or weekend: Yes \_\_\_\_\_ No \_\_\_\_\_.
- Minimum notification time required for utilities outages and road closing:
  - a) Electric Power: \_\_\_\_\_ working days.
  - b) Water: \_\_\_\_\_ working days.
  - c) Gas: \_\_\_\_\_ working days.
  - d) Steam: \_\_\_\_\_ working days.
  - e) Central AC lines: \_\_\_\_\_ working days.
  - f) Roads: \_\_\_\_\_ working days.

**NOTE:** Enclose underground primary electrical service in concrete from the new utility tie-in points to the pad mounted transformer and/or mechanical room panel boxes. Provide one spare conduit for each service sealed at both ends. The conduit may be PVC provided it conforms to NFPA 70, current edition.

**NOTE:** If existing sidewalk, curbs, gutters, or paving are disturbed or removed during construction, the paving or concrete must be replaced by the Contractor.

7. Coordination and Notification Required for Railroad Track Work:

- Point of contact for coordination: \_\_\_\_\_  
 Tel. \_\_\_\_\_ Email \_\_\_\_\_
- Road Closing:
  - a) Can both lanes of traffic be closed: Yes \_\_\_\_\_ No \_\_\_\_\_.
  - b) Maximum time road can be closed: Yes \_\_\_\_\_ No \_\_\_\_\_.
  - c) Can road be closed over a holiday or weekend: Yes \_\_\_\_\_ No \_\_\_\_\_.
- Railroad Track Closing:
  - a) Can track be closed to traffic: Yes \_\_\_\_\_ No \_\_\_\_\_.
  - b) Maximum time track can be closed: Yes \_\_\_\_\_ No \_\_\_\_\_.
  - c) Can track be closed over holiday of weekend: Yes \_\_\_\_\_ No \_\_\_\_\_.
- Minimum notification time required for railroad track and road closing:
  - a) Railroad track: \_\_\_\_\_ working days.
  - b) Road: \_\_\_\_\_ working days.
- Are used track components to be sorted and properly stored: Yes \_\_\_ No \_\_\_ .
- Are samples, ultra-sonic inspections, temperature recordings, and certificates to be submitted for ties, rail track components, or ballast: Yes \_\_\_ No \_\_\_\_\_.
- Are RAILER markings and reporting required: Yes \_\_\_ No \_\_\_\_\_.
- Are there special radio or communication requirements: Yes \_\_\_ No \_\_\_\_\_.

**NOTE:** If existing sidewalk, curbs, gutters, drainage, ballast, or paving are disturbed or removed during construction, the paving, drainage, ballast, or concrete must be replaced by the Contractor.

**B.3.4 ARCHITECTURAL AND STRUCTURAL BUILDING DESIGN REQUIRMENTS**

:

1. SEISMIC DESIGN ZONE: \_\_\_\_\_  
 Structural design shall be in accordance with codes specified in the RFP.
2. Basic wind speed: \_\_\_\_\_ mph. Basic wind speed: \_\_\_\_\_ mph.
3. Basic wind speed: \_\_\_\_\_ mph.
4. Ground Snow Load: \_\_\_\_\_ PSF (Plus code live load).
5. Maximum Frost Penetration: \_\_\_\_\_ inches.
6. Heat Transmission: "U" Factors:

- Walls: \_\_\_\_\_.
- Floor (slab-on-grade) at perimeter foundation wall: \_\_\_\_\_.
- Floor over ventilated crawl spaces: \_\_\_\_\_.
- Ceiling and/or roofs: \_\_\_\_\_.

7. Roof:

- Minimum pitch: \_\_\_\_\_
- Type: \_\_\_\_\_
- Scuppers and drains are required: Yes \_\_\_\_\_, (If a parapet type roof is proposed);  
No \_\_\_\_\_.
- Gutters and downspouts: Yes, \_\_\_\_\_  
No, \_\_\_\_\_ Type: \_\_\_\_\_
- Drainage carry off: Splash Blocks \_\_\_\_\_; or  
Underground drainage system \_\_\_\_\_ (internal roof drains not permitted.)
- Access to roof: \_\_\_\_\_.

**NOTES:** Catwalks to and around rooftop HVAC units and other equipment are required (Cary tread or equal). Where possible, architectural screening of visible rooftop equipment is required.

8. Site Conditions:

- Environmental Assessment required: Yes \_\_\_\_\_ No \_\_\_\_\_.  
Completion Date: \_\_\_\_\_  
EIS Required: Yes \_\_\_\_\_ No \_\_\_\_\_.  
Completion Date: \_\_\_\_\_  
(Provide copies of actions to date.)
- Cultural Resources Compliance Completed: Yes \_\_\_\_\_ No \_\_\_\_\_.
- Site Conditions:  
Topographical feature description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Confirm or identify subterranean hazards:

- Fill area
- Old foundations
- Unexploded ordnance
- Existing/abandoned utility line
- Tunnels/mines

Other

- Soil investigation data available: Yes \_\_\_\_\_ No \_\_\_\_\_.
- At project location: Yes \_\_\_\_\_ No \_\_\_\_\_.

Other: \_\_\_\_\_

- Soil bearing capacity: \_\_\_\_\_ PFS.
- Actual test: \_\_\_\_\_,
- Assumed: \_\_\_\_\_.

**NOTE:** The successful Offeror shall be responsible for accomplishing additional necessary testing to verify soil characteristics at the site and design of the foundation system to meet these requirements.

9. Building Exterior:
- Brick: Yes \_\_\_\_\_ No \_\_\_\_\_,
  - Other: \_\_\_\_\_.

**NOTE:** Where brick is required, the exterior walls shall be finished with face brick with through body integral color and shall match the brick currently in place in Building No's \_\_\_\_\_.

**NOTE:** The final floor plan as designed by Offerors shall include all functional areas outlined subsequently in this section. Gross building areas shall not exceed that specified in the RFP, including the mechanical room.

10. Barrier Free Requirements:  
(Where applicable) as minimum, \_\_\_\_\_ guest units shall be barrier free.

**NOTE:** Where required, "Barrier Free Requirements" shall be designed and constructed to provide for the Physically Handicapped (interior and exterior), in accordance with Uniform Federal Accessibility Standards (UFAS) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

11. Kickplates required on interior wood doors: Yes \_\_\_\_\_ No \_\_\_\_\_.

12. Approximate total maximum occupancy:
- Female: Adults \_\_\_\_\_ Children \_\_\_\_\_
  - Male: Adults \_\_\_\_\_ Children \_\_\_\_\_
  - TOTAL: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**B.3.5 LANDSCAPE REQUIREMENT**

List any special requirements:

**NOTE:** Offerors will provide a Landscaping Plan for the project area as required in the RFP. Surface area disturbance and tree removal will be minimized. Trees determined to be retained will be incorporated in the Landscaping Plan. Landscaping shall refer to the planting of trees, shrubs, plants, etc. and shall not be associated with establishment of turf as defined below. Trees, shrubs, plants, etc. shall be guaranteed for a period of one (1) year from time of planting.

- 1. Establishment of Turf:
- 2. Soil Poisoning: For termite protection is \_\_\_\_\_, is not \_\_\_\_\_ required.

**NOTE:** It will be the Contractor's responsibility to protect all existing turf and landscaping affected by the construction and to replace any turf or landscaping that has been damaged, for the term of the contract.

- 3. Paint Color:

List standard paint colors: \_\_\_\_\_  
\_\_\_\_\_

- 4. Finishes:

List standard finishes: \_\_\_\_\_  
\_\_\_\_\_

**B.3.6 ELECTRICAL DESIGN REQUIREMENTS**

- I. EXTERIOR LIGHTING:

PARKING AREA(S) LIGHTING REQUIRED: YES \_\_\_ NO \_\_\_\_\_.

Type of lighting:

- \_\_\_\_\_ High Pressure Sodium
- \_\_\_\_\_ Low Pressure Sodium
- \_\_\_\_\_ Mercury
- \_\_\_\_\_ Halogen
- \_\_\_\_\_ Other

Average Intensity:

\_\_\_\_\_ foot candles per sq. yd. with a uniformity ratio of 4:1 \_\_\_\_\_,  
Other \_\_\_\_\_ (Avg. to min.)

Type pole: \_\_\_\_\_.

Special mounting requirements:

\_\_\_\_\_  
\_\_\_\_\_

Switching:

Type: \_\_\_\_\_ Manual  
 \_\_\_\_\_ Clock \_\_\_\_\_ 7 day \_\_\_\_\_ 7 day  
 \_\_\_\_\_ Astronomical  
 \_\_\_\_\_ Photo Electric  
 \_\_\_\_\_ Combination of above as indicated  
 \_\_\_\_\_ Other

- Exterior building lighting required: Yes \_\_\_\_\_ No \_\_\_\_\_.

Type of lighting:

\_\_\_\_\_ High Pressure Sodium  
 \_\_\_\_\_ Low Pressure Sodium  
 \_\_\_\_\_ Mercury  
 \_\_\_\_\_ Halogen  
 \_\_\_\_\_ Other

Average Intensity: \_\_\_\_\_ foot candles per sq. yd.

To be mounted on the building structure: Yes \_\_\_\_\_ No \_\_\_\_\_.

Switching:

Type: \_\_\_\_\_ Manual  
 \_\_\_\_\_ Clock \_\_\_\_\_ 7 day \_\_\_\_\_ 7 day  
 \_\_\_\_\_ Astronomical  
 \_\_\_\_\_ Photo Electric  
 \_\_\_\_\_ Combination of above as indicated.  
 \_\_\_\_\_ Other

Location: \_\_\_\_\_.

Lighting for plumbing and electrical chases required: Yes \_\_\_\_\_ No \_\_\_\_\_.

**NOTE:** All electrical wiring (exterior and interior) shall be copper.

2. Outside weather proof receptacles:

Shall be installed every \_\_ feet along the building exterior. Outside weather proof receptacles should be RCD (GFCI) protected.

**NOTE:** The building shall have emergency light fixtures and exit lights in accordance with NFPA requirements. Both shall have battery powered back-up, charge level meters and test buttons.

3. Electromagnetic Shielding:

List any electromagnetic shielding requirements.

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4. Standby/Backup Power Requirements:

List and standby/backup power requirements.

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**B.3.7 MECHANICAL/PLUMBING DESIGN REQUIREMENTS**

1. Heating design data:

- Below is the outside dry bulb temperature that is equaled or exceeded 97 1/2 percent of the time, on the average, during the coldest 3 consecutive months (Dec., Jan., and Feb.). Heating design shall be based on the dry bulb temperature equaled or exceeded 97 1/2 percent of the time.

a). Dry bulb temperature: \_\_\_\_\_.

b). Wind velocity: \_\_\_\_\_.

c). Degree days: \_\_\_\_\_.

- Interior design temperatures: 68 degrees.

2. Air conditioning design data:

- Outside dry bulb and wet bulb temperatures that are equaled or exceeded 2 1/2 percent of the time, on the average, during the warmest 4 consecutive months (Jun. thru Sep.) are given below. Air conditioning design shall be based on the 2 1/2 percent dry bulb, wet bulb temperature.

a). Dry bulb temperature: \_\_\_\_\_.

b). Wet bulb temperature: \_\_\_\_\_.

- Interior design temperatures: \_\_\_\_\_.

a). Dry bulb temperature: \_\_\_\_\_.

b). Wet bulb temperature: \_\_\_\_\_.

3. Heating and air conditioning system:

Shall be designed to provide a relative humidity of 50% + 10% or -10%.

4. Mechanical Systems:

Economy cycle. The air conditioning system except where room fan coil units are located, if located where the winter design dry bulb temperature is 35 degrees F (97 1/2% basis) or less, shall be designed so that 100% outside air may be used in the system during those cool weather periods when the outside air temperature is sufficiently low to provide all the cooling needed, or reduce the load on the

air conditioning refrigeration equipment. Use of the economy cycle in areas above 358 F shall be provided when it can be clearly shown that use of the economy cycle is cost effective.

5. Install humidity control override: Yes \_\_\_\_\_ No \_\_\_\_\_.
6. Automatic timer controls required for:
  - Heating System: Yes \_\_\_\_\_ No \_\_\_\_\_.
  - Air Conditioning System: Yes \_\_\_\_\_ No \_\_\_\_\_.
7. Heating and Air Conditioning Source:
  - Self contained plant: Heat \_\_\_\_\_ AC \_\_\_\_\_.
  - Supply lines from central plant: Heat \_\_\_\_\_ AC \_\_\_\_\_.
  - Purchased heat: \_
8. Low profile roof mounted HVAC units are permissible: Yes \_\_\_\_\_ No \_\_\_\_\_
9. Automatic timer controls required for:
  - Heating System: Yes \_\_\_\_\_ No \_\_\_\_\_.
  - Air Conditioning System: Yes \_\_\_\_\_ No \_\_\_\_\_.
10. Heating fuel to be used:
 

Fuel:

Natural gas \_\_\_\_\_

#2 Fuel oil \_\_\_\_\_, or

Propane \_\_\_\_\_.
11. Dual fuel heating plant required: Yes \_\_\_\_\_ No \_\_\_\_\_.

Primary Fuel \_\_\_\_\_,

Secondary Fuel \_\_\_\_\_.

12. Outside air supply intake:  
To close when building is unoccupied: Yes \_\_\_\_\_ No \_\_\_\_\_.
13. Outside air supply intake:  
To close when building is unoccupied: Yes \_\_\_\_\_ No \_\_\_\_\_.
14. Type heating and air conditioning filters required:
 

( ) Permanent ( ) Throw away
15. Covers and locks:  
required on interior utilities controls: Yes \_\_\_\_\_ No \_\_\_\_\_.
16. Plumbing Design Data:
  - Exterior hose bibs: Minimum of \_\_\_\_\_ each with 3/4" hose connection on building exterior.
  - a). Frost protection required: Yes \_\_\_\_\_  
No \_\_\_\_\_.

b). Removable cutoff handles required: Yes \_\_\_\_\_ No \_\_\_\_\_.

• Interior hose bibs: See Functional Requirements

• Grease trap (s) required: Yes \_\_\_\_\_ No \_\_\_\_\_.  
Location (s): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

• \_\_\_\_\_ Commodes shall be floor mounted  
flush valve type.

• \_\_\_\_\_ Lift station required: Yes \_\_\_\_\_  
No \_\_\_\_\_.  
Hot water heater (s) required: Yes \_\_\_\_\_ No \_\_\_\_\_.

- a). Energy source: Natural gas \_\_\_\_\_ #2 Fuel oil \_\_\_\_\_.
- b). Required minimum temperature: \_\_\_\_\_.
- c). System: \_\_\_\_\_.

**NOTE:** All domestic water piping below grade shall be type K copper. All domestic water piping above grade shall be either type L copper in accordance with appropriate codes. All joints shall be soldered with 95/5 Tin/Antimony solder. The entire potable water system shall be lead free. Vent piping shall be schedule 40 galvanized steel or DWV weight copper.

**NOTE:** Emergency shutoff switches shall be mounted in a location for responding security/fire department forces to shut system down.

- Provide a minimum of \_\_\_\_\_ floor drain(s) in the laundry and mechanical room.
- Insulate all water pipes (hot & cold) above slab: Yes \_\_\_\_\_ No \_\_\_\_\_.

**NOTE:** The domestic hot and cold water piping below grade shall be kept to a minimum, and below the frost line if located outside the building perimeter.

• All domestic water pipes (hot & cold) shall be stenciled HW or CW. If pipes have been insulated then the pipe insulation shall also be stenciled.

• Provide grease interceptor: Yes \_\_\_\_\_ No \_\_\_\_\_  
Location: \_\_\_\_\_

• Provide a water filtration system: Yes \_\_\_\_\_ No \_\_\_\_\_  
Location: \_\_\_\_\_

• Type: \_\_\_\_\_

• Other plumbing considerations or requirements:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**B.3.8 MINIMUM REQUIREMENTS FOR RESTROOMS**

The following criteria are for minimal requirements only and may be superseded in quantities and/or finishes, providing that changes are an upgrading of the minimal requirements.

**General: MALE and FEMALE**

<b>ITEM</b>	<b>QUANTITY</b>	<b>SPECIAL REQUIREMENTS</b>
Lavatory	_____	
Commode	_____	
Faucets	_____	Chrome finish.
Expose pipes/valves	_____	Chrome finish.
Pipe penetrations	_____	Chrome finish escutcheons.
Clean outs	_____	Chrome covers.
Mirrors	_____	Mech. wall fasteners. Lighting
Floor drain	_____	Each restroom.
Hose bib	_____	Under lavatory in each restroom.
Wall finish		Ceramic tile to 5' height
Ceiling		moisture resistant DW.
Floors		Ceramic tile w/ceramic tile base, or quarry tile w/quarry tile base. Tile shall be MUD-SET.
Toilet Partitions	_____	At all commodes and urinals. overhead braced w/door bumpers baked enamel w/skirts.
Skirts	_____	18" stainless steel. Watertight top edge.
Duplex receptacle	_____	GFCI type over vanity.
Paper towel dispenser (with trash receptacle)	_____	Recessed in wall.
Hand dryer	_____	Over each lavatory.
Soap dispenser	_____	Liquid pump.
Toilet paper dispenser	_____	Each commode stall.

ITEM	QUANTITY	SPECIAL REQUIREMENTS
<b>Specific: WOMENS</b>		
Sanitary napkin disposal	_____	Each commode stall.
Sanitary napkin dispenser	_____	Each restroom, coin operated.
<b>Specific: MENS</b>		
Urinal	_____	Porcelain wall mounted w/stainless steel part.

**NOTE:** Each restroom shall be designed and constructed with provisions for the handicapped and shall conform to the latest edition of the National Standard Plumbing Code and the Uniform Federal Accessibility Standards published in the Federal Register, August 7, 1984 (Current Edition).

**B.3.9 SAFETY REQUIREMENTS**

I. Fire Protection Requirements

- Sprinkler System Required: Yes \_\_\_\_\_ No \_\_\_\_\_
  - a). Type system to be installed: Wet \_\_\_\_\_ Dry \_\_\_\_\_
  - b). Complete coverage throughout the structure: Yes \_\_\_\_\_ No \_\_\_\_\_

If no, describe proposed system, layout, etc.: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

c). Exterior siamese connections are required.

- Detection System:

- a). Smoke detectors required: Yes \_\_\_\_\_ No \_\_\_\_\_  
**NOTE:** Radium type shall not be used.
- b). Heat detectors required: Yes \_\_\_\_\_ No \_\_\_\_\_  
 (Rate of Rise Heat Detectors shall not be permitted.)

**NOTE:** When smoke and heat detectors are specific, full coverage of the building is required. In addition, heat detectors are also to be installed in conjunction with potential fire producing equipment such as furnaces, electric motors, etc. All detection devices shall be spaced and installed in accordance with manufacturer's specifications and the latest edition of the NFPA in effect at the time of installation. Heat detectors shall be set to trigger at 1358 F. The heat and smoke detectors shall be the combination type. The smoke detection unit shall alarm locally and the heat detection unit shall alarm the facility and transmit the alarm to the fire department via a dedicated telephone line or appropriate transmission media, i.e. radio transmission equipment. Automatic cutoff of air handling equipment is required when smoke or heat detectors, sprinkler systems, or any other automatic/manual fire alarm suppression system are activated.

- **Manually Activated Fire Alarm System:**  
Installed in accordance with the latest edition of the NFPA in effect at the time of installation, is required. Also provide manual pull stations at the ends of the building. The pull stations shall be tied into a central panel box that will signal the fire department via a dedicated telephone line or appropriate transmission media, i.e. radio transmission equipment.
- Special fire suppression system (s) required: Yes \_\_\_\_\_ No \_\_\_\_\_.  
Describe type, location, and justification: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Fire extinguishers (manually operated) are required.
  - a). Government furnished: Yes \_\_\_\_\_ No \_\_\_\_\_.
  - b). Quantity and locations shall be based upon building design, NFPA, requirements, and coordinated with Installation's fire department.
  - c). Recessed cabinet mounted: Yes \_\_\_\_\_ No \_\_\_\_\_.

**NOTE:** The Contractor (Offeror) shall furnish and install the recessed fire extinguisher cabinets. The cabinets shall be at a minimum 24 1/2" tall, 7" deep and 8 1/2" wide w/glass doors.
- All interior finish materials shall be per NFPA standards and UFC 3-600-01, *Design: Fire Protection Engineering for Facilities*, 17 April 2003.
- Water supply lines: for the sprinkler system shall be black steel pipe.
- The installation's standard fire alarm panels shall be specified for ease of maintenance and sustainability.
- Emergency Lighting Requirements: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Security Requirements

- Building physical security:
  - a). Intrusion detection system required: Yes \_\_\_\_\_ No \_\_\_\_\_.  
Type system to be installed: \_\_\_\_\_  
Desired location of detectors: \_\_\_\_\_  
Exterior door alarm requirements: \_\_\_\_\_  
Exterior window alarm requirements: \_\_\_\_\_
  - b). Duress alarm system (s) required: Yes \_\_\_\_\_ No \_\_\_\_\_.  
Type system to be installed: \_\_\_\_\_  
Location (s): \_\_\_\_\_

- Safe (s) required: Yes \_\_\_\_\_ No \_\_\_\_\_.

Type and Number: \_\_\_\_\_

Size: \_\_\_\_\_

Location (s): \_\_\_\_\_

Secure to building: Yes \_\_\_\_\_ No \_\_\_\_\_.

If yes, how: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Connect to main intrusion alarm system: Yes \_\_\_\_\_ No \_\_\_\_\_.

- Remote transmission of the intrusion alarm system: to the installations master system required:  
Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, provide and install the transmitter, all conduit, wiring, hookups from the intrusion alarm devices to the transmitter, as well as all exterior underground conduit, required wiring, panel boxes and all other ancillary equipment to bring the system to the existing communication transmission lines. The final connection at the communication line will be made by the government. All systems proposed shall be compatible with the existing system (s) installed at the installation. Point of coordination is Provost Marshall's Physical Security Officer. Specify the installation's standard intrusion alarm system if required.

- Keying requirements:

a). Rooms requiring card readers:

b). Rooms requiring cipher locks:

c). Rooms requiring individual keys:

d). Rooms requiring master keys:

e). Exterior keying requirements:

f). At least six (6) keys shall be provided for each lock. An additional twelve (12) sub master and six (6) master keys shall be provided.

g). The Offeror shall provide fifty (50) key blanks in addition to the above keying requirements.

- All exterior doors shall have unremovable hinge pins.

- Panic hardware shall be in accordance with NFPA requirements.

- Hardened secure area (s) required: Yes \_\_\_\_\_ No \_\_\_\_\_

Location (s): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- Fencing Requirements:
  - a). Location:
  - b). Type and height:
  - c). Gate requirements:
  
- Antiterrorism Requirements:
  - a). Blast resistant windows: \_\_\_\_\_  
**NOTE:** Blast resistant windows, made of laminated glass, with frames as prescribed in IAW UFC 4-010-01
  - b). Setbacks: \_\_\_\_\_  
**NOTE:** Parking standoff minimum of 10m for all facilities not designated by AT Officer as 'High Occupancy', 'Billeting', or 'Primary Gathering'. These facilities will require 25m parking standoff zone.
  - c). Barriers: \_\_\_\_\_  
**NOTE:** Facilities designated as a Mission Essential Vulnerable Asset (MEVA) in the AT Plan, will require physical barriers to enforce the 25m parking standoff zone.
  - d). Bollards:  
**NOTE:** See p. 11-13:
  - e). Mass Notification System: \_\_\_\_\_  
**NOTE:** New facility construction will incorporate Mass Notification System Requirements.
  
- Risk/Threat Analysis Requirements:
  - a).
  - b).
  - c).  
**NOTE:** Risk/Threat analysis shall be conducted by the USAG-M AT Officer, and approved through the Garrison Commander and senior Mission Commander in the AT Plan. This facility has received consideration through the USAG-M AT Officer..

**B.3.10 Communications Requirements**

- Intercom system required: Yes \_\_\_\_\_ No \_\_\_\_\_.  
 Give a brief description of the requirements for the system: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  
- Music/Paging system required: Yes \_\_\_\_\_ No \_\_\_\_\_.  
 Give a brief description of the requirements for the system: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  
- Telephone system required: Yes \_\_\_\_\_ No \_\_\_\_\_.  
 Location: \_\_\_\_\_

Type: \_\_\_\_\_

Pay telephone required: Yes \_\_\_\_\_ No \_\_\_\_\_.

If required, unit (s) will be wall hung. Contractor shall run wire and conduit from pay phone outlets to the main panel. Phones to be provided by Contractor.

**NOTE:** Contractor shall provide all conduit, wire, junction boxes and pull wires for the telephone system as required. Hookup of the telephone system will be performed by the Contractor. The Contractor shall coordinate all the telephone requirements with the installation's Directorate of Public Works (DPW) office and the local telephone company to determine requirements and provide space for communication equipment, panels, etc., in the mechanical room of where otherwise designed.

The basic telephone system shall be the "Centrax System" as provided by: \_\_\_\_\_

The system functions shall include the following:

- a). Direct in dialing, with restrictions on receiving collect calls.
  - b). Direct out dialing to local exchange number only.
  - c). Restrictions on placing chargeable calls outside the local exchange, except for calls charged to credit card or calls made with the charges reversed.
- Television system required: Yes \_\_\_\_\_ No \_\_\_\_\_.

The technical and installation requirements of the television system shall be coordinated with \_\_\_\_\_, the local cable television provider.

Locations/number of internal outlets: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Wiring and grounding shall be in accordance with the National Electric Code.

- Mass Notification System  
(Required per UFC 4-010-01, Standard 23: for New Inhabited Buildings and for Existing Buildings (Primary Gathering and Billeting), also for Existing Buildings, Recommended for all Inhabited Buildings)

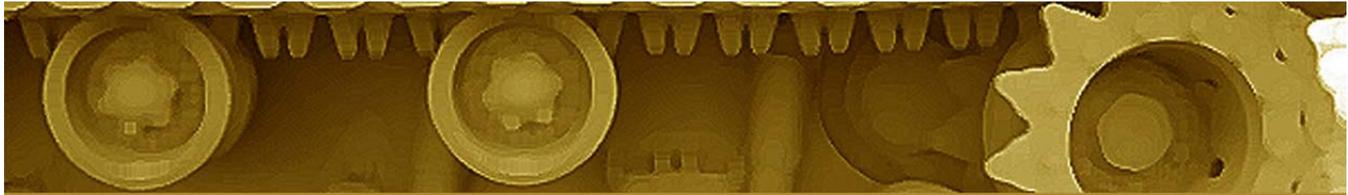
Type of Mass Notification System Required: \_\_\_\_\_

3. Signage Requirements

(Excluding those required by NFPA and OSHA)

- Interior signage: \_\_\_\_\_
- Exterior Signage: \_\_\_\_\_

All exterior signage shall conform with the Army Installation Design Guide and Post Wide Paint/Exterior Finish Standards and color charts.



## Appendix C Interior Design Review Checklist

NOT APPLICABLE TO DETROIT ARSENAL

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## Appendix D Sustainable Design



Figure 12-6 Sustainable Site Design

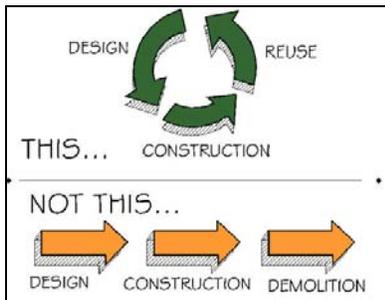


Figure 12-7 Sustainable Design Process

### D.1 WHAT IS SUSTAINABLE DESIGN?

Sustainable design and development is an integrated approach to planning, designing, building, operating, and maintaining facilities in a collaborative and holistic manner among all stakeholders (Figure 12-6). It is a systematic process and engineering practice with how to do it guidance, checklist, tools, and scoring systems. Sustainable design integrates the decision-making across the installation, basing every decision on the greatest long-term benefits and recognizing the interrelationship of installation actions with the natural environment. In the content of Army installations Sustainable Design is the design, construction, operation, and reuse/removal of the built environment in an environmentally and energy efficient manner (Figure 12-7). The basic objectives of sustainability are:

Reduce the consumption of energy, land, materials, water, and other non-renewable resources.

Minimize the waste of energy, land, materials, water, and other limited resources.

Protect the natural environment that is the source of all resources.

Create livable, healthy, and fiscally productive manmade environments for existing and future generations.

Designing for sustainability ultimately increases quality of life through better resource protection and use. The design process must incorporate a change in mind-set that embraces less consumptive lifestyles. This mind-set change must include global interdependence, stewardship of the environment, social responsibility, and economic viability. The new design mind-set must change from the traditional approach to recognize the impacts of every design choice on natural and cultural resources and on local, regional, and global environments.

## D.2 SUSTAINABLE DESIGN AND DEVELOPMENT

Practicing the principles of sustainable design in the planning, design, construction, and operation of infrastructure and facilities is a smart business practice. Protecting our natural resources and reducing our impact on the natural environment is achievable when we create energy efficient (Figure 12-8), healthy (Figure 12-9), high-performance (Figure 12-10), and safe buildings.

### D.2.1 The Integrated Design Process

Critical to the success of sustainable design and development is the organization and commitment of the team to engage in the Integrated Design Process. To effect change in building design and operation, the project delivery process itself must become a collaborative effort to integrate design strategies among all disciplines and all players in the project delivery process. Integrated design demands a more inclusive team, working closer together than is traditionally the case. Future building users and facility managers must be invited to join architects, engineers, and planners in developing the vision and goals for new facilities. (Adapted from the HOK Guidebook to Sustainable Design)

Appendix D, Sustainable Design, discusses the sustainable design concept and its application to Army projects. Paragraph D.4 discusses the Sustainable Project Rating Tool (SPiRiT) developed by the U.S. Army Corps of Engineers (USACE). Per the Assistant Secretary of the Army (Installation & Environment) Sustainable Design and Development Memorandum and the Assistant Chief of Staff for Installation Management (ACSIM) endorsement of Sustainable Design and Development initiative, the SPiRiT rating system will be used by design professionals in all new construction, additions, or renovation of Army facilities for rating sustainability. (Be aware that the Army will transition from SPiRiT to the US Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) rating system effective with the FY 08 Military Construction Program.)

### D.2.2 The Spirit Document

The SPiRiT document (Appendix E) was derived from the U.S. Green Building Council LEED 2.0 (Leadership in Energy and Environmental Design) Green Building Rating System. See Website "SPiRiT Wizard" which outlines using SPiRiT, records and tracks rationale, generates SPiRiT rating and permits reuse of previous strategies for subsequent projects.

### D.2.3 Army Rating Standard

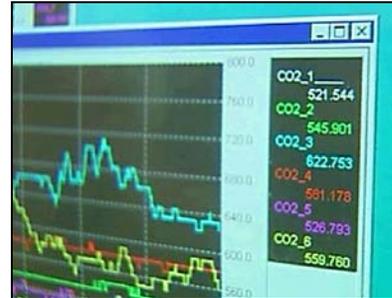
The SPiRiT rating of "Silver" is the standard for all FY06 MILCON vertical construction projects currently under design (as of March 18, 2003). For all other FY06 and future-year MILCON projects, the minimum SPiRiT rating requirement is "Gold". See Assistant Secretary of the Army Memorandum Subject: Sustainable Design and Development Requirements, dated 18 March 2003.

Further information on sustainable design can be obtained at the following websites:

Assistant Chief of Staff for Installation Management, Sustainable Design and Development Website This site provides information on the following topics: documentation and references; sustainable process, tools, products and materials; Sustainable Design and Development Training; and links to various sustainable design and development informational website.



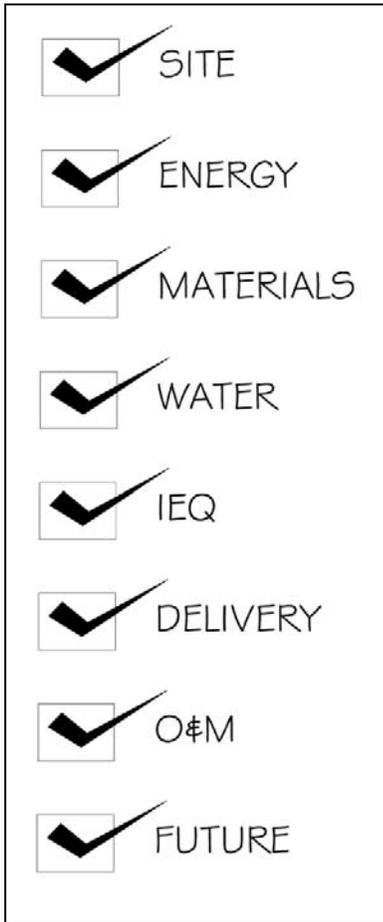
**Figure 12-8** Energy Efficient Lighting Contributes to Sustainability



**Figure 12-9** CO<sub>2</sub> Measurements of Indoor Air Quality Assisting in Creating a Healthy Environment



**Figure 12-10** Efficient Water Usage Contributes to a High Performance Facility



**Figure 12-11** Sustainable Design Principles

Sustainable Sites .....	20 pts.	max
Water Efficiency .....	5 pts.	max
Energy/Atmosphere .....	28 pts.	max
Materials/Resources .....	13 pts.	max
Indoor Enrichment .....	17 pts.	max
Facility Delivery Prices .....	7 pts.	max.
O&M .....	6 pts.	max.
Future Mission .....	4 pts.	max.
<b>Total:</b>	<b>100 pts.</b>	<b>max</b>

**Figure 12-12** SPiRiT Checklist Points Summary

U.S Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory (CERL), Sustainable Design and Development Website.

Whole Building Design Guide (WBDG) This site provides comprehensive and current information on sustainable design strategies and technologies.

**D.3 SUSTAINABILITY AND THE FEDERAL GOVERNMENT**

The Federal Government has led the nation in the energy efficient, resource-conserving building design, construction, and operation. Executive Order (EO) 13123, "Greening the Government through Efficient Energy Management", was issued June 3, 1999. This Order establishes that sustainable design principles shall be applied to all Federal projects in order to reduce pollution and other environmental costs associated with facility construction, operation, and eventual decommissioning. The principles of sustainable design for Federal Agencies established by EO 13123 include siting, design, and construction, as follows (Figure 12-11):

Site - Optimize site potential.

Energy – Minimize nonrenewable energy consumption.

Materials – Use environmentally preferable products.

Water – Protect and conserve water.

Indoor Environmental Quality – Enhance indoor environmental quality.

Facility Delivery – Holistic delivery of facility.

O&M – Optimize operational and maintenance practices.

Future Missions – Functional life of facility and support systems.

**D.4 SPIRiT**

The U.S. Army Corps of Engineers (USACE) has developed a checklist for sustainability to be used by design professionals in all new construction, additions, or renovation of Army facilities. This checklist is the "Sustainable Project Rating Tool (SPiRiT)". The SPiRiT document was derived from the U.S. Green Building Council LEED 2.0 (Leadership in Energy and Environmental Design) Green Building Rating System.

SPiRiT is a rating tool that offers a checklist, strategies, and scores to provide sustainable facilities to the Army. SPiRiT allows environmentally responsible practices to be integrated into the process of facility delivery from the very beginning of the project. By using a "whole building" perspective, the SPiRiT rating tool (See Appendix E, SPiRiT Checklist) helps in preserving the environment and improving facility life-cycle management. SPiRiT is based on accepted energy and environmental principles.

The SPiRiT document includes eight (8) categories of design concerns (Figure 12-12). A facility points summary is included at the end of the document. Points are achieved based upon the sustainable design issues addressed in the building, site and infrastructure design. The design is certified by the designer and design review personnel based upon the following certification levels.

- SPiRiT Bronze 25 to 34 Points
- SPiRiT Silver 35 to 49 Points
- SPiRiT Gold 50 to 74 Points
- SPiRiT Platinum 75 to 100 Points

NOTE: Beginning in FY08, all MILCON vertical construction projects must achieve the SILVER level of LEED NC (New Construction) certification. See the Memorandum dated January 5, 2006.

#### D.5 ARMY STANDARDS

The cited Army Standards shall be met.

The SPiRiT rating of "Silver" is the standard for all FY06 MILCON vertical construction projects currently under design (as of March 18 2003). For all other FY06 and future-year MILCON projects, the minimum SPiRiT rating requirement is "Gold". See [Assistant Secretary of the Army Memorandum Subject: Sustainable Design and Development Requirements](#), dated 18 March 2003.

#### D.6 REFERENCES

The following references are provided for guidance.

[Assistant Chief of Staff for Installation Management memorandum Subject: Sustainable Project Rating Tool, dated 21 December 2002](#)

[Assistant Chief of Staff for Installation Management, Sustainable Design and Development Website](#)

U.S Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory (CERL), [Sustainable Design and Development Website](#)

[Air Force Sustainable Facilities Guide](#)

Whole Building Design Guide

## Appendix E SPiRiT Checklist

SUSTAINABILITY PROJECT RATING TOOL (SPiRiT)					
Facility Points Summary					Maximum Points
<b>1.0</b>	<b>Sustainable Sites (S)</b>	<b>Score</b>	<b>0</b>		<b>Max 20</b>
1.R1 *	Erosion/Sedimentation/Water Quality Control				[Required]
1.C1 *	Site Selection				2
1.C2 *	Installation/Base Redevelopment				2
1.C3 *	Brownfield Redevelopment				1
1.C4 *	Alternative Transportation				4
1.C5 *	Reduced Site Disturbance				2
1.C6 *	Storm water Management				2
1.C7	Landscape & Ext. Design to Reduce Heat Islands				2
1.C8 *	Light Pollution Reduction				1
1.C9 **	<i>Optimize Site Features</i>				1
1.C10 **	<i>Facility Impact</i>				2
1.C11 **	<i>Site Ecology</i>				1
<b>2.0</b>	<b>Water Efficiency (W)</b>	<b>Score</b>	<b>0</b>		<b>Max 5</b>
2.C1	Water Efficient Landscaping				2
2.C2	Innovative Wastewater Technologies				1
2.C3 *	Water Use Reduction				2
<b>3.0</b>	<b>Energy and Atmosphere (E)</b>	<b>Score</b>	<b>0</b>		<b>Max 28</b>
3.R1 *	Fundamental Building Systems Commissioning				[Required]
3.R2 *	Minimum Energy Performance				[Required]
3.R3	CFC Reduction in HVAC&R Equipment				[Required]
3.C1 *	Optimize Energy Performance				20
3.C2 *	Renewable Energy				4
3.C3	Additional Commissioning				1
3.C5 *	Measurement and Verification				1
3.C6 *	Green Power				1
3.C7 **	<i>Distributed Generation</i>				1
<b>4.0</b>	<b>Materials and Resources (M)</b>	<b>Score</b>	<b>0</b>		<b>Max 13</b>
4.R1 *	Storage & Collection of Recyclables				[Required]
4.C1 *	Building Reuse				3
4.C2 *	Construction Waste Management				2
4.C3	Resource Reuse				2
4.C4 *	Recycled Content				2
4.C5	Local/Regional Materials				2
4.C6	Rapidly Renewable Materials				1
4.C7	Certified Wood				1
<b>5.0</b>	<b>Indoor Environmental Quality (IEQ)</b>	<b>Score</b>	<b>0</b>		<b>Max 17</b>
5.R1 *	Minimum IAQ Performance				[Required]
5.R2	Environmental Tobacco Smoke (ETS) Control				[Required]
5.C1 *	<i>IAQ Carbon Dioxide (CO2) Monitoring</i>				1
5.C2	Increase Ventilation Effectiveness				1
5.C3	Construction IAQ Management Plan				2
5.C4	Low-Emitting Materials				4
5.C5 *	Indoor Chemical and Pollutant Source Control				1
5.C6	Controllability of Systems				2
5.C7	Thermal Comfort				2
5.C8	Daylight and Views				2
5.C9 **	<i>Acoustic Environment /Noise Control</i>				1
5.C10 **	<i>Facility In-Use IAQ Management Plan</i>				1

<b>6.0</b>	<b>Facility Delivery Process (P)</b>	<b>Score</b>	<b>0</b>	<b>Max 7</b>
6.C1 **	Holistic Delivery of Facility			7
<b>7.0</b>	<b>Current Mission</b>	<b>Score</b>	<b>0</b>	<b>Max 6</b>
7.C1 **	Operation and Maintenance			3
7.C2 **	Soldier and Workforce Productivity and Retention			3
<b>8.0</b>	<b>Future Missions</b>	<b>Score</b>	<b>0</b>	<b>Max 4</b>
8.C1 **	Functional Life of Facility and Supporting Systems			2
8.C2 **	Adaptation, Renewal and Future Uses			2
		Total Score	0	Max 100
<b>SPiRiT Sustainable Project Certification Levels</b>				
	<b>Army Standard - SPiRiT Bronze</b>			<b>25 to 34 Points</b>
	<b>Army Goal - SPiRiT Silver</b>			<b>35 to 49 Points</b>
	<b>SPiRiT Gold</b>			<b>50 to 74 Points</b>
	<b>SPiRiT Platinum</b>			<b>75 to 100 Points</b>

**NOTE:** Beginning in FY08, all MILCON vertical construction projects must achieve the SILVER level of [LEED NC](#) (New Construction) certification. See the [Memorandum dated January 5, 2006](#).

## Appendix F Maintenance Schedule

LANDSCAPE MAINTENANCE SCHEDULE	Inspection of Property <sup>1</sup>	Snow Removal	Seasonal Clean-up <sup>2</sup>	Weekly Watering	Plant Lawn Seed	Fertilize Lawn	Mow Lawns	Transplant Trees and Shrubs	Plant New Evergreens and Shrubs	Plant New Deciduous Shrubs	Plant New Deciduous Trees	Plant Summer Annuals & Perennials	Plant Early Spring Annuals	Prune Deciduous Trees	Prune Needle Evergreens	Prune Broadleaf Evergreens	Prune Junipers	Prune Yews	Prune Pines	Prune Early Flowering Shrubs <sup>3</sup>	Prune Late Flowering Shrubs <sup>4</sup>	Mulch Beds <sup>5</sup>	Fertilize Shade Trees	Weed Flower Beds	
	January	o	o	o													o								
February	o	o	o											o		o									
March	o	o						o	o	o			o	o	o	o		o			o			o	
April	o			o				o	o	o					o		o	o				o		o	
May	o			o			o		o	o		o			o	o		o	o			o		o	
June	o			o			o								o	o		o	o	o		o		o	
July	o			o			o											o		o		o		o	
August	o			o	o		o				o											o		o	
September	o			o	o	o	o	o	o		o				o							o	o	o	
October	o	o	o	o		o	o	o	o	o	o				o								o	o	
November	o	o	o	o		o			o	o	o				o										
December	o	o	o	o																					

<sup>1</sup> Inspect for damage and maintenance issues.

<sup>2</sup> Cut Back Plants. Leaf Removal. Snow/Ice Removal. Prune Ice Damaged Trees.

<sup>3</sup> Early Flowering: Bloom before June 15<sup>th</sup> on old wood.. These plants should be pruned immediately following flowering.

<sup>4</sup> Late Flowering: Bloom after June 15<sup>th</sup> on new wood. Prune in very early spring.

<sup>5</sup> Mulch as needed.

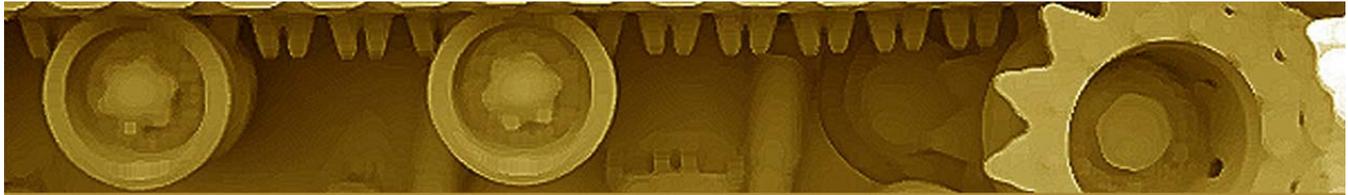
For further information, see <http://www.urbanext.uiuc.edu/>.

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## Appendix G Prioritized Improvements Projects List

Prioritized Improvements Projects List						
<b>INSTALLATION: Detroit Arsenal</b>			<ul style="list-style-type: none"> <li>PRESS "ENTER" TO INSERT A NEW LINE.</li> <li>PRESS "TAB" AT END OF LAST ITEM TO INSERT NEXT ITEM #.</li> </ul>			
DPW or EQUIVALENT - MASTER PLANNER						
NAME:		PHONE: EMAIL:		ADDRESS:		
PRIORI TY NO.	PROJECT TITLE	RECOMMEND ED FUNDING SOURCE	ALTERNATIVE FUNDING SOURCE	COST ESTIMATE	IDG PARA NO.	POINT OF CONTACT
1	Exterior Signage	OMA	-	--	6.2	
2	Pedestrian Circulation	OMA	-	--	6.3	
3	Buildings 230/231/229 Front Entrance	OMA	-	--	6.4	
4	Glancy Circle	OMA	-	--	6.5	
5	Center and Arsenal Avenues	OMA	-	--	6.6	
6	Eleven Mile Road Fencing	OMA	-	--	6.7	
7	Savage Circle	OMA	-	--	6.8	
8	Building 200 Force Protection	OMA	-	--	6.9	
9	Perimeter Trail	OMA	-	--	6.10	
10	Installation Master Plan for Trees	OMA	-	--	6.11	

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## Appendix H Self-Help Project Checklist

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## Appendix I Interior Finishes Standards

The following Interior Finishes will be used at Detroit Arsenal:

INTERIOR FINISHES CHART COLOR SCHEME ONE			
VISUAL ZONE: Administration Visual Zone – Detroit Arsenal			
Interior Design Element	Permitted Materials	Notes (Hyperlinked)	
Carpet	Offices	Lees "Heartland" D8446, 501 Everglade <a href="#">(or equal)</a>	
	Corridors	Lees "Groundwork" D7942, 501 Everglade <a href="#">(or equal)</a>	
	Conference, Special Areas	Lees "Flamestitch" D4896, 501 Everglade <a href="#">(or equal)</a>	
Paint	Primary Colors	Benjamin Moore HC-4 "Putnam Ivory" <a href="#">(or equal)</a>	
		Benjamin Moore OC-99 "Deserted Island" <a href="#">(or equal)</a>	
		Benjamin Moore HC-2114 "Soft Fern" <a href="#">(or equal)</a>	
	Secondary Colors	Benjamin Moore HC-124 "Caldwell Green" <a href="#">(or equal)</a>	
		Benjamin Moore HC-65 "Hodley Red" <a href="#">(or equal)</a>	
Restrooms	ICI #2013 White, High Hiding Rm Kerapoxy <a href="#">(or equal)</a>	Wall and Ceiling	
Resilient	Entry, Corridors, Storage, Dining, Utility, & Equipment Areas	Mannington Brushworks 717 "Venetian Silk" <a href="#">(or equal)</a>	
		Mannington Brushworks 703 "Ecru" <a href="#">(or equal)</a>	
		Mannington Brushworks 715 "Baltic Green" <a href="#">(or equal)</a>	
		Mannington Brushworks 713 Florentine" <a href="#">(or equal)</a>	
	Base	Johnsonite 49 "Beige" <a href="#">(or equal)</a>	
		Johnsonite 168 "Thunder" <a href="#">(or equal)</a>	
Tile	Restroom Walls	Daltile #0-137 Canvas, 4"x4" <a href="#">(or equal)</a>	Field Tile
		Daltile #K-189 Navy, 4"x4" <a href="#">(or equal)</a>	Accent Tile
		Daltile #K-180 Chamois, 4"x4" <a href="#">(or equal)</a>	Accent Tile
		Daltile #0190 Artic White, 4"x4" <a href="#">(or equal)</a>	Accent Tile
	Restroom Floors and Base	Daltile #D325 Marble, 2x2" <a href="#">(or equal)</a>	Field Tile
		Daltile Keystones #D469 Galaxy, 2"x2" <a href="#">(or equal)</a>	Accent Tile
		Daltile Keystones #D440 Honey, 2"x2" <a href="#">(or equal)</a>	Accent Tile
Grout	Mape Classic Collection, #5 Chamois, Kerapoxy <a href="#">(or equal)</a>		
Vestibules	Crossville Ceramics Geostone R101 Wetlands <a href="#">(or equal)</a>	12" x 12"	
Casework	Restroom Vanities	Corian "Fossil" <a href="#">(or equal)</a>	Countertops
		Wilsonart 4790-60 Greystone <a href="#">(or equal)</a>	Vanity Base
	Toilet Partitions	Wilsonart 4790-60 Greystone <a href="#">(or equal)</a>	
	Countertops	Pionite AT141 "Mr Sandman" <a href="#">(or equal)</a>	
		Wilsonart 4791-60 "Willowstone" <a href="#">(or equal)</a>	
Cabinets	Pionite ST650-S Palomino <a href="#">(or equal)</a>		
	Wilsonart 4844-60 "Loden Zephyr" <a href="#">(or equal)</a>		
Wood	Maple, Cherry		

Figure 12-13 Interior Finishes Chart — Administration Zone – Color Scheme 1

Interior Finishes – Detroit Arsenal  
Visual Zone: Administration – Color Scheme One

Carpet



Lees "Heartland"



Lees "Groundwork"



Lees "Flamestitch"

Paint



Deserted Island



Hodley Red



Caldwell Green



Putnam Ivory



Soft Fern

Resilient



Ecru



Florentine



Baltic Green



Venetian Silk

Tile, Casework, Wood



Willowstone

Loden Zephyr

Maple



Wetlands



Mr. Sandman

Palomino

Cherry

Figure 12-13 Sample Swatches – Administration Zone – Scheme I

INTERIOR FINISHES CHART COLOR SCHEME TWO			
VISUAL ZONE: <b>Administration Visual Zone – Detroit Arsenal</b>			
Interior Design Element		Permitted Materials	Notes (Hyperlinked)
Carpet	Offices	Lees "Heartland" D8446, 307 Capri <a href="#">(or equal)</a>	
	Corridors	Lees "Groundwork" D7942, 307 Capri <a href="#">(or equal)</a>	
	Conference, Special Areas	Lees "Flamestitch" D4896, 307 Capri <a href="#">(or equal)</a>	
Paint	Primary Colors	Benjamin Moore AC-4 "Yosemite Sand" <a href="#">(or equal)</a>	
		Benjamin Moore OC-99 "Deserted Island" <a href="#">(or equal)</a>	
		Benjamin Moore HC-114 "Saybrook Sage" <a href="#">(or equal)</a>	
	Secondary Colors	Benjamin Moore HC-145 "Van Courtland Blue" <a href="#">(or equal)</a>	
Benjamin Moore HC-71 "Hasbrouck Brown" <a href="#">(or equal)</a>			
Restrooms	ICI #2013 White, High Hiding Rm Kerapoxy <a href="#">(or equal)</a>	Wall and Ceiling	
Resilient	Entry, Corridors, Storage, Dining, Utility, & Equipment Areas	Armstrong Imperial 51858 "Sandrift White" <a href="#">(or equal)</a>	
		Mannington Inspirations 425 "Willow Tones" <a href="#">(or equal)</a>	
		Armstrong Imperial 51916 "Dutch Delft" <a href="#">(or equal)</a>	
		Mannington Designer Essentials 239 "Brown Earth" <a href="#">(or equal)</a>	
	Base	Flexco 09 "Veiled Brown" <a href="#">(or equal)</a> Flexco 058 "Blue Shadow" <a href="#">(or equal)</a>	
Tile	Restroom Walls	Daltile #0-137 Canvas, 4"x4" <a href="#">(or equal)</a>	Field Tile
		Daltile #K- 189 Navy, 4"x4" <a href="#">(or equal)</a>	Accent Tile
		Daltile #K- 180 Chamois, 4"x4" <a href="#">(or equal)</a>	Accent Tile
		Daltile #0190 Artic White, 4"x4" <a href="#">(or equal)</a>	Accent Tile
	Restroom Floors and Base	Daltile #D325 Marble, 2"x2" <a href="#">(or equal)</a>	Field Tile
		Daltile Keystones #D469 Galaxy, 2"x2" <a href="#">(or equal)</a>	Accent Tile
		Daltile Keystones #D440 Honey, 2"x2" <a href="#">(or equal)</a>	Accent Tile
Grout	Mape Classic Collection, #5 Chamois, Kerapoxy <a href="#">(or equal)</a>		
Vestibules	Crossville Ceramics Americana AV112 Gold Rush <a href="#">(or equal)</a>	12" x 12"	
Casework	Restroom Vanities	Corian "Fossil" <a href="#">(or equal)</a>	Countertops
		Wilsonart 4790-60 Greystone <a href="#">(or equal)</a>	Vanity Base
	Toilet Partitions	Wilsonart 4790-60 Greystone <a href="#">(or equal)</a>	
	Countertops	Formica 3507-58 "Batik Mat" <a href="#">(or equal)</a>	
		Nevamar EA-2-IT "Earthstone" <a href="#">(or equal)</a>	
Cabinets	Formica 3502-58 "Breeze Solids" <a href="#">(or equal)</a>		
	Wilsonart 4886-60 "Morro Zephyr" <a href="#">(or equal)</a>		
Wood	Maple, Cherry		

**Figure 12-15** Interior Finishes Chart — Administration Zone – Color Scheme 2

Interior Finishes – Detroit Arsenal

Visual Zone: Administration – Color Scheme Two

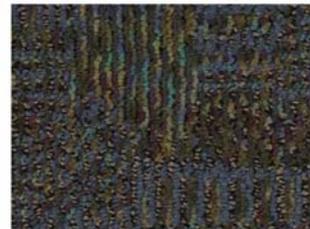
Carpet



Heartland



Groundwork



Flamestitch

Paint



Deserted Island



Yosemite Sand



Saybrook Sage



Van Courtland Blue



Hasbrouk Brown

Resilient



Brown Earth



Sandrift White



Dutch Delft



Willow Tones

Tile, Casework, Wood



Earthstone



Morro Zephyr



Maple



Gold Rush



Batik Mat



Breeze Solidz



Cherry

Figure 12-14 Sample Swatches – Administration Zone – Scheme 2

INTERIOR FINISHES CHART COLOR SCHEME			
VISUAL ZONE: <b>Research &amp; Development Visual Zone – Detroit Arsenal</b>			
Interior Design Element	Permitted Materials	Notes (Hyperlinked)	
Carpet	Offices	Constantine Commercial Shadowlands C2   3N58 Black Lagoon <a href="#">(or equal)</a>	
	Conference, Special Areas		
Paint	Primary Colors	Benjamin Moore 2061-70 "Caribbean Mist" <a href="#">(or equal)</a>	
		Benjamin Moore OC-53 "Horizon" <a href="#">(or equal)</a>	
		Benjamin Moore RME-74 Cliffside Gray <a href="#">(or equal)</a>	
	Secondary Colors	Benjamin Moore 2062-20 "Gentleman's Gray" <a href="#">(or equal)</a>	
Restrooms	Benjamin Moore HC- 165 "Boothbay Gray" <a href="#">(or equal)</a>	Wall and Ceiling	
	ICI #2013 White, High Hiding Rm, Kerapoxy <a href="#">(or equal)</a>		
Resilient	Entry, Corridors, Storage, Dining, Utility, & Equipment Areas	Mannington Assurance II 16314 "Sterling Blue" <a href="#">(or equal)</a>	
		Mannington Assurance II 16303 "Shale" <a href="#">(or equal)</a>	
		Mannington Assurance II 16311 "Larkspur" <a href="#">(or equal)</a>	
	Base	Johnsonite 92 Blue_Lagoon <a href="#">(or equal)</a>	
	Johnsonite 40 Black <a href="#">(or equal)</a>		
Tile	Restroom Walls	Daltile #0-137 Canvas , 4" x 4" <a href="#">(or equal)</a>	Field Tile
		Daltile #K-189 Navy, 4" x 4" <a href="#">(or equal)</a>	Accent Tile
		Daltile #K-180 Chamois, 4" x 4" <a href="#">(or equal)</a>	Accent Tile
		Daltile #0190 Artic White, 4" x 4" <a href="#">(or equal)</a>	Accent Tile
	Restroom Floors and Base	Daltile #D325 Marble, 2" x 2" <a href="#">(or equal)</a>	Field Tile
		Daltile Keystones #D469 Galaxy, 2" x 2" <a href="#">(or equal)</a>	Accent Tile
		Daltile Keystones #D440 Honey, 2" x 2" <a href="#">(or equal)</a>	Accent Tile
Grout	Mape Classic Collection, #5 Chamois, Kerapoxy <a href="#">(or equal)</a>		
Vestibules	Crossville Ceramics VS110 18" x 18' Azul <a href="#">(or equal)</a>		
Casework	Restroom Vanities	Corian 'Fossil' <a href="#">(or equal)</a>	Countertops
		Wilsonart 4790-60 Greystone <a href="#">(or equal)</a>	Vanity Base
	Toilet Partitions	Wilsonart 4790-60 Greystone <a href="#">(or equal)</a>	
	Countertops	Formica 1782-58 Stardust <a href="#">(or equal)</a>	
		Wilsonart 4646-60 'Blue_Moraine" <a href="#">(or equal)</a>	
Cabinets	Formica 3 505-11 "Storm Solidz" <a href="#">(or equal)</a>		
	Wilsonart D318-60 "Shadowblue" <a href="#">(or equal)</a>		
Wood	Maple, Cherry		

Figure 12-17 Interior Finishes Chart — Research and Development Visual Zone

Interior Finishes – Detroit Arsenal  
Visual Zone: **Research and Development**

Carpet



Black Lagoon

Paint



Caribbean Mist



Horizon



Cliffside Gray



Gentleman's Gray



Boothbay Gray

Resilient



Sterling Blue



Shale



Larkspur

Tile, Casework, Wood



Storm Solidz



Stardust



Azul



Blue Moraine



Shadowblue



Maple



Cherry

**Figure 12-15** Sample Swatches – Research and Development Visual Zone

INTERIOR FINISHES CHART COLOR SCHEME			
VISUAL ZONE: <b>Industrial Visual Zone – Detroit Arsenal</b>			
Interior Design Element	Permitted Materials	Notes (Hyperlinked)	
Carpet	Offices	Interface Transformation 17Z4191 “Conifer”(or equal) <a href="#">(or equal)</a>	
	Conference, Special Areas	Interface Transformation 17Z4191 “Conifer”(or equal) <a href="#">(or equal)</a>	
Paint	Primary Colors	Benjamin Moore HC-174 “Lancaster Whitewash” <a href="#">(or equal)</a>	
		Benjamin Moore HC-80 “Bleeker Beige” <a href="#">(or equal)</a>	
		Benjamin Moore HC-111 “Nantucket Gray” <a href="#">(or equal)</a>	
	Secondary Colors	Benjamin Moore HC-107 “Gettysburg Gray” <a href="#">(or equal)</a>	
		Benjamin Moore HC-46 “Jackson Tan” <a href="#">(or equal)</a>	
Restrooms	ICI #2013 White, High Hiding Rm, Kerapoxy <a href="#">(or equal)</a>	Wall and Ceiling	
Resilient	Entry, Corridors, Storage, Dining, Utility, & Equipment Areas	Mannington Essentials 133 “Almondine” <a href="#">(or equal)</a>	
		Mannington Essentials 123 “Wheat” <a href="#">(or equal)</a>	
		Mannington Designer Essentials 255 “Frosted Jade” <a href="#">(or equal)</a>	
		Armstrong Imperial 51942 “Curried Caramel” <a href="#">(or equal)</a>	
	Base	Johnsonite 29 Moon Rock <a href="#">(or equal)</a>	
	Johnsonite 45 Sandalwood <a href="#">(or equal)</a>		
Tile	Restroom Walls	Daltile #0-137 Canvas , 4” x 4” <a href="#">(or equal)</a>	Field Tile
		Daltile #K-189 Navy, 4” x 4” <a href="#">(or equal)</a>	Accent Tile
		Daltile #K-180 Chamois, 4” x 4” <a href="#">(or equal)</a>	Accent Tile
		Daltile #0190 Artic White, 4” x 4” <a href="#">(or equal)</a>	Accent Tile
	Restroom Floors and Base	Daltile #D325 Marble, 2” x 2” <a href="#">(or equal)</a>	Field Tile
		Daltile Keystones #D469 Galaxy, 2” x 2” <a href="#">(or equal)</a>	Accent Tile
		Daltile Keystones #D440 Honey, 2” x 2” <a href="#">(or equal)</a>	Accent Tile
Grout	Mape Classic Collection, #5 Chamois, Kerapoxy <a href="#">(or equal)</a>		
Vestibules	Crossville Ceramics Geostone R1904 Pine Barren <a href="#">(or equal)</a>	12” x 12”	
Casework	Restroom Vanities	Corian “Fossil” <a href="#">(or equal)</a>	Countertops
		Wilsonart 4790-60 Greystone <a href="#">(or equal)</a>	Vanity Base
	Toilet Partitions	Wilsonart 4790-60 Greystone <a href="#">(or equal)</a>	
	Countertops	Nevamar RK6001T “Indie Rock” <a href="#">(or equal)</a>	
		Wilsonart 4851-38 “Mission Sand” <a href="#">(or equal)</a>	
Cabinets	Nevamar SG0002T “Green Tea” <a href="#">(or equal)</a>		
	Wilsonart D478-60 “Amazon” <a href="#">(or equal)</a>		
Wood	Maple, Cherry		

Figure 12-19 Interior Finishes Chart — Industrial Visual Zone

Interior Finishes – Detroit Arsenal

Visual Zone: **Industrial**

Carpet



Conifer

Paint



Lancaster Whitewash



Bleeker Beige



Jackson Tan



Nantucket Gray



Gettysburg Gray

Resilient



Almondine



Wheat

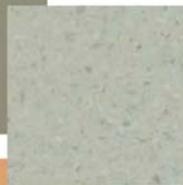


Frosted Jade

Tile, Casework, Wood



Green Tea



Indie Rock



Pine Barren



Amazon



Maple



Mission Sand



Cherry

**Figure 12-16** Sample Swatches – Industrial Visual Zone

Interior Finishes - Detroit Arsenal  
Typical Restrooms - All Visual Zones

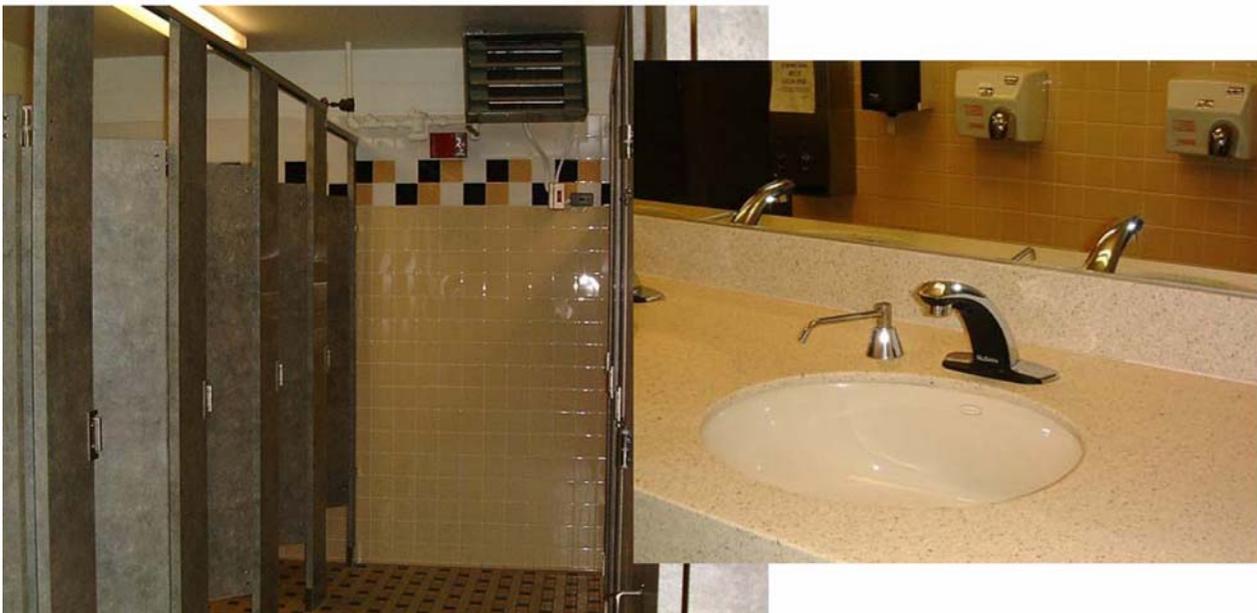
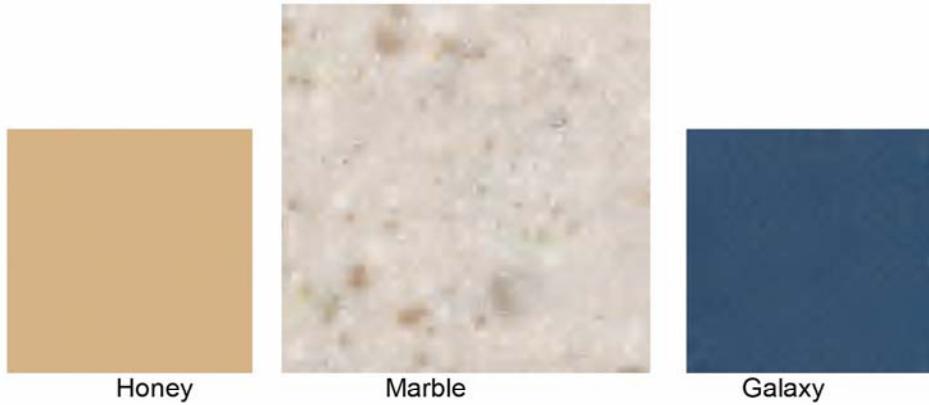


Figure 12-17 Typical Restrooms

## Interior Finishes – Detroit Arsenal

Typical Restrooms – All Visual Zones



### Floor Tile

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### Wall Tile

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### Toilet Partitions and Vanities

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Figure 12-22 Sample Swatches – Typical Restrooms

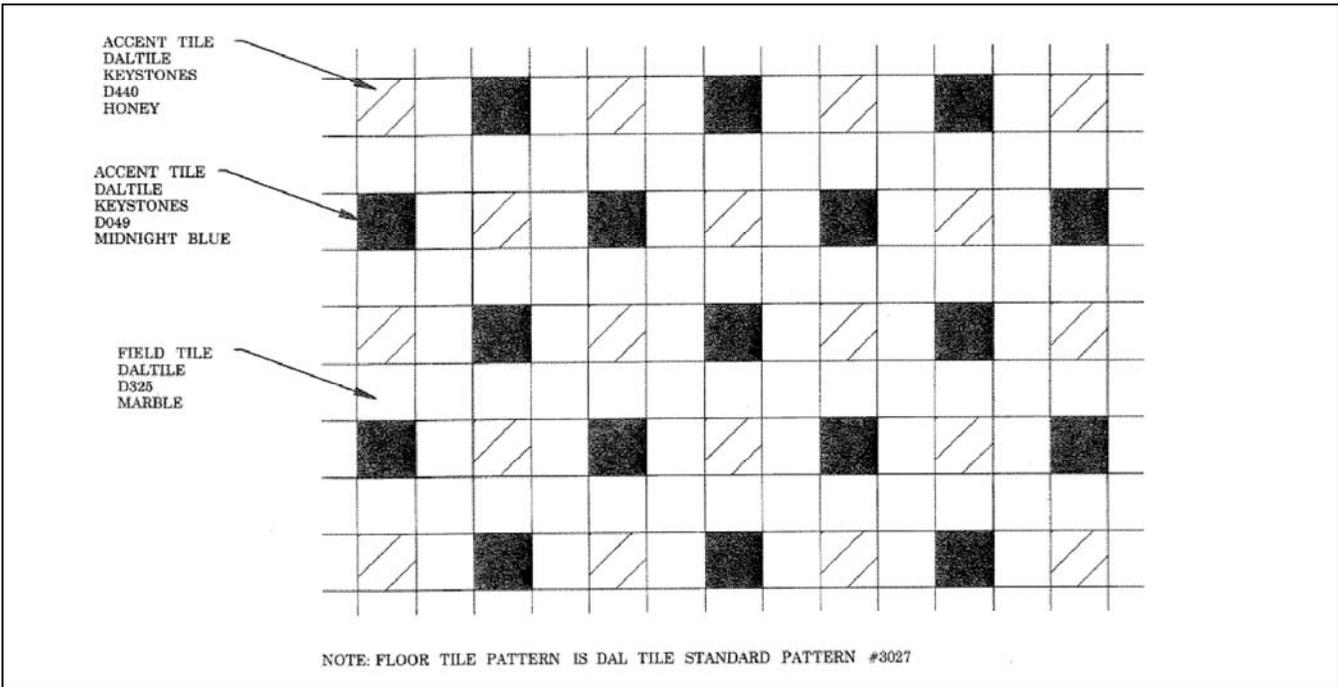


Figure 12-20 Floor Tile Pattern

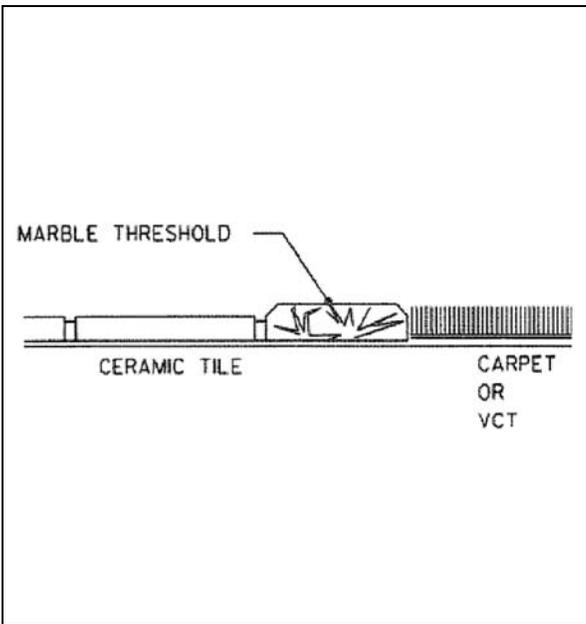


Figure 12-18 Transition Detail

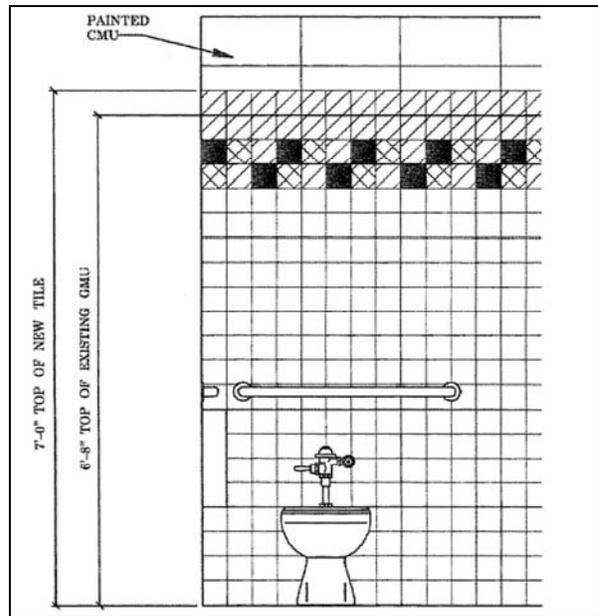


Figure 12-19 Wall Tile Elevation



## Appendix J Interior Furnishings Standards

NOT APPLICABLE TO DETROIT ARSENAL

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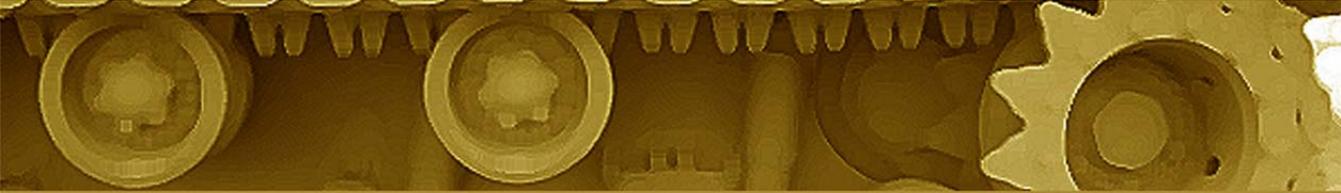
## Appendix K Exterior Materials Chart

<b>VISUAL ZONE: <i>Administration Visual Zone</i></b>			
<b>Building Design Element</b>		<b>Permitted Material Type</b>	<b>Notes (Hyperlinked)</b>
<b>Walls</b>	Base (primary) material	Brick, Pre-cast	
	Secondary material	Stucco, Brick, Metal	
<b>Roof</b>	Sloped areas	Asphalt Shingles, Metal	
	“Flat” areas	Membrane Roofing	
<b>Fenestration</b>	Doors	Metal	
	Storm Doors	Metal	
	Door & Window Frames	Aluminum, Vinyl	
	Storm window or sash	Aluminum	
	Window	Clear Glass	
<b>Trim Items</b>	Fascia	Aluminum	
	Soffit	Aluminum	
	Gutters and D.S.	Aluminum, Copper	
	Awnings and canopies	Glass, Metal	
	Stair or balcony railings, balusters, and related trim/accessories	Metal	
	Handrails	Metal	
	Fire Escapes	Metal	
	Grilles and louvers	Metal, Aluminum	
	Coping	Aluminum	
	Roof ventilators	Aluminum to match roof color	
<b>Related Site Structures</b>	Courtyard enclosure walls, retaining walls, fences, dumpster enclosures	Masonry, Metal	
	Porch crawl space enclosure	Masonry, Metal, Wood	

<b>VISUAL ZONE: <i>Research and Development</i></b>			
<b>Building Design Element</b>		<b>Permitted Material Type</b>	<b>Notes (Hyperlinked)</b>
<b>Walls</b>	Base (primary) material	Brick, Pre-cast, Block	
	Secondary material	Stucco, Brick, Metal	
<b>Roof</b>	Sloped areas	Asphalt Shingles, Metal	
	“Flat” areas	Membrane Roofing	
<b>Fenestration</b>	Doors	Metal	
	Storm Doors	Metal	
	Door & Window Frames	Aluminum, Vinyl	
	Storm window or sash	Aluminum	
	Window	Clear Glass	
<b>Trim Items</b>	Fascia	Aluminum	
	Soffit	Aluminum	
	Gutters and D.S.	Aluminum, Copper	
	Awnings and canopies	Glass, Metal	
	Stair or balcony railings, balusters, and related trim/accessories	Metal	
	Handrails	Metal	
	Fire Escapes	Metal	
	Grilles and louvers	Metal, Aluminum	
	Coping	Aluminum	
	Roof ventilators	Aluminum to match roof color	
<b>Related Site Structures</b>	Courtyard enclosure walls, retaining walls, fences, dumpster enclosures	Masonry, Metal	
	Porch crawl space enclosure	Masonry, Metal, Wood	

<b>VISUAL ZONE: Industrial Zone</b>			
<b>Building Design Element</b>		<b>Permitted Material Type</b>	<b>Notes (Hyperlinked)</b>
<b>Walls</b>	Base (primary) material	Brick, Pre-cast, Block	
	Secondary material	Stucco, Brick, Metal	
<b>Roof</b>	Sloped areas	Asphalt Shingles, Metal	
	“Flat” areas	Membrane Roofing	
<b>Fenestration</b>	Doors	Metal	
	Storm Doors	Metal	
	Door & Window Frames	Aluminum, Vinyl	
	Storm window or sash	Aluminum	
	Window	Clear Glass	
<b>Trim Items</b>	Fascia	Aluminum	
	Soffit	Aluminum	
	Gutters and D.S.	Aluminum, Copper	
	Awnings and canopies	Glass, Metal	
	Stair or balcony railings, balusters, and related trim/accessories	Metal	
	Handrails	Metal	
	Fire Escapes	Metal	
	Grilles and louvers	Metal, Aluminum	
	Coping	Aluminum	
	Roof ventilators	Aluminum to match roof color	
<b>Related Site Structures</b>	Courtyard enclosure walls, retaining walls, fences, dumpster enclosures	Masonry, Metal	
	Porch crawl space enclosure	Masonry, Metal, Wood	

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## Appendix L Exterior Color Charts

### L.1 EXTERIOR COLOR CHARTS FOR INSTALLATION BUILDINGS

Colors schemes and building materials are critical design elements in relating adjacent buildings and creating a compatible visual environment within an installation. Related Army Standards are found in Chapter 3, Paragraph 3.5.5 Color, 3.5.5.2 Historic Buildings, 3.5.6 Texture, 3.5.7 Material, and 3.11 Renovations and Additions. This section identifies the Army standard palette of colors that will unify installations. A sufficient color palette range is provided to allow for variety. General direction on the use and application of materials and their colors follows:

Avoid cluttered, cosmetic application of a number of different colors on a facade. The exterior color scheme should consist of a wall color, trim color, and an accent color, all of which should work together with the choice of roofing to provide a harmonious appearance compatible with adjacent structures and environs.

Select colors from the following Exterior Color Chart based upon their appropriateness to the building type, desired appearance, material to be painted, and prevailing architectural design and landscape character of the installation. Sustainability and ease of maintenance should also be considered.

Avoid garish colors. Strong or vibrant colors should be used with restraint and should be limited to accents or focal points such as entrance doors where appropriate.

### L.2 PANTONE® COLORS

The six digit color designations found in the Exterior Color Charts are **PANTONE® TPX** series numbers taken from the **PANTONE® for architecture and interiors color guide**, which have been cross-referenced to the **PANTONE® process guide**. The colors in the **process guide** are intended for viewing on a color monitor and for printing on a four-color process printer (CMYK) using ISO 2846-1 inks. With proper calibration, colors viewed and printed should accurately represent the specified color.

Calibration for Dell FP E171 and 1800FP Monitor is per manufacturer's recommendation.

Calibration for Hewlett Packard Color 4500 is per manufacturer's recommendation.

For calibration of equipment other than the above, contact Pantone at (201) 935-5500.

### L.3 COLOR VALIDATION

Due to calibration and other technical problems, the color of paint to be used should be based on manufacturer's correspondence to the six-digit **PANTONE® TPX** number and shall not be predicated on matching a computer-generated sample as seen in the Exterior Color Charts.

“White” when given without a number shall be construed as generic and is intended to cover those manufacturer’s paints and finished materials called “white”. Some slight variance may be discernible from one manufacturer to another.

#### **L.4 COLOR NAMES**

Names given for colors are not those assigned by **PANTONE®** but are rather the generic names used by the Army for general color identification only. Always use the six-digit **PANTONE® TPX** number instead of the generic name when specifying a color.

#### **L.5 SUPPLEMENTAL COLOR BOARD**

Included in this Appendix is a supplemental Color Board (Page L-4) containing squares with a simulation of each color used in the Exterior Color Charts. The electronic reproduction of this Color Board is, however, subject to some distortion and the color will probably be inaccurate to a greater or lesser degree depending on the printer used. A hard copy is available which contains accurate representations of all of the Army’s standard exterior colors. This hard copy is the **COLOR BOARD for the IDS APPENDIX L: HARD COPY VERSION** and may be requested by E-mail at: [Baxter.Lawrence@mantech.com](mailto:Baxter.Lawrence@mantech.com) with a copy to [Dannie.Fason@mantech.com](mailto:Dannie.Fason@mantech.com).

If the E-mail is not acknowledged within three business days, call (703) 378-1030 to verify the request.

Provide the following information: quantity of color boards requested; name, title, and telephone number of person placing the order; mailing address; and the name of the installation.

#### **L.6 FACTORY FINISHED MATERIALS**

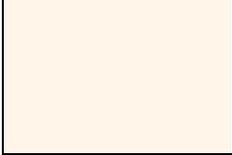
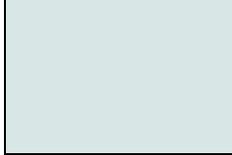
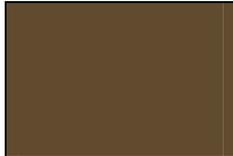
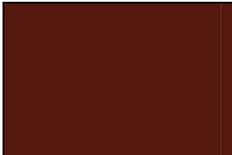
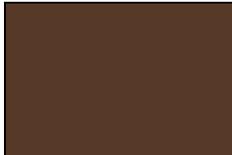
Colors given for surfaces that will be factory finished during manufacture are intended for guidance and are not intended to constitute a directive for a custom color or finish. Colors shall be selected from standard manufacturers colors with the exception of those manufactured products, which can be finished with a custom color at no additional cost and that would not result in diminishment of the standard material guarantee or serviceability.

#### **L.7 SPECIALTY FINISHES**

Site Elements, addressed in Chapter 6, are painted one of the colors used in the Color Charts and shown on the Color Board. Fire Hydrants (see Paragraph 6.6.6.5) which shall be Nutmeg Brown in color shall be finished in a standard manufacturer’s paint, suitable for this application, to which glass beads or other suitable reflective material has been added so as to create a light reflective finish meeting NFPA standards.

## L.8 COLOR BOARD FOR THE ARMY INSTALLATION DESIGN STANDARDS

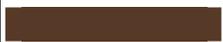
The color squares shown here are approximations of the **PANTONE® TPX** numbers indicated. They have been simulated using RGB values and are intended to be reproduced electronically. Color quality may vary with printer. **PANTONE® TPX** colors are a standard. In order to accurately reproduce the specified colors on these sheets and meet the required US Army standard, you must use the actual **PANTONE® TPX** swatch of the color indicated. A hard copy supplemental sheet with accurate color representations is available. See Paragraph L.5 for details.

				
11-0604 TPX SHELL	11-0907 TPX ALMOND	12-0910 TPX CUSTARD	12-4607 TPX PASTEL SKY	13-1009 TPX TAN
				
13-1013 TPX ALLSPICE	13-1107 TPX BEIGE	14-4506 TPX BLUEGRAY	15-1306 TPX TAUPE	15-1309 TPX NATURAL
				
15-5704 TPX GRAY	16-1210 TPX MOCHA	16-1221 TPX BROWN	16-6216 TPX METAL GREEN	18-1027 TPX DARK BROWN
				
18-1444 TPX SALSA	19-1540 TPX MAROON	14-4318 TPX SKY BLUE	18-1027 TPX NUTMEG BROWN	

**LISTING OF ORIGINAL SOURCE FEDERAL OR COMMERCIAL MANUFACTURER'S DESIGNATION WITH NEW IDS NAME & EQUIVALENT PANTONE® DESIGNATIONS**

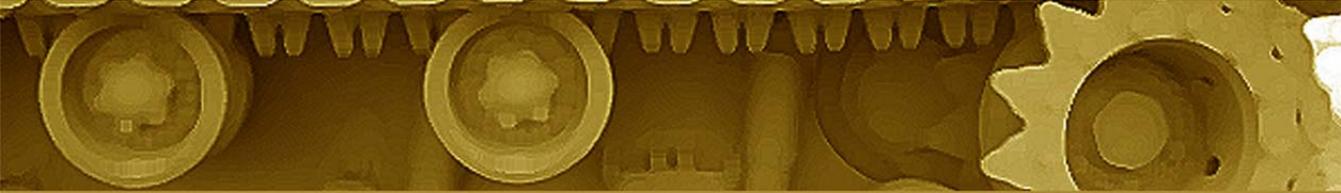
Source	Old Federal Color Name and/or Number	Other Name and/or Number	IDS Name (Generic)	IDS and PANTONE® TPX Number	Process Number	( C-M-Y-K )
Federal Paint Number	Tan 23578		TAN	13-1009 TPX	24-7C	0-10-25-10
Federal Paint Number	Tan 23717		CUSTARD	12-0910 TPX	22-8C	0-5-15-0
Federal Paint Number	Gray 26492		GRAY	15-5704 TPX	329-9C	0-0-3-30
Federal Paint Number	White 20372		TAUPE	15-1306 TPX	31-8C	5-10-20-20
Federal Paint Number	Metal Green 24373		METAL GREEN	16-6216 TPX	285-7C	25-0-30-25
Federal Paint Number	Brown 20313		BROWN	16-1221 TPX	76-8C	0-25-25-20
Federal Paint Number	Mocha 20372		MOCHA	16-1210 TPX	48-9C	10-15-25-15
Federal Paint Number	Gray 25526		BLUEGRAY	14-4506 TPX	213-9C	20-03-03-15
Federal Paint Number	Ochre 31643		ALLSPICE	13-1013 TPX	36-8C	0-15-25-0
Duron	Oyster White 921	(Oyster White) Almond 5910W	ALMOND	11-0907 TPX	32-9C	0-5-10-0
Duron	Alcazar Brown 8306N	Dark Brown 5225N	DARK BROWN	18-1027 TPX	318-1C	70-80-100-30
Duron	Shell White 917	White 5770W	SHELL	11-0604 TPX	No Match	0-3-3-0
Generic (no mfg. ref.)	Chocolate		DARK BROWN	18-1027 TPX	318-1C	70-80-100-30
ICI	Dusty Trail # 425		NATURAL	15-1309 TPX	44-7C	20-20-30-5
ICI	Sand Motif # 422		MOCHA	16-1210 TPX	48-9C	10-15-25-15
ICI	Bisque # 436		BEIGE	13-1107 TPX	43-9C	10-10-15-0
ICI	Salsa # 123		SALSA	18-1444 TPX	83-3C	30-75-75-0
ICI	Liberty Red # 159		MAROON	19-1540 TPX	69-2C	20-75-80-30
Generic (no mfg. ref.)	Pastel Sky		PASTEL SKY	12-4607 TPX	247-8C	20-0-5-3
			SKY BLUE	14-4318 TPX	229-7C	40-5-5-0
SHERMAN WILLIAMS		JAVA SW6090	NUTMEG BROWN	18-1222 TPX	322-9C	50-55-55-0

**L.9 EXTERIOR COLOR CHART: CENTRAL ATLANTIC USA**

Building Design Element		Required Color Standard	Color Sample (See Note 4)	Notes (Hyperlinked)
Walls	Base (primary) Material	Red Brick or limestone neutral gray tones		
	Secondary Material	Almond 11-0907 TPX or Custard 12-0910 TPX		
		Mocha 16-1210 TPX or Blue Gray 14-4506 TPX		
Roof	Sloped Areas	Metal Green 16-6216 TPX		
		Clay Terracotta		
		Fiberglass Shingle Gray/White		
	“Flat” Areas	White		
Fenestration	Doors	Wood: White 11-0604 TPX		
		Steel: Dark Brown 18-1027 TPX		
	Storm Doors	White		
	Door & Window Frames	Brown 16-1221 TPX		
	Storm Window or sash	White		
	Window	White		
Trim Items	Fascia	White		
	Soffit	White		
	Gutters and D.S.	Brown 16-1221 TPX		
	Awnings and Canopies	Tan 12-0910 TPX		
	Stair or Balcony Railings, Balusters and related Trim	Dark Brown 18-1027 TPX		
	Handrails	Dark Brown 18-1027 TPX		

Building Design Element		Required Color Standard	Color Sample (See Note 4)	Notes
<b>Trim Items</b>	Fire Escapes	Dark Brown 18-1027 TPX		
	Grilles and Louvers	Brown 16-1221 TPX		
	Coping	Brown 16-1221 TPX		
	Roof Ventilators	Blend to match roof		
<b>Related Site Structures</b>	Courtyard Enclosure Walls, Retaining Walls, Fences, Dumpster Enclosures	Red Brick or Dark Brown 18-1027 TPX		
	Porch Crawl Space Enclosure	White		

<b>NOTES:</b>	
<b>Note 1</b>	Color samples are electronic approximations of colors, which should not be construed as accurately representing the color standard. Paint shall match the PANTONE® number.



## Appendix M Historic Preservation Guidelines

### M.1 INTRODUCTION

#### M.1.1 Military Planning and Design

Most of the history and literature about the military does not deal with the topic of Army facility planning and design processes. However, to plan for the future development of an Army installation, it is necessary to go back and attempt to understand what has taken place there in the past.

In the development of its policies, the Army had to deal with the question of how buildings relate to one another by both use and layout and by architectural characteristics. At least in its earliest phases, this development was not always a conscious formulation of policy; so much as it was the immediate response to a given situation. Over the years, there have been different forces affecting the process of military planning in this country. As illustrated by the various districts and zones on Detroit Arsenal.

### M.2 HISTORIC PRESERVATION REGULATIONS

The Army's management of historic properties is pursuant to the duties and responsibilities established by Congress under the National Historic Preservation Act (NHPA) of 1966 and its subsequent amendments. This act committed Federal agencies to a program of identification and protection of historic properties on the land they own. The NHPA established the Advisory Council on Historic Preservation (ACHP) to "advise the President and the Congress on matters relating to historic preservation; (and to) recommend measures to coordinate activities of Federal, State, and local agencies." (16 U.S.C. 470j)

The NHPA also created the National Register of Historic Places to designate publicly or privately owned resources and to encourage identification and planning which promotes the compatible use of these properties. The National Register is the official listing of the nation's historic and cultural resources considered worthy of preservation. It includes "districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture". (16 U.S.C. 470a)

The NHPA has established a number of procedural steps, which Federal agencies must meet in order to comply with the intent of the law. This is set forth in Section 106 of the NHPA which requires that: "the head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, buildings, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking." (16 U.S.C. 470f)

Pursuant to its authority in overseeing the nation's historic preservation programs, the Department of the Interior has developed regulations which amount to a set of acceptable standards for work on properties listed in or eligible for listing in the National Register. The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation act as a guide to the Advisory Council and State Historic Preservation Offices in their procedural review of Federal undertakings. These guidelines should also act as standards for all Federal agencies as they commence planning for any undertaking, which has the potential to trigger Section 106 review, thus assuring that all proposed projects would meet Advisory Council and NHPA requirements.

Federal agencies must comply with the NHPA by following a series of steps detailed in 36 CFR 800. The Army further explains its policies and procedures in Army Regulation (AR) 200-4, Cultural Resources Management and Department of the Army Pamphlet (DA PAM) 200-4, Cultural Resources Management. This Installation Design Guideline is intended to be used in conjunction with the above regulations as well as with the (Installation Name) Integrated Cultural Resources Management Plan (ICRMP).

The recently developed Army Alternate Procedures (AAP) provides a new method for managing historic properties. The AAP, a streamlined approach to Section 106 of the National Historic Preservation Act, now allows installations to manage historic properties programmatically rather than on a project-by-project review. These procedures also enable installations to leverage existing Army and DoD program requirements while internally managing historic properties in a more efficient and cost effective manner.

### **M.3 STANDARDS AND GUIDELINES**

#### **M.3.1 Rehabilitation of Historic Properties**

Design and renovation guidelines for historic districts, such as those within Detroit Arsenal are of necessity much broader than design guidelines for single structures. Such guidelines must not only address the appropriate architectural image (style, material, etc.) for proposed new buildings, they must also address how a proposed action within the historic district will impact its integrity. By this it is meant, how any new work will affect the original design intent of the given historic area.

New work should not:

Conflict with the existing architectural character. For example, it should not:

Be larger in mass or taller than the existing historic structures.

Be of a color or material that conflicts visually with the predominant historic material used in the area.

Destroy the historic fabric of any existing structures or landscape features, which are essential character defining elements within the district.

Destroy the spatial relationship between or among historic buildings designed as a grouping; this includes the regular spacing of buildings within a group, as well as views from one to the other or into the grouping as a whole.

New work should:

- Seek to enhance and protect the historic quality and existing resources. For example:
  - Conduct a survey examining the level of use existing facilities prior to determining the need for new construction.
  - Follow the Standards and Guidelines for Historic Preservation as recommended by the Secretary of the Interior.
- Provide necessary modern conveniences as unobtrusively as possible. For example, it should:
- Site new construction so that it does not destroy existing building relationships or configurations.
- Scale new buildings down so as to minimize their visual impact.
- Place parking to the rear of historic buildings.
- Landscape parking areas and modern mechanical equipment so as to screen them from view.

Phase out (gradually eliminate) existing intrusions. For example, it should:

- Demolish structures designated as intrusions on the National Register Inventory when they are no longer needed.
- Restore buildings that have been altered by inappropriate color schemes, replacement windows, porch enclosures, etc.

### **M.3.2 Treatment of Historic Fabric**

The most effective way to preserve historic properties is to keep them in use and to consistently maintain them. When buildings and grounds are consistently used for their intended purposes and regular maintenance is conducted, there is rarely a need for extensive preservation work. Only when they are misused, underused or left vacant for long periods of time does large-scale rehabilitation become necessary. It follows that if a regular maintenance program is put into effect once a property has been appropriately renovated, another major rehabilitation will rarely be required.

### **M.3.3 Standards for Historic Preservation Projects**

#### Compatible use of historic sites and structures

Every reasonable effort should be made to use a historic structure or site for its originally intended purpose or to provide a compatible use. The use should be compatible in the sense that it involves minimal alteration to the property and/or has no adverse effect upon its historic integrity. Use of the site and structure should be regulated to prevent alterations that are potentially damaging to historic fabric and/or cultural context.

#### Retention of character defining features

Distinguishing stylistic or character defining features and examples of skilled craftsmanship should not be destroyed, altered, or removed from a historic site or structure. All such fabric should be treated with sensitivity and preserved in its original context and form.

#### Treatment of deteriorated historic fabric

Deteriorated historic fabric should be repaired rather than replaced whenever possible. When replacement is unavoidable, new material, whether man-made or natural, should match the existing fabric in composition, design, color, texture, and other visual/structural qualities.

#### Documentation of missing historic elements

Replacement of missing historic elements should be based on the accurate duplication of features known to have existed and substantiated by historic pictorial and/or physical evidence and not on conjecture, nor simply on the

example of similar treatment found on other structures or sites of the same period or region.

#### Retention of historic alterations

Changes to a historic structure or site, which have occurred over the course of time, may provide evidence of important social or cultural processes. As such they should be respected and their potential significance carefully evaluated.

#### Unacceptable alterations

Historic sites and structures should be recognized as products of their own time and as part of an important cultural process. Alterations which have no historical basis, or which destroy the authenticity of the place, are discouraged.

#### Acceptable alterations and additions

When possible, alterations and new additions to historic structures or sites should be done in such a manner as to leave the essential form and integrity unimpaired.

#### Contemporary design in a historic context

Contemporary design for additions to existing historic sites or districts should not be discouraged if such design is compatible with the massing, proportions, scale, materials, color, views, and general contextual relationships of the place.

#### Surface cleaning methods

Surface cleaning of structures or buildings should be undertaken with the gentlest possible means, and only when cleaning is essential to the preservation of the buildings. Cleaning methods, such as sand blasting, which could damage historic material or speed their deterioration, are discouraged.

#### Archaeological resources

All treatment work, which potentially affects surface or sub-surface pre-historic or historic archaeological resources, should be coordinated with an archaeologist.

#### Historic preservation and maintenance

The guidelines contained within this IDG are general in nature. The IDG must be utilized in conjunction with the Installation ICRMP.

### **M.4 GUIDELINES FOR HISTORIC PRESERVATION PROJECTS.**

#### Roof Guidelines

Preserve existing historic roofing. Repair and patch with matching materials.

All roofs should receive an annual inspection. Repair and patch all materials as needed and clean out all gutters and drains.

When full replacement of the roof becomes necessary, replace or restore with historic materials.

#### Roof details

Retain and/or maintain all existing chimneys, ventilators, vents, louvers and decorative elements such as brackets, dentils, and cornices. When possible, restore missing decorative elements.

#### Wall Guidelines

- Limestone and brick masonry
  - Clean only when necessary using the gentlest possible means.
  - Repair or replace deteriorated or missing units as needed.

- Stucco

Repair damaged or deteriorated stucco.

Repaint only when necessary with appropriate color based on analysis of historic paint.

- Wood

Retain or repair wood siding; where replacement is necessary, match existing clapboards in width and species.

Repaint only as need to maintain moisture protection.

Use color scheme based on analysis of existing paint layers.

#### Porch Guidelines

Retain or maintain existing original porches (Figure 4).

Remove historically inappropriate porches.

Where possible, restore original porches that have been removed or enclosed.

#### Window Guidelines

In most historic districts or buildings, windows constitute a highly visible design element as they make up a large percentage of façades.

If building an addition or altering the building, maintain height configuration of windows.

Retain window size and fenestration pattern when replacing windows or altering the building.

If replacing windows, preserve frame material or use historically accurate reproductions. Avoid replacing original frames with aluminum frames.

Restore historic windows where non-historic replacement windows have been used.

The window manufacturing industry can replicate and/or reproduce most all types and sizes of windows to match existing historic windows. In many cases, matching replacement windows are available as stock items.

#### Door Guidelines

Although not usually as visually overpowering as windows, main entrance doorways are also important façade details. As a design element, decorative doors have stylistic features that belong to the particular era for which they were designed.

Retain or maintain existing historic doors.

If replacing doors, preserve frame material or use historically accurate reproductions.

If building an addition, or altering the building, maintain the size of the original door opening.

Restore all main entranceways by reinstalling appropriate frames.

#### Color Guidelines

If historic buildings must be repainted before an accurate color scheme is developed, a very conservative approach should be followed. Repaint to match the existing colors or colors that can be documented to have been used on that building.

Utilize a qualified historic paint color specialist for an inventory and analysis of the paint layer sequences for all building groupings.

Establish a rotating schedule for the painting and cleaning of each building.

#### Painting Guidelines

Do not undertake a paint job until any problems with leaking water have been solved. All gutters and downspouts should be repaired and be in good operating condition.

Only repaint when existing coat is no longer performing, as excessive coats of paint create a thick film, which obscures detail.

#### Handicap and Safety Access Guidelines

As a general rule, buildings listed in or determined eligible for listing in the National Register may receive special consideration for meeting safety and accessibility requirements. Any modifications required to bring a historic structure in compliance with safety and accessibility codes should be carefully planned and undertaken so that they do not adversely affect the design of main entrances or principal facades.

Where possible, avoid alterations to the main façade and principal doorways.

Place or install new ramps, lifts, and any added fire escapes on secondary building facades such as, to the side or rear of the building.

Locate new doorways at the rear or side of the building.

Required protective railings on ramps, stairs, steps, and lifts should match existing porch railings.

#### Mechanical Equipment Guidelines

In many cases within historic districts, mechanical equipment is located outside of the building. When historic structures are renovated and mechanical systems are upgraded, equipment placement should be planned in order to make the least visual impact.

Where possible, locate mechanical equipment within the building.

Screen necessary surface equipment with vegetation.

When large groups of buildings are upgraded as one project, consider the use of a remote system.

#### Guidelines for Additions

In general, additions should follow all of the guidelines for new construction within historic districts; but, because their proximity makes the potential for damage to historic fabric even greater, there are additional principles that should be followed.

Avoid changes that impact primary facades.

Note that some highly visible freestanding buildings may not have a secondary facade, and thus additions are not advisable.

Scale down additions so that it makes the least visual impact.

Design should establish a clear and obvious difference between the existing historic structure and the new addition.

### Force Protection Guidelines

These guidelines should be used in conjunction with the *UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings* and the Force Protection Design Standards of this Army Installation Design Guide and Standards.

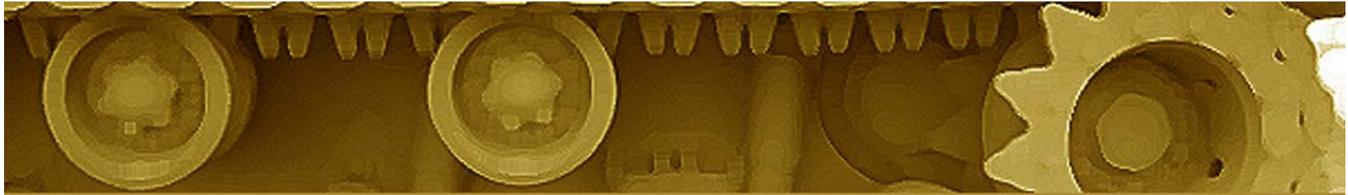
## **M.5 ARMY STANDARDS**

- [Army Regulation \(AR\) 200-4, Cultural Resources Management](#)
- [Department of the Army Pamphlet \(DA PAM\) 200-4, Cultural Resources Management](#)
- [The Secretary of the Interior's Standards for the Treatment of Historic Properties](#)

## **M.6 REFERENCE**

- [Advisory Council on Historic Preservation, United States Army Environmental Center](#)

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## Appendix N Housekeeping Rules

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PLANT SELECTION LIST Plant Material Suitability Matrix	ORIGIN		FORM			USE				CONDITION			FOLIAGE			FEATURE			HEIGHT			GROWTH									
	Native	Introduced	Irregular	Oval/Round	Upright	Pyramidal	Vase	Street Tree	Accent/Residential	Woodland Infill	Barrier, Buffer/Screen	Erosion Control	Sun	Partial Shade	Shade	Drought	Wet Conditions	Deciduous	Coniferous	Evergreen/Semi	Fragrance	Fruit/Nut/Herb	Fall Color/Interesting Bark	Flower	Small	Medium	Large	Slow	Medium	Fast	
Fagus grandifolia American Beech	o				o								o	o			o	o												o	o
Fraxinus americana White Ash	o			o	o	o			o	o			o					o								o	o	o			
Fraxinus pennsylvanica Green Ash	o			o	o			o	o				o	o				o									o				o
Ginkgo biloba Ginkgo		o			o			o	o				o	o				o									o				
Gleditsia triacanthose Imperial Honeylocust	o			o				o					o					o								o					o
Gleditsia triacanthose Skyline Honeylocust		o				o		o					o	o				o								o					o
Gymnocladus dioicus Kentucky Coffeetree	o				o			o	o				o				o	o									o				o
Hamamelis virginiana Witch Hazel	o		o	o				o	o	o			o	o				o							o						o
Juglans cinerea White Walnut	o							o					o					o								o					o
Juglans nigra Black Walnut	o			o				o	o				o					o			o					o					o
Larix laricina Tamarack	o				o								o				o	o								o					o
Liquidambar styraciflua Sweetgum	o					o		o	o				o					o		o	o					o					o
Liriodendron tulipifera Tulip Poplar	o			o	o			o	o				o					o								o					o
Magnolia soulangiana Saucer Magnolia		o		o				o	o				o					o								o					o
Malus floribunda Flowering Crabapple		o		o				o					o					o		o	o					o					o
Nyssa sylvatica Black Gum	o			o		o		o	o		o		o				o	o								o					o
Ostrya virginiana Iron wood	o			o		o		o		o			o	o				o								o		o			
Platanus occidentalis Sycamore	o				o	o		o	o				o	o		o		o								o					o
Populus deltoids Eastern Cottonwood	o				o				o		o		o				o	o								o	o				o
Populus grandidentata Big-toothed Aspen	o		o		o			o	o		o		o				o									o					o

PLANT SELECTION LIST Plant Material Suitability Matrix	ORIGIN		FORM				USE				CONDITION				FOLIAGE		FEATURE			HEIGHT			GROWTH								
	Native	Introduced	Irregular	Oval/Round	Upright	Pyramidal	Vase	Street Tree	Accent/Residential	Woodland Infill	Barrier, Buffer/Screen	Erosion Control	Sun	Partial Shade	Shade	Drought	Wet Conditions	Deciduous	Coniferous	Evergreen/Semi	Fragrance	Fruit/Nut/Herb	Fall Color/Interesting Bark	Flower	Small	Medium	Large	Slow	Medium	Fast	
Populus tremuloides Quaking Aspen	○		○									○					○								○					○	
Prunus americana Wild Plum	○		○	○					○	○		○			○		○			○	○			○					○		
Prunus nigra Canada Plum	○							○				○					○				○	○		○			○				
Prunus pennsylvanica Pin Cherry	○		○	○				○		○		○					○				○				○					○	
Prunus sargentii Sargent Cherry		○		○	○	○			○	○		○	○				○						○			○			○		
Prunus serotina Black Cherry	○			○				○	○	○		○					○				○					○				○	
Ptelea trifoliata Common Hoptree	○							○		○		○	○				○			○		○	○	○				○			
Pyrus calleryana Peartree		○		○	○	○		○	○			○	○		○		○					○	○	○		○				○	
Quercus alba White Oak	○			○	○	○		○	○			○	○				○					○	○	○		○		○		○	
Quercus bicolor Swamp White Oak	○			○	○	○			○			○			○	○	○				○	○				○		○		○	
Quercus macrocarpa Bur Oak	○			○				○	○			○			○		○									○		○			
Quercus muhlenbergii Chinkapin Oak	○			○				○		○		○			○		○					○				○		○			
Quercus palustris Pin Oak	○					○		○	○			○			○	○	○				○	○				○		○			○
Quercus rubra Northern Red Oak	○			○	○			○	○			○			○		○				○	○				○		○			○
Quercus velutina Black Oak	○		○					○		○		○	○				○					○			○		○		○		
Robinia pseudoacacia Black Locust	○		○	○				○	○	○	○	○			○		○			○			○			○		○			○
Salix amygdaloides Peachleaf Willow	○		○		○			○		○		○	○				○									○		○			
Salix nigra Black Willow	○			○				○				○	○			○	○					○				○		○			
Sassafras albidum Sassafras	○		○	○				○	○			○			○		○					○				○		○			
Sassafras verifolium Sassafras	○		○			○		○	○			○	○				○			○		○				○		○		○	○

PLANT SELECTION LIST Plant Material Suitability Matrix	ORIGIN		FORM			USE				CONDITION				FOLIAGE			FEATURE			HEIGHT			GROWTH									
	Native	Introduced	Irregular	Oval/Round	Upright	Pyramidal	Vase	Street Tree	Accent/Residential	Woodland Infill	Barrier, Buffer/Screen	Erosion Control	Sun	Partial Shade	Shade	Drought	Wet Conditions	Deciduous	Coniferous	Evergreen/Semi	Fragrance	Fruit/Nut/Herb	Fall Color/Interesting Bark	Flower	Small	Medium	Large	Slow	Medium	Fast		
Sorbus americana Mountain Ash	○			○				○	○			○					○				○	○		○					○			
Tilia americana American Linden	○		○	○				○		○		○	○		○		○				○		○	○			○			○		
Tilia cordata Little Leaf Linden	○				○	○		○				○	○				○						○		○				○			
Ulmus americana American Elm	○			○				○				○			○		○						○		○					○		
Ulmus rubra Red Elm	○					○	○	○		○		○	○				○								○	○			○			
Zelkova serrata Green Vase Zelkova		○				○	○	○		○		○					○						○				○			○		
<b>Shrubs</b>																																
Amelanchier arborea Serviceberry	○			○				○	○	○		○	○	○			○						○		○	○			○			
Amorpha canescens Leadplant	○			○				○				○	○	○	○		○						○	○					○			
Aronia prunifolia Black Chokecherry	○			○				○	○			○	○				○						○		○	○						
Ceanothus americanus NJ Tea	○		○					○				○	○	○			○						○	○			○					
Ceanothus sanguineus Red Stem Ceanthus	○			○				○				○	○		○		○						○		○	○	○					
Cephalanthus occidentalis Button Bush	○			○				○				○	○	○	○		○						○		○	○			○			
Cornus alternifolia Alternate Leaved Dogwood	○		○	○				○	○			○	○	○			○						○	○					○			
Cornus amomum Silky Dogwood		○			○	○		○	○			○	○	○	○		○						○			○					○	
Cornus racemosa Grey Dogwood	○		○		○			○	○	○		○	○	○			○						○	○					○			
Cornus stolonifera Red Twig Dogwood	○			○				○	○		○	○	○				○						○	○	○	○			○			
Euonymus atropurpurea Burning Bush	○			○				○	○	○		○	○	○	○		○						○	○	○	○	○					
Gaultheria procumbens Checker Berry	○		○					○	○	○		○	○	○					○	○	○		○	○				○				

PLANT SELECTION LIST Plant Material Suitability Matrix	ORIGIN		FORM				USE				CONDITION				FOLIAGE		FEATURE			HEIGHT			GROWTH							
	Native	Introduced	Irregular	Oval/Round	Upright	Pyramidal	Vase	Street Tree	Accent/Residential	Woodland Infill	Barrier, Buffer/Screen	Erosion Control	Sun	Partial Shade	Shade	Drought	Wet Conditions	Deciduous	Coniferous	Evergreen/Semi	Fragrance	Fruit/Nut/Herb	Fall Color/Interesting Bark	Flower	Small	Medium	Large	Slow	Medium	Fast
Ilex verticillata Winterberry	o		o	o				o	o	o		o	o				o				o				o	o	o			
Juniperus communis Common Juniper	o		o					o	o	o		o			o				o					o	o		o			
Juniperus horizontalis Creeping Juniper	o		o					o		o	o	o							o					o			o			
Juniperus prostrata Prostrate Juniper	o		o					o	o	o	o	o							o				o	o					o	
Juniperus chinensis Chinese Juniper		o	o	o				o	o	o		o			o			o						o	o	o	o	o		
Lindera benzoin Spicebush	o		o						o				o	o						o	o	o	o		o	o	o	o		
Prunus virginiana Choke Cherry	o		o					o	o			o						o				o	o		o	o			o	
Sambucus canadensis American Elderberry	o		o						o				o								o		o			o		o	o	
Rhus glabra Smooth Sumac	o		o						o	o	o	o						o				o	o			o		o		
Rhus typhina Sumac	o		o						o		o	o	o					o				o	o			o		o		
Rosa Scarlet Medland Rose		o	o	o				o	o	o	o	o						o				o		o				o		
Taxus canadensis Canadian Yew	o		o									o	o	o					o						o			o		
Taxus sp. Yew		o		o				o	o		o	o							o					o	o	o			o	
Thuja occidentalis American Arborvitae		o				o		o	o		o	o			o	o		o				o			o	o	o	o		
Viburnum acerifolium Maple Leaf Viburnum	o		o	o				o	o	o		o	o		o						o	o	o		o		o			
Viburnum dentatum Arrowwood	o		o	o				o	o	o		o	o									o	o		o	o		o		
Viburnum lentago Black Haw	o		o	o				o	o	o		o	o	o	o							o	o		o	o		o		
Viburnum opulus Cranberry Viburnum		o	o					o	o	o		o	o			o						o	o		o	o		o		
Viburnum prunifolium Blackhaw Viburnum	o			o				o	o	o		o	o	o	o							o	o		o	o	o	o		



## Appendix P Army Facilities Standardization Program – Centers of Standardization

### **P.1 GENERAL**

The various facility types are listed with contact information according to the Center of Standardization (COS) responsible for development of standards for that facility type.

### **P.2 SPECIFIC CONTACT INFORMATION**

For more specific contact information, such as POC with email address and telephone number, refer to the IDS Newsletter (<https://secureapp2.hqda.pentagon.mil/acsimnews/>) under the heading “Standardization Program POCs”. An Army Knowledge Online (AKO) account will be required to access the information which includes the Category Code, Army Proponent, ACSIM Proponent, HQUSACE POC, and HQIMA POC.

## Army Facilities Standardization Program Centers of Standardization

<u>Assigned Center</u>	<u>Facility Type</u>
<b>U.S. Army Engineering and Support Center, Huntsville</b> <b>Attn: CEHNC-ED-CS-A and IS</b> <b>P.O. Box 1600</b> <b>Huntsville AL 35807</b> <b>Telephone: 256-895-1673/1672/1535</b>	Child Development Center-Infant/Toddlers
	Child Development Center Playground
	Child Development Center – 6 to 10 Year Olds
	Physical Fitness Facilities
	Fire Station
	Hazardous Material Storage Facility
	Outdoor Sports Facility
	Close Combat Tactical Trainer (CCTT)
	Urban Assault Course (UAC) <i>replaces:</i> <i>Military Operations Urban Terrain (MOUT)</i>
	Training Range
	Youth Activity Center
	Bowling Center (RFP)
	Army Community Service Centers
	Consolidated Fire/Police/Safety Facility
<b>U.S. Army Engineer District, Louisville</b> <b>ATTN: CELRL-ED-D-A</b> <b>600 Martin Luther King Jr. Place</b> <b>Louisville, KY 40202 Tel: 502-315-6250</b>	Army Reserve Center
<b>U.S. Army Engineer District, Norfolk</b> <b>ATTN: CENAO-TS-EA</b> <b>803 Front Street</b> <b>Norfolk, VA 23510</b> <b>Telephone: 757-441-7702</b>	Classroom XXI
	Criminal Investigation Facility (CIDC)
	Enlisted Personnel Dining Facility
	Family Housing (RFP)
	General Instruction Building
	Information Systems Facility
	Troop Issue Subsistence Activity Facility (TISA)
	Central Issue Facility
General Purpose Warehouse	
<b>U.S. Army Engineer District, Omaha</b> <b>ATTN: CENWO-ED-DG/PM-M</b> <b>215 North 17<sup>th</sup> Street</b> <b>Omaha, NE 68102</b> <b>Telephone: 402-221-4552/443</b>	Army Chapel
	Chapel Family Life Center
	Religious Education Facility
	Small Site Chapel
	Access Control Points
	Airfields, Railroads, Pavements, Bridges, & Dams

<p><b>U.S. Army Engineer District, Mobile</b>  <b>ATTN:CESAM-PM-SI</b>  <b>P.O. Box 2288</b>  <b>Mobile, AL 36652-2288</b>  <b>Telephone: 251-394-3600</b></p>	<p>National Guard Armory</p>
<p><b>U.S. Army Engineer District, Savannah</b>  <b>ATTN: CESAS-EN-E</b>  <b>P.O. Box 889</b>  <b>Savannah, GA 31402</b>  <b>Telephone: 912-652-5212</b></p>	<p>Company Operations Facility (COF)  Military Entrance Processing Station (MEPS)  Tactical Equipment Maintenance Facility (TEMF)  Unaccompanied Enlisted Personnel Housing (UEPH), New &amp; Modernization  One Station Unit Training (OSUT) Barracks  Unaccompanied Officer / Sr. Enlisted / Quarters  Unaccompanied Officer Quarters, Transient  Brigade / Battalion HQ  Operational Readiness Training Complex (ORTC)  Deployment Facility  *Advanced Individual Training (AIT) Barracks  *Basic Combat Trainee (BCT)</p>
<p><b>U.S. Army Engineer District, Tulsa</b>  <b>ATTN: CESWT-EC-D</b>  <b>1645 S. 101<sup>ST</sup> East Avenue</b>  <b>Tulsa, OK 74128</b>  <b>Telephone: 918-669-7033</b></p>	<p>*Advanced Individual Training (AIT) Barracks  *Basic Combat Trainee (BCT)  Reception Barracks</p>
<p>*AIT &amp; BCT to be transferred to Savannah, upon completion by Tulsa.</p>	
<p><b>CFSC</b>  <b>Telephone: 703-681-1506</b></p>	<p>Army Lodging  Clubs/FBE Facilities  Golf Courses  Recreational Lodging</p>

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## Appendix Q Standards and References

Standards and References for the Army Installation Design Standards (IDS).

### Q.I CHAPTER 2: SITE PLANNING DESIGN STANDARDS

#### Q.I.1 Army Standards

- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Army Regulation \(AR\) 200-2, Environmental Effects of Army Actions](#)
- [Army Regulation \(AR\) 210-20, Master Planning for Army Installations](#)
- [Army Regulation \(AR\) 415-15, Army Military Construction Program Development and Execution](#)
- [Army Regulation \(AR\) 420-70, Buildings and Structures](#)

#### Q.I.2 References

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 7](#)
- [Unified Facilities Criteria \(UFC\) 3-400-01, Design: Energy Conservation](#)
- [Unified Facilities Criteria \(UFC\) 3-210-01A, Design: Area Planning, Site Planning, and Design](#)
- [Unified Facilities Criteria \(UFC\) 3-210-06A, Design: Site Planning and Design](#)
- [Unified Facilities Criteria \(UFC\) 3-230-15FA, Design: Subsurface Drainage Facilities for Airfields and Heliports](#)
- [Unified Facilities Criteria \(UFC\) 3-230-16FA, Design: Drainage and Erosion Control Structures for Airfields and Heliports](#)
- [Unified Facilities Criteria \(UFC\) 3-230-17FA, Design: Drainage for Areas Other than Airfields](#)
- [Unified Facilities Criteria \(UFC\) 3-230-18FA, Design: General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas](#)
- [Unified Facilities Criteria \(UFC\) 3-260-02, Design: Pavement Design for Airfields](#)
- [Unified Facilities Criteria \(UFC\) 3-250-01FA, Design: Pavement Design for Roads, Streets, Walks and Open Storage Areas](#)
- [Unified Facilities Criteria \(UFC\) 3-300-05A, Installation Support](#)
- [Technical Instructions \(TI\) 800-01, Design Criteria](#)
- [Technical Instructions \(TI\) 801-02, Family Housing](#)
- [Master Planning Instructions \(MPI\)](#)
- [Whole Building Design](#)

**Q.2 CHAPTER 3, BUILDING DESIGN STANDARDS****Q.2.1 Army Standards**

- [Army Regulation \(AR\) 200-4, Cultural Resources Management](#)
- [Army Regulation \(AR\) 420-70, Buildings and Structures](#)
- [Unified Facilities Criteria \(UFC\) 3-520-01, Interior Electrical Systems](#)
- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)
- [UFC 4-171-05, Design: Guide for Army Reserve Facilities](#)
- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Secretary of the Interior's Standards for the Treatment of Historic Properties](#)
- [Technical Manual \(TM\) 5-807-10, Signage](#)
- [Technical Instructions \(TI\) 809-04, Seismic Design for Buildings](#)
- [Technical Instructions \(TI\) 809-05, Seismic Design Evaluation and Rehabilitation for Buildings](#)
- [Technical Manual \(TM\) 5-809-10/Navy NAVFAC P-355/Air Force AFM 88-3, Chap 13, Seismic Design for Buildings](#)
- [Technical Manual \(TM\) 5-809-10-2/Navy NAVFAC P-355.2/Air Force AFM 88-3, Chap 13, Sec B, Seismic Design Guidelines for Upgrading Existing Buildings](#)
- [U.S. Army Corps of Engineers Engineering Technical Letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide](#)
- [Standards of Seismic Safety for Existing Federally Owned and Leased Buildings](#)
- [Army Barracks Master Plan, Appendix I, Army Barracks Standards](#)
- [Memorandum Subject: Revised Barracks Construction Criteria, dated 1 May 2003](#)
- [Quality Standards for New and Replacement Residential Communities Initiative \(RCI\) Family Housing](#)
- [Army Lodging Standards](#)
- [Design Manual for Remoted Target Systems \(RETS\) Ranges, CEHCN 1110-1-23 Manual](#)
- [Unexploded Ordinance Considerations in the Planning, Design, and Construction of Ranges, Supplement to CEHNC 1110-1-23 Manual](#)
- [Revised Range Design/Construction Interface Standards](#)
- [Army Chapel Standard Definitive Design](#)
- [Army Standard for Chapel Construction – January 2004 and Memorandum for Record, subject: The Army Standards for Chapels, dated 21 January 2004.](#)
- [Army Standards for Company Operation Facility \(COF\)](#)
- [Army Standards for Child Development Center Construction \(for school-age children\) October 2004](#)

## Q.2.2 References

- [Army Regulation \(AR\) 190-13, The Army Physical Security Program](#)
- [Army Regulation \(AR\) 200-1, Environmental Protection and Enhancement](#)
- [Army Regulation \(AR\) 200-2, Environmental Effects of Army Actions](#)
- [Army Regulation \(AR\) 200-4, Cultural Resources Management](#)
- [Army Regulation \(AR\) 210-20, Master Planning for Army Installations](#)
- [Army Regulation \(AR\) 210-21, Army Ranges and Training Land Program](#)
- [Army Regulation \(AR\) 405-45, Real Property Inventory Management](#)
- [Army Regulation \(AR\) 405-70, Utilization of Real Property](#)
- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 8](#)
- [Unified Facilities Criteria \(UFC\) 4-510-01, Design: Medical Military Facilities](#)
- [Unified Facilities Criteria \(UFC\) 1-200-01, Design: General Building Requirements, 31 July 2002](#)
- [Unified Facilities Criteria \(UFC\) 3-400-01, Design: Energy Conservation](#)
- [Unified Facilities Criteria \(UFC\)3-130-07, Arctic and Subarctic Construction - Buildings](#)
- [Engineering Regulation \(ER\) 1110-345-122, Engineering and Design, Interior Design](#)
- [Department of the Army Pamphlet \(DA PAM\) 200-4, Cultural Resources Management](#)
- [U.S. Army Corps of Engineers, Design Guide \(DG\) 1110-3-122, Design Guide for Interiors](#)
- [Department of Defense \(DoD\) Interior Design Website](#)
- [Technical Instructions \(TI\) 800-01, Design Criteria](#)
- [Technical Instructions \(TI\) 811-16, Lighting Design](#)
- [Technical Manual \(TM\) 5-683, Electrical Interior Facilities](#)
- [Technical Manual \(TM\) 5-688, Foreign Voltage and Frequencies Guide](#)
- [Army Barracks Master Plan](#)
- [Air Force Sustainable Facilities Guide](#)
- [Air Force Interior Design Guides](#)
- [Office of the Assistant Secretary of the Army for Financial Management and Comptroller \(OASA \[FM&C\]\) Sales and Outlease of Army Assets - Installation Guide](#)
- [Assistant Chief of Staff for Installation Management, Sustainable Design and Development Website](#)
- [U.S Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory \(CERL\), Sustainable Design and Development Website](#)
- [U.S. Army Corps of Engineers Engineering Technical Letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide](#)
- [Whole Building Design Guide](#)
- [Unified Facilities Guide Specifications \(UFGS\), "Division 12 - Furnishings", Construction Criteria Base](#)
- [Engineering and Construction Bulletins](#)
- [Assistant Secretary of the Army memorandum Subject: Sustainable Design and Development Requirements, dated 18 March 2003](#)
- [Chapter 4, Circulation Design Standards](#)

**Q.2.3 Army Standards**

- [Army Regulation \(AR\) 420-72, Transportation Infrastructure and Dams](#)
- [Technical Manual \(TM\) 5-811-1/Air Force AFJMAN 32-1080, Electric Power Supply and Distribution](#)
- [Technical Manual \(TM\) 5-850-2/Air Force AFJMAN 32-1046, Railroad Design and Rehabilitation](#)
- [Manual For Railway Engineering](#)
- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)
- [Unified Facilities Criteria \(UFC\) 3-210-02, Design: POV Site Circulation and Parking](#)
- [Unified Facilities Criteria \(UFC\) 3-230-18FA, Design: General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas](#)
- [Unified Facilities Criteria \(UFC\) 3-260-02, Design: Pavement Design for Airfields](#)
- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Manual of Uniform Traffic Control Devices \(MUTCD\)](#)
- [Chicago's Bike Lane Design Manual \(Provides a comprehensive series of technical drawings and design specifications for bike lanes\).](#)

**Q.2.4 References**

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 9](#)
- [U.S. Air Force, Landscape Design Guide, Parking Area](#)
- [U.S. Air Force, Landscape Design Guide, Walkways and Bikeways \(Provides a comprehensive walkways and bikeways planning guide including sections on paving materials and gradients and curvature data\).](#)
- [Illumination Engineering Society of North America \(IESNA\)](#)
- [Federal Highway Administration reference document “Accessible Sidewalks and Street Crossings – an informational guide”.](#)

**Q.3 CHAPTER 5, LANDSCAPE DESIGN STANDARDS****Q.3.1 Army Standards**

- [Unified Facilities Criteria \(UFC\) 3-210-05FA, Design: Landscape Design and Planting Criteria](#)
- [Army Regulation \(AR\) 420-70, Buildings and Structures](#)
- [Technical Manual \(TM\) 5-630, Natural Resources Land Management](#)
- [American Standard for Nursery Stock, ANSI Z60.1](#)
- [Overseas \(Host Nation Standards\)](#)

**Q.3.2 References**

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 10](#)
- [USAF Landscape Design Guide](#)
- [C. Brickell and D. Joyce. Pruning and Training. 1996](#)

**Q.4 CHAPTER 6, SITE ELEMENTS DESIGN STANDARDS****Q.4.1 Army Standards**

- [DoD 4525.8-M, DoD Official Mail Manual](#)
- [Army Regulation \(AR\) 420-49, Utility Services](#)
- [Army Regulation \(AR\) 420-70, Buildings and Structures](#)
- [Army Regulation \(AR\) 420-72, Transportation Infrastructure and Dams](#)
- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)

- [Technical Manual \(TM\) 5-807-10, Signage](#)
- [Manual of Uniform Traffic Control Devices \(MUTCD\)](#)
- [MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings](#)
- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)

#### Q.4.2 References

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design](#)
- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 11](#)
- [Army Regulation \(AR\) 1-33, Memorial Programs](#)
- [Army Regulation \(AR\) 840-1, Department of the Army Seal, and Department of the Army Emblem and Branch of Service Plaques](#)
- [Technical Instructions \(TI\) 811-16, Lighting Design](#)
- [Technical Manual \(TM\) 5-663, Child Development Center, Play Area Inspection and Maintenance Program](#)
- [Unified Facilities Criteria \(UFC\) 3-210-04, Design: Children's Outdoor Play Areas](#)
- [National Fire Protection Association \(NFPA\) 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants](#)
- [Advisory Circular AC 70/7460-1K, Obstruction Marking and Lighting](#)

### Q.5 CHAPTER 7, FORCE PROTECTION DESIGN STANDARDS

#### Q.5.1 Army Standards

- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)
- [Unified Facilities Criteria \(UFC\) 4-010-10, DoD Minimum Antiterrorism Standoff Distances for Buildings. \(This document is a "For Official Use Only \[FOUO\]" publication. Users may contact the Point of Contact posted at the noted website for inquires regarding this document\).](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Americans with Disabilities Act Accessibility Guideline \(ADAAG\)](#)
- [DoD Instruction 2000.16, DoD Antiterrorism Standards](#)

#### Q.5.2 References

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 12](#)
- [DoD Handbook 2000.12-H, Protection of DoD Personnel and Activities Against Acts of Terrorism and Political Turbulence, February 1993 \(This Handbook is a "For Official Use Only \[FOUO\]" publication. Users may contact the Point of Contact posted at the following website to obtain a copy of the Handbook\).  
<http://www.dtic.mil/whs/directives/corres/html/o200012h.htm>](#)
- [Army Regulation \(AR\) 525-13, The Army Force Protection Program \(Available only through the Army Knowledge Online web portal\).](#)
- [UFC 4-010-02, DoD Security Engineering Manual, \(This document is in draft form. See the Security Engineering Working Group website\).](#)
- [U.S. Air Force, Installation Force Protection Guide: \(Contains information on installation planning, engineering design, and construction techniques that will preclude or minimize the effect of a terrorist attack\).](#)
- [Unified Facilities Criteria \(UFC\) Security Engineering series, UFC 4-020-01FA, UFC 4-020-02FA, UFC 4-020-03FA, UFC 4-020-04FA, are available on the Army Corps of Engineers publications website. A copy of the manuals can also be acquired via a standard publications account. The four volumes cover, Project Development, Concept Design, Final Design, and Electronic Security Systems respectively.](#)

## Q.6 APPENDIX D, SUSTAINABLE DESIGN

### Q.6.1 Army Standard

- The SPiRiT rating of "Silver" is the standard for all FY06 MILCON vertical construction projects currently under design (as of March 18 2003). For all other FY06 and future-year MILCON projects the minimum SPiRiT rating requirement is "Gold". See [Assistant Secretary of the Army memorandum Subject: Sustainable Design and Development Requirements, dated 18 March 2003](#).

### Q.6.2 References

- [Assistant Chief of Staff for Installation Management memorandum Subject: Sustainable Project Rating Tool, dated 21 December 2002](#)
- [Assistant Chief of Staff for Installation Management, Sustainable Design and Development Website](#)
- [U.S Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory \(CERL\), Sustainable Design and Development Website](#)
- [Air Force Sustainable Facilities Guide](#)
- [Whole Building Design Guide](#)

## Q.7 APPENDIX M, HISTORIC PRESERVATION GUIDELINES

### Q.7.1 Army Standards

- [Army Regulation \(AR\) 200-4, Cultural Resources Management](#)
- [Department of the Army Pamphlet \(DA PAM\) 200-4, Cultural Resources Management](#)
- [The Secretary of the Interior's Standards for the Treatment of Historic Properties](#)

### Q.7.2 References

- [Advisory Council on Historic Preservation](#)
- [United States Army Environmental Center](#)



## Appendix R Room Numbering Procedure

The procedure below describes the methodology of achieving the above stated goals. Following the implementation of this system the room numbers are posted on the applicable building drawings which will be maintained by the Detroit Arsenal Public Works Division. These procedures are applicable to all existing or new configurations and subdivisions of rooms, including fixed offices and modular furniture arrangements.

A four character room “numbering” system will be used to designate the rooms in the larger buildings and a three character number is required in the smaller buildings

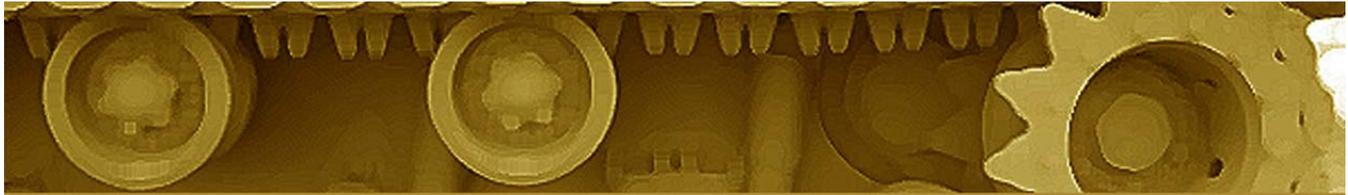
- I. Four character room designators shall be assigned be in the format of “XXXX”, with the following special code designations:
  - a. The first character of the room number (as per the format IXXX) shall be used to indicate floor of the building on which the room is located
    - 1) 1XXX shall be used to indicate rooms located on the first floor
    - 2) 2XXX shall be used to indicate rooms located on the second floor
    - 3) 3XXX shall be used to indicate rooms located on the third floor
    - 4) 4XXX shall be used to indicate rooms located on the fourth floor and penthouse
    - 5) BXXX shall be used to indicate rooms located in the “Basement” of a building
  - b. The second digit of the room number (as per the format X1XX) shall be used to indicate the “Quadrant “of the floor in which the room is located.
    - 1) Buildings 229 and 231.
      - a) X1XX and X2XX shall be used to indicate rooms located in the Northeast Quadrant of the Building.
      - b) X3XX and X4XX shall be used to indicate rooms located in the Southeast Quadrant of the Building.
      - c) X5XX and X6XX shall be used to indicate rooms located in the Southwest Quadrant of the Building.
      - d) X7XX and X8XX shall be used to indicate rooms located in the Northwest Quadrant of the Building.
    - 2) Building 230
      - a) X1XX shall be used to indicate rooms located in the Northeast Quadrant of the west wing.
      - b) X2XX shall be used to indicate rooms located in the Southeast Quadrant of the west wing.
      - c) X3XX shall be used to indicate rooms located in the Southwest Quadrant of the west wing.
      - d) X4XX shall be used to indicate rooms located in the Northwest Quadrant of the west wing.

- e) X5XX shall be used to indicate the Center Core of Building 230
  - f) X6XX shall be used to indicate the Northeast Quadrant of the east wing.
  - g) X7XX shall be used to indicate the Southeast Quadrant of the east wing.
  - h) X8XX shall be used to indicate the Southwest Quadrant of the east wing.
  - i) X9XX shall be used to indicate the Northwest Quadrant of the east wing.
- c. Room Numbers with zeros in both the third and fourth character positions (XX00) shall be used to indicate large rooms with multiple doors and are generally occupied by a large number of associates.
- d. Room numbers with a zero in the fourth character position only (XXX0) shall be used to indicate small lobbies, snack bars, refreshment stations and medium-sized, multi-occupant administrative rooms.
- e. Room numbers with a “ninety series” (XX90) in the third and fourth character positions shall be used to designate rooms which have utilitarian functions not associated with populated rooms.
- 1) XX90 Mechanical Rooms
  - 2) XX90T Telephone Rooms
  - 3) XX90P Plumber’s Closets.
  - 4) XX91 Men’s Restroom
  - 5) XX92 Women’s Restrooms
  - 6) XX93 Unisex Restroom
  - 7) XX94 Lounges in Women’s Restrooms
  - 8) XX95 Unused
  - 9) XX96 & 97 Janitor’s Closets
  - 10) XX98 Unusual Uses i.e. loading docks, vaults, etc. etc.
  - 11) XX99 Electrical Rooms.
- f. Buildings 200A, 200B, 200C and 200D shall continue to use the room numbering currently assigned and on file with the Detroit Arsenal Directorate of Public Works (DPW). Assignment of room numbers for new rooms should be coordinated through the DPW.
2. Three character numbers for smaller buildings are to be in the format of “XXX”, with the following special code designations.
- a. Three character room numbers with zeroes in both the second and third character positions (X00) shall be used to indicate large rooms with multiple doors and are generally occupied by a large number of associates.
  - b. Three character room numbers with zeroes in third position only (XX0), shall be used to indicate small lobbies, snack bars, refreshment stations and medium sized multi-occupant administrative rooms.
  - c. Three character room numbers with the “ninety series” in second and third character positions (X90), shall be used to indicate rooms which have utilitarian functions not associated with populated rooms.
- 1) X90 Mechanical Rooms
  - 2) X90T Telephone Rooms
  - 3) X90P Plumber’s Closets
  - 4) X91 Men’s Restroom

5) X92	Women's Restrooms
6) X93	Unisex Restroom
7) X94	Lounges in Women's Restrooms
8) X95	Unused
9) X96 & 97	Janitor's Closets
10) X98	Unusual Uses i.e. loading docks
11) X99	Electrical Rooms.

- d. Rooms within the smaller buildings shall follow the numbers currently on file in the Public Works Section, Building 205.
3. Room numbering systems and related signage for new buildings shall be required as part of the construction project, coordinated with the Detroit Arsenal DPW during design. Room numbering and related signage shall be in compliance with TM 5-807-10, this Installation Design Guide, and all applicable State, Federal or local requirements.
  4. Location, placement and physical characteristics (size, color and font) of all room number signs will be in accordance with Section 4-4, TM 5-807-10 (Signage).
  5. Building directories, floor directories, directional signs, interior location maps and evacuation plans shall be used in all buildings.
    - a. Their location, placement and physical characteristics shall be in accordance with TM 5-807-10 and all applicable Fire and Safety laws, regulation and policies.
    - b. Only room numbers that are in compliance with the installation room numbering policy and approved by the Detroit Arsenal Directorate of Public Works will be used on these signs, maps and plans.
    - c. Changes and updates to room numbering and related signage which are necessitated by renovation or construction projects must be included as part of the design and execution of those projects.

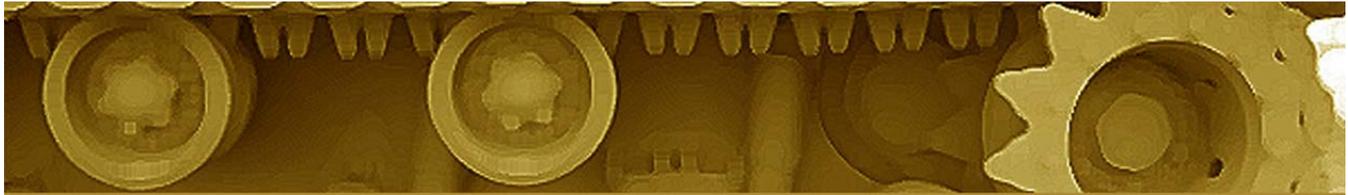
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## Appendix S Technical Design Guide

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## Appendix T Environmental

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