100% FINAL SUBMITTAL
AUGUST 2010

FORT BENNING
Installation Design Guidelines

SUBMITTED TO:
U.S. ARMY CORPS OF ENGINEERS AND FORT BENNING, GEORGIA

SUBMITTED BY:
EDAW INC.
in association with
The Johnson-McAdams Firm

INSTALLATION DESIGN GUIDE

FOR THE

U. S. ARMY GARRISON
FORT BENNING, GEORGIA

Prepared By
EDAW / AECOM
Atlanta, GA
Under the direction of
U.S. Army Engineer District, Savannah
Corps of Engineers
Savannah, Georgia

APPROVED BY:

NOV 22 2010

THOMAS D. MACDONALD
Colonel, Infantry
Garrison Commander

Date:

AUGUST 2010

Executive Summary

The Installation Design Guide (IDG or "the Guide") provides design guidance and Army and installation-specific requirements for standardizing design, renovations and maintenance on Fort Benning and Camp Merrill. Through consistent use of the IDG, the goal is to improve the quality of the total environment of both installations. Improvements to the quality of the natural and built environments and use of sustainable design and development practices have a direct impact on the efficiency and effectiveness of the installation in performing its mission and on the quality of life of those who live on, work at, or visit Fort Benning and Camp Merrill.

In order to achieve efficiency and effectiveness in installation design, Fort Benning and Camp Merrill should be fully committed to integrating the design practices described in the IDG. The Guide provides guidance and establishes requirements for all installation personnel involved in design, construction, maintenance, or renovation of installation facilities and infrastructure in order to meet current and future mission needs. The IDG is a gateway guide that also provides links and information on a variety of other required and recommended practices related to design, construction, maintenance, and renovation. For example, complementary design guidance documents include the Treatment Plan for Historic Buildings/Districts (for conserving the historic character of the installation) and the Fort Benning Branding Study (for logos and signage at gateways/entrances). The trainee barracks developments at Sand Hill and Harmony Church, as well as the new RCI housing developments also establish design precedents in those visual zones.

Fort Benning

Section 5 of the IDG details the installation image, visual themes and visual zones of Fort Benning. Fort Benning presents numerous disparate visual images accumulated throughout its lengthy history as an Army installation. The installation's many facilities and residential areas reflect decades of continual growth showing a history and variety of design approaches. Furthermore, the base has four distinct cantonment areas (Main Post, Sand Hill, Kelley Hill, and Harmony Church) with installation land uses ranging from administrative, commercial, residential, recreational, medical, industrial, and educational to training and range areas.

Fort Benning is currently in the midst of major transformations as a result of the Department of Defense Base Realignment and Closure (BRAC) process. The most significant of these transformation activities is the relocation of the US Army Armor School and Center from Fort Knox, Kentucky to Fort Benning. Once relocated, the Armor School and Center and Infantry School and Center will be combined to form the US Army Maneuver Center of Excellence. The land use and design variety on the installation complicates efforts to unify the installation visually, hence the development of both visual themes and zones as the basis of the IDG to guide design thinking on the installation.

Visual themes are generalized groupings of visual zones that have complementary uses and/or similar visual characteristics. Themes are not limited to one land use type and can include a range of activities. Visual themes include broad scale activities that occur on the installation, from training to recreation to deployment activities. These activities are similar in design and layout characteristics. An installation can have a number of visual themes, and each visual theme can encompass a number of visual zones.

Visual zones are grouped under the established visual themes and represent physical areas of the installation. Visual zones are areas within the installation that share common or unified visual characteristics. Visual characteristics define and contribute to one's perception of being in a particular area with a few dominant features that define its image. Typical features that contribute to a visual zone include unique buildings, historic character, vehicular and pedestrian corridors, landscape treatment, natural features or open space, and spatial relationships. Frequently, visual zones correspond to land use, although not exclusively.

Knowledge, Skills, and Attitude (KSA) are the three domains of educational activity according to Benjamin Bloom's taxonomy of learning. KSA also forms a conceptual foundation for the recommended visual unification of Fort Benning by reflecting the educational and training missions of the installation. Each domain of educational activity stands for a visual theme, and each theme includes its own rationale, set of goals, and recommendations for realizing those goals for each of Fort Benning's 12 visual zones: Harmony Church, Kelley Hill, Lawson Army Airfield, Lawson Army Airfield Historic District, Main Post, Main Post Historic District, Suburban Main Post, Parachute Jump Tower Historic District, RCI Housing, RCI Housing-Historic, Sand Hill and Training Areas/Ranges. Each visual zone is defined by distinctive design characteristics, and design recommendations are tailored to enhance the definition and character of each visual zone.

Over the years, Fort Benning has sought to enhance the educational mission of the installation as well as its historic setting. Thus, the installation's primary visual themes, KSA, relate to design that helps create a "campus-like" atmosphere focused on education. Planning a successful campus-like installation requires adherence to a number of design principles that facilitate growth, learning, and efficacy. These principles fall into three categories: promoting intellectual and social interaction, respecting historic resources, and valuing mission-specific design. Customized design practices have been built around these campus planning principles in the IDG and are recommended for implementation throughout Fort Benning. Examples of these campus design principles include creating a pedestrian-friendly environment and enhancing visual zone identity through a hierarchy of streets, thematic streetscape design, and well-defined edges. To implement the Knowledge, Skills, and Attitude (KSA) concept at Fort Benning, the following improvement projects (described in Section 6) are recommended:

1) Suburban Main Post/Hospital Sub Area Master Plan;

2) Lawson Army Airfield (LAAF) Sub Area Master Plan;

3) Planting Master Plan;

4) Smoking Gazebo Model Project;

5) Force Protection Improvements at Buildings 358 and 479;

6) Historic Districts Visual Zone Identity and Gateway Program; and

7) Harmony Church Roadway Screening.

As these projects are implemented at Fort Benning and as the IDG becomes the standard for all projects, the goals of the IDG will be achieved. Fort Benning will develop an efficient, effective, and sustainable infrastructure that enhances the ability of the installation to meet its mission. Maintenance and life-cycle costs will be minimized, therefore making the most of limited resources. Fort Benning will present a unified image that reflects its important history as an Army installation and military community.

Camp Merrill

Section 5 details the installation image, visual themes, and visual zones of Camp Merrill. Camp Merrill is a sub-installation of Fort Benning and is located in the Chattahoochee National Forest near Dahlonega, Georgia. The camp was created to fulfill the mission of the U.S. Army Infantry School's (USAIS) Ranger Training Battalion. The first construction efforts began in 1960 with the area's steep mountainous topography limiting development. Currently, Camp Merrill's visual character is fairly unified, with small-scale buildings set in a wooded mountain environment resulting in a consistent image. Some visual disparities do exist, however, which have been generated over different design and construction eras.

Similarly, KSA forms a conceptual foundation for the recommended visual unification of Camp Merrill by reflecting the Camp's educational and training mission. Each domain of educational activity represents a visual theme, and each theme includes its own rationale, set of goals, and recommendations for realizing those goals in each of Camp Merrill's four visual zones: Airfield, Camp Merrill, Camp Merrill RCI Housing, and Training Areas/Ranges. To implement the Knowledge, Skills, and Attitude (KSA) concept at Camp Merrill, the following improvement projects (described in Section 6) are recommended:

1) Streetscape Master Plan;

2) Planting Master Plan; and

3) Parking Lot Design Improvements

Similarly, as these projects are implemented at Camp Merrill and as the IDG becomes the standard for all projects, the goals of the IDG will be achieved. Camp Merrill will develop an efficient, effective, and sustainable infrastructure that enhances the ability of the installation to meet its mission. Maintenance and life-cycle costs will be minimized, therefore making the most of limited resources. Finally, Camp Merrill will present a unified image that reflects its training mission.

Links

Go to Section 1

Go to Table of Contents

Table of Contents

Glossary/List of Acronyms…….. xiii

Section 1: Introduction…… 1-1

1.1 Purpose…… 1-1
1.2 Goal…… 1-1
1.3 Objectives…… 1-1
1.4 Audience…… 1-2
1.5 Organization…… 1-2
1.6 When to Use the Army Installation Design Guide…… 1-3
1.7 Maintaining the Army Installation Design Guide…… 1-3
1.8 Responsibilities…… 1-3
1.9 Sustainable Design and Development…… 1-4
1.10 Army Standards…… 1-6

Section 2: Introduction to the IDG…… 2-1

2.1 Introduction…… 2-1
2.2 The Design Guide Process…… 2-1
2.3 Using the Design Guide…… 2-3
2.4 Implementation…… 2-4

Section 3: Design Guide Analysis Criteria…… 3-1

3.1 Introduction…… 3-1
3.2 Goals, Objectives, and Recommendations……3-1
3.3 Identification and Classification of Visual Elements…… 3-1
3.4 Design Principles…… 3-1
3.5 Visual Elements…… 3-2

Section 4: Installation Profile…… 4-1

4.1 Setting……4-1
4.2 Existing Land Use……4-9
4.3 Future Land Use…… 4-10

Section 5: Visual Themes and Zones…….5-1

5.1 Introduction…… 5-1
5.2 Installation Image…… 5-1
5.3 Visual Themes……5-2
5.4 Visual Zones…… 5-3

Section 6: Improvement Projects…… 6-1

6.1 Introduction…… 6-1
6.2 Fort Benning – Suburban Main Post/Hospital Sub Area Master Plan…… 6-1
6.3 Fort Benning – Lawson Army Airfield Sub Area Master Plan……6-4
6.4 Fort Benning – Planting Master Plan…… 6-8
6.5 Fort Benning – Smoking Gazebo Model Project…… 6-9
6.6 Fort Benning – Force Protection Improvements at Buildings 358 and 479……6-12
6.7 Fort Benning – Historic District/Visual Zone Identity and Gateway Program…… 6-12
6.8 Fort Benning – Harmony Church Roadway Screening…… 6-17
6.9 Camp Merrill – Streetscape Master Plan……6-19
6.10 Camp Merrill – Planting Master Plan……6-20
6.11 Camp Merrill – Parking Lot Design Improvements…… 6-21

Section 7: Site Planning Design Standards……..7-1

7.1 Introduction…… 7-1
7.2 Site Planning Objectives…… 7-1
7.3 Site Planning Considerations…… 7-2
7.4 Site Planning Design Criteria…… 7-4
7.5 Natural Conditions…… 7-5
7.6 Manmade Site Conditions…… 7-7
7.7 Army Standards…… 7-8
7.8 References……7-9

Section 8: Building Design Standards 8-1

8.1 Introduction 8-1
8.2 Building Objectives 8-1
8.3 Structural Character 8-2
8.4 Building Entrances 8-4
8.5 Service Areas 8-4
8.6 Building Accessibility 8-4
8.7 Building Code and Seismic Policy 8-5
8.8 Indigenous Structures 8-6
8.9 Historic Architecture 8-6
8.10 Renovations and Additions 8-7
8.11 Plazas and Courtyards 8-8
8.12 Building Maintenance 8-8
8.13 Interior Design 8-8
8.14 Exterior Building Materials and Color 8-18
8.15 Key Facility Types Standardization 8-21
8.16 Physical Security Requirements 8-24
8.17 Sale and Out-lease of Army Assets 8-24
8.18 Army Standards 8-24
8.19 References 8-25

Section 9: Circulation Design Standards 9-1

9.1 Introduction 9-1
9.2 Circulation Objectives 9-1
9.3 Roadway Hierarchy 9-2
9.4 Roadway Setbacks 9-10
9.5 Circulation System Design 9-11
9.6 Intersections 9-13
9.7 Entrance Gates 9-15
9.8 Parking Requirements 9-15
9.9 Parking Lot Location and Design 9-16
9.10 Service Areas 9-17
9.11 Drop-Off Areas 9-18
9.12 Walkways and Pedestrian Circulation 9-18
9.13 Bikeways 9-21
9.14 Army Standards 9-26
9.15 References 9-27

Section 10: Landscape Design Standards…… 10-1

10.1 Introduction……..... 10-1
10.2 Landscape Objectives……..... 10-1
10.3 Principles of Landscape Development…… 10-2
10.4 Sustainable Landscape Development…… 10-4
10.5 Landscape Design Guidelines…….. 10-4
10.6 Plant Material Selection…… 10-8
10.7 Plant Palette and Plant Categories…….. 10-9
10.8 Plant Material Installation…….. 10-10
10.9 Maintenance of Plant Material…….. 10-12
10.10 Tree Protection and Preservation……10-14
10.11 Anti-Terrorism/Force Protection Considerations…… 10-14
10.12 Army Standards……..... 10-15
10.13 References…….....10-15

Section 11: Site Elements Design Standards…… 11-1

11.1 Introduction……..... 11-1
11.2 Site Element Objectives……11-1
11.3 Site Furnishings……..... 11-2
11.4 Signs……..... 11-12
11.5 Lighting……..... 11-24
11.6 Utilities……..... 11-28
11.7 Army Standards……..... 11-31
11.8 References…….....11-31

Section 12: Force Protection Design Standards……..12-1

12.1 Introduction……..... 12-1
12.2 Building Siting and Design Standards…… 12-1
12.3 Fencing……..... 12-4
12.4 Landscape Considerations…… 12-5
12.5 Lighting……..... 12-6
12.6 Berms…….....12-6
12.7 Gates and Entrances (Access Control Points [ACP])…….. 12-7
12.8 Army Standards……..... 12-8
12.9 References…….....12-8

Appendices

Appendix A - Design Team IDG Checklist
Appendix B - Project Requirements IDG Checklist
Appendix C - Interior Design Review Checklist
Appendix D - Sustainable Design
Appendix E - LEED Project Checklists
Appendix F - Landscape Maintenance Schedule
Appendix G - Prioritized Improvements Project List
Appendix H - Self-Help Project Checklist
Appendix I - Interior Finishes Standards
Appendix J - Interior Furnishings Standards
Appendix K - Reserved
Appendix L - Exterior Color Checklist
Appendix M - Historic Preservation Guidelines
Appendix N - Housekeeping Rules
Appendix O - Plant Palette
Appendix P - Army Facilities Standardization Program Centers of Standardization
Appendix Q - Standards and References
Appendix R – DOIM Requirements
Appendix S – Sample Specifications

List of Figures and Tables

Section 1: Introduction……..1-1

Figure 1.1 The Army Installation Design Guide is a tool to implement Army Standards…… 1-1
Figure 1.2 Design Guide Audience……..1-2
Figure 1.3 Measuring CO2 for indoor air quality assists in creating a healthy environment.. 1-5
Figure 1.4 Energy efficient lighting contributes to sustainability…….. 1-5

Section 2: Introduction to the IDG…….. 2-1

Figure 2.1 Include positive visual elements……2-2
Figure 2.2 Using the design guide……...2-3

Section 3: Design Guide Analysis Criteria…….…… 3-1

Figure 3.1 Symmetrical elements…… 3-1
Figure 3.2 Monumental and human scale building forms…….3-1
Figure 3.3 Parade ground axis with building as terminus……....3-2
Figure 3.4 Buildings are typically the dominant feature on an installation.……3-2
Figure 3.5 Landmarks provide orientation of place……...3-3
Figure 3.6 Street trees help define spaces and visual lines.……3-3

Section 4: Installation Profile……..4-1

Figure 4.1 Lawson Army Airfield (LAAF)…… 4-6
Figure 4.2 Rural lands and rivers border the installation…..……..4-8
Figure 4.3 Camp Merrill setting……...4-8

Section 5: Visual Themes and Zones……..5-1

Table 5-1 Fort Benning Image…… 5-4
Figure 5.1 Fort Benning Visual Zones…..…… 5-5
Figure 5.2 Camp Merrill Visual Zones……..…… 5-7
Table 5-2 Camp Merrill Image…… 5-9
Figure 5.3 Bldg 5124 is an example of new construction at Harmony Church……...5-10
Figure 5.4 Historic and iconic buildings define Main Post Historic District character……..5-12
Figure 5.5 Barracks display consistency of design and materials at Kelley Hill……...5-13
Figure 5.6 Hangar buildings characterize LAAF……...……..5-14

Figure 5.7 Viewshed at Lawson Army Airfield Historic District……5-15

Figure 5.8 Much of the architecture for administrative buildings is of the modernist era……5-16
Figure 5.9 Martin Army Community Hospital……...5-17
Figure 5.10 Parachute Jump Towers……..……..5-18
Figure 5.11 Sidewalks and street frontage represent a focus on elements of traditional neighborhood design……...……...5-19
Figure 5.12 Historic homes and streets create a distinctive setting..…….. 5-20
Figure 5.13 Brick and mortar construction for most buildings establishes continuity of design…… 5-22
Figure 5.14 Natural wooded areas and unimproved roads characterize the training areas/ranges……..…….. 5-23
Figure 5.15 Airfield provides a wooded mountain vista……... 5-24
Figure 5.16 Small-scale buildings in natural, wooded mountain landscape……5-25
Figure 5.17 Large single-family lots currently represent suburban approach to design…….. 5-26
Figure 5.18 Rock climbing wall in the mountaineering training area……..5-28

Section 6: Improvement Projects……6-1

Figure 6.1 Suburban Main Post Sub Area Master Plan, Planning Issues…….…… 6-3
Figure 6.2 Disorganized and poorly defined parking at LAAF…….…….. 6-4
Figure 6.3 Forest buffer contains the visual experience at LAAF..... 6-4
Figure 6.4 LAAF Sub Area Master Plan Planning Issues……..……6-7
Figure 6.5 Planting is often insufficient for the intended purpose..... 6-8
Table 6-1 Main Post Tree Inventory – Trees to Preserve……6-8
Table 6-2 Main Post Tree Inventory – Trees to Replace……..6-9
Figure 6.6 Department of Public Works (DPW) Model Gazebo Project…… 6-11
Figure 6.7 Unsightly Jersey barriers used as force protection..…… 6-12
Figure 6.8 Fort Benning Gateways...…… 6-15
Figure 6.9 Harmony Church Roadway Screening……..……...6-18
Figure 6.10 Existing non-native landscape elements……..……..6-19
Table 6-3 Roadway Classification and Estimates……..6-19
Figure 6.11 Existing erosion fencing at Camp Merrill……...6-20
Figure 6.12 Use of jersey barriers to define parking areas……..……..6-21
Figure 6.13 Use of boulders to better define parking areas at Camp Merrill…….. 6-21

Section 7: Site Planning Design Standards……7-1

Figure 7.1 Site plan…… 7-1
Figure 7.2 Site Opportunity and Constraint Plan……..…….. 7-2

Figure 7.3 Accommodate natural conditions…….... 7-5
Figure 7.4 Develop around natural landforms…….... 7-5
Figure 7.5 Building oriented for passive solar heating and cooling.....…….. 7-6
Figure 7.6 Orient buildings and roads to topography…….. 7-7
Figure 7.7 Screen parking areas……..……7-8

Section 8: Buildings Design Standards…….. 8-1

Figure 8.1 Sand Hill Visual Zone……..……..… 8-1
Figure 8.2 Historic Main Post Visual Zone……..……..…….. 8-1
Figure 8.3 Adapt buildings design to site conditions……... 8-1
Figure 8.4 Use of indigenous construction materials reduces transportation cost…… 8-2
Figure 8.5 Structure scale and massing……..... 8-2
Figure 8.6 Example of monumental scale……..8-3
Figure 8.7 Example of human scale……8-3
Figure 8.8 Fenestration breaks up a building's mass……...8-3
Figure 8.9 Color and form contribute to a sense of place……...8-3
Figure 8.10 Entrance is a positive visual experience……...……..……..8-4
Figure 8.11 Plants and berms in service area present a positive visual image..…….. 8-4
Figure 8.12 Facilities must meet accessibility standards……8-4
Figure 8.13 Use of locally available building materials reduces transportation cost…… 8-6
Figure 8.14 Fort Benning historic building……...8-6
Figure 8.15 Fort Benning historic building……... 8-6
Figure 8.16 Example of incompatible addition……8-7
Figure 8.17 Plazas and courtyards as design elements……..……....8-7
Figure 8.18 A typical bubble diagram indicating group relationships……..8-8
Figure 8.19 A typical blocking diagram demonstrating the fit into the building footprint..…… 8-9
Figure 8.20 System furniture utility column for electrical and communication distribution….. 8-9
Figure 8.21 Control noise sources……..……..……8-10
Figure 8.22 Typical distribution of light……..……... 8-11
Figure 8.23 Contract seating, various chair classes……...8-12
Figure 8.24 Systems furniture options……... 8-13
Figure 8.25 Window treatments should complement the interior space..... 8-15
Figure 8.26 Directional signage directs circulation……..8-15
Figure 8.27 Decorative accessories can add a sense of uniqueness..……8-16
Figure 8.28 Harmony Church Visual Zone……..……..... 8-18
Figure 8.29 Kelley Hill Visual Zone……..……..... 8-19
Figure 8.30 Lawson Army Airfield Visual Zone……8-19
Figure 8.31 Lawson Army Airfield - Historic Visual Zone……..……..…… 8-19
Figure 8.32 Main Post Visual Zone……..……..... 8-19

Figure 8.33 Main Post Historic Visual Zone…… 8-20
Figure 8.34 Suburban Main Post Visual Zone…… 8-20
Figure 8.35 RCI Housing Visual Zone…… 8-20
Figure 8.36 RCI Housing – Historic Visual Zone…… 8-20
Figure 8.37 Sand Hill Visual Zone…… 8-21
Figure 8.38 The geographical areas for exterior color…… 8-21

Section 9: Circulation Design Standards…… 9-1

Figure 9.1 Vehicular and pedestrian system…… 9-1
Figure 9.2 Separate pedestrian/bicycle/vehicular access…… 9-1
Figure 9.3 Adapt circulation to topography…… 9-2
Figure 9.4 Roadway hierarchy…… 9-2
Figure 9.5 Fort Benning Roadway Hierarchy…… 9-3
Figure 9.6 Camp Merrill Roadway Hierarchy…… 9-5
Figure 9.7 Primary roadway section…… 9-7
Figure 9.8 Boulevard…… 9-7
Figure 9.9 Secondary street section…… 9-8
Figure 9.10 Improved, visually appealing street…… 9-8
Figure 9.11 Tertiary street section…… 9-8
Figure 9.12 Tertiary street plan…… 9-8
Figure 9.13 Cul-de-sac section – may incorporate plantings…… 9-9
Figure 9.14 Cul-de-sac plan…… 9-9
Figure 9.15 Anti-terrorism roadway setbacks within a controlled perimeter…… 9-10
Figure 9.16 Positive visual image conveyed…… 9-11
Figure 9.17 Build into natural landforms…… 9-11
Figure 9.18 Roadway alignment…… 9-12
Figure 9.19 Landscape and berms buffer air and noise pollution…… 9-12
Figure 9.20 Intersection design…… 9-13
Figure 9.21 Accessible parking…… 9-14
Figure 9.22 Required minimum accessible parking spaces…… 9-15
Figure 9.23 Provide islands with trees to soften visual expanse…… 9-15
Figure 9.24 Trees, berms, and walls screen parking lot…… 9-16
Figure 9.25 Trees/berm screen…… 9-16
Figure 9.26 Parking structures are desirable but expensive – consider anti-terrorism standards in planning…… 9-17
Figure 9.27 Typical loading area…… 9-17
Figure 9.28 Typical drop-off area…… 9-18
Figure 9.29 Promote means of access other than vehicular, such as walkways and bikeways…… 9-18

Figure 9.30 Ramps must be provided per UFAS standards…….. 9-18
Figure 9.31 Primary walkways……..…….... 9-19
Figure 9.32 Secondary walkways……..……..……..…….. 9-19
Figure 9.33 Tertiary walkways……..…….... 9-19
Figure 9.34 Minimum walkway widths……..9-20
Figure 9.35 Place landscape and site furnishings along walkways……9-20
Figure 9.36 Class I Bikeway…….…….. 9-23
Figure 9.37 Class II Bikeway……..……..9-23
Figure 9.38 Class III Bikeway…….…… 9-23
Figure 9.39 Provide convenient bicycle storage……..……..……..... 9-24
Figure 9.40 Bicycle storage should be covered…… 9-24
Figure 9.41 Adequate sight lines give pedestrians an unobstructed view of crosswalks..... 9-24

Section 10: Landscape Design Standards……..……10-1

Figure 10.1 The use of native plants improves visual quality ……..…….…… 10-1
Figure 10.2 Provide comfort to the pedestrian environment..…….. 10-1
Figure 10.3 Landscaping reinforces circulation hierarchy……..... 10-2
Figure 10.4 Principles of design illustrated…..……10-3
Figure 10.5 Plant material promotes sustainability Primary roadway section……..... 10-4
Figure 10.6 Foundation plantings adding scale and creating entryway…….. 10-5
Figure 10.7 Plantings used to screen dumpsters…… 10-5
Figure 10.8 Open space enhanced by plantings…..……..…….. 10-5
Figure 10.9 Street trees reinforcing roadway hierarchy……..... 10-6
Figure 10.10 Provide parking lot planting to reduce heat gain……...……..…… 10-6
Figure 10.11 Landscaping at entrance gates will meet AT/FP requirements..……... 10-8
Figure 10.12 Basic design categories..…….. 10-8
Figure 10.13 Plant categories……...……10-10
Figure 10.14 Install plant material according to industrial standards……... 10-11
Figure 10.15 Space plants according to their mature size..……... 10-12
Figure 10.16 Grouped plants have greater impact..……10-12
Figure 10.17 Proper tree pruning procedures……..……... 10-12
Figure 10.18 Group plants in mulched beds to reduce maintenance……10-13
Figure 10.19 Construct a barrier at drip line during construction to maintain grade..……..10-14
Figure 10.20 Establish a visual barrier in perimeter setback……10-14
Figure 10.21 Use trees to obscure sight lines……..……10-15

Section 11: Site Elements Design Standards……..11-1

Figure 11.1 Site elements……..……..……..11-1

Figure 11.2 Exposed utilities create negative visual impact.....11-2
Figure 11.3 Planted screen minimizes negative visual impact..... 11-2
Figure 11.4 Recommended Landscapeforms Plainwell Aluminum Bench.....11-3
Figure 11.5 Retaining wall/seating..... 11-4
Figure 11.6 Trellis and vines providing shelter.....11-4
Figure 11.7 Landscapeforms Steelhead Perforated Table..... 11-5
Figure 11.8 Travers Perforated Chair.....11-5
Figure 11.9 Example of a bus shelter allowing adequate shelter and visibility 11-6
Figure 11.10 Picnic shelter design..... 11-6
Figure 11.11 Recommended Landscapeforms Gretchen picnic table.....11-6
Figure 11.12 Kiosk example..... 11-7
Figure 11.13 Screen wall hides mechanical equipment 11-7
Figure 11.14 Berm and shrubs hide mechanical equipment 11-7
Figure 11.15 Example of aluminum fencing..... 11-8
Figure 11.16 Landscapeforms Plainwell Aluminum Litter Receptacle.....11-8
Figure 11.17 Enclose dumpsters with walls, fences, or plantings and place on concrete pad.. 11-9
Figure 11.18 Standard flagpole..... 11-9
Figure 11.19 Movable planters..... 11-10
Figure 11.20 Bicycle rack placement..... 11-10
Figure 11.21 Ribbon bicycle rack 11-10
Figure 11.22 HessAmerica Cento 360 bollard 11-11
Figure 11.23 Playgrounds and tot lots meet specific criteria for materials, color, and design throughout the installation..... 11-11
Figure 11.24 Sample water fountain 11-12
Figure 11.25 Signing language helps establish a signing system 11-14
Figure 11.26 Signs can be organized into classes within the visual hierarchy..... 11-14
Figure 11.27 Building-mounted information sign..... 11-14
Figure 11.28 Building/ Facility Outdoor Sign 11-15
Figure 11.29 Building/ Facility Outside Small Sign..... 11-15
Figure 11.30 Signs for Ranges, Training Areas, and Fields.....11-15
Figure 11.31 Informational Signs.....11-16
Figure 11.32 Engraved bronze memorial plaque..... 11-16
Figure 11.33 Street address location at entrance doors..... 11-17
Figure 11.34 Use of street addresses on all building identification signs..... 11-17
Figure 11.35 Installation entrance signs.....11-18
Figure 11.36 Typical street signs..... 11-19
Figure 11.37 Directional sign.....11-19
Figure 11.38 Typical arrow for use on all destination signs.....11-19
Figure 11.39 Regulatory sign.....11-20
Figure 11.40 Signs should be simple, legible, and combined..... 11-22

Figure 11.41 Placement is critical to ensure easy readability..... 11-22
Figure 11.42 Visual cutter causes confusion..... 11-23
Figure 11.43 Location maps provide a sense of place..... 11-23
Table 11-1 Lighting Design Matrix..... 11-25
Figure 11.44 Example of cutoff, bollard, wall and spot lighting..... 11-26
Figure 11.45 Pole height and function..... 11-27
Figure 11.46 Lamp characteristics.....11-27
Figure 11.47 Screen existing utilities to decrease visual impact 11-28
Figure 11.48 Soften impact of overhead lines..... 11-29
Figure 11.49 Screen utilities to reduce negative impact.....11-29
Figure 11.50 Fire hydrants should be nutmeg brown and caps shall indicate tested water Pressure..... 11-30

Section 12: Force Protection Design Standards.....12-1

Figure 12.1 Bollards as force protection for Building 35..... 12-1
Figure 12.2 Diagram from UFC 4-010-01, DoD Minimum Anti-terrorism Standards for Buildings.....12-2
Figure 12.3 Fencing as a protective measure at Harmony Church.....12-4
Figure 12.4 Types of lighting systems for installation environments.....12-6
Figure 12.5 Berms can serve many force protection functions 12-6
Figure 12.6 Conceptual entrance gate to meet AT/FP requirements 12-7

Glossary

1391 – A form used by the Department of Defense to submit requirements and justifications in support of funding requests for military construction to Congress

Asset - A characteristic of installation infrastructure that supports the goals stated in this IDG

Baffle - A built structure or planting that obstructs the view into or out of an area

Barrier - A plant that has intimidating thorns or spines and is sited purposely to block foot traffic or other access to the home or yard.

Combatant Commanders - A commander of one of the unified or specified combatant commands established by the President. Also called CCDR.

Design Charrette - A meeting or series of meetings used to scope a project that includes end users and all stakeholders whose areas of responsibility may be affected by a project.

Greenfield - A site that has not experienced previous construction. Usually a Greenfield site will have naturally occurring vegetation, soils, and topography.

Infrastructure - Stationary physical capital belonging to the Army that supports the installation mission, namely buildings, landscape, site elements, circulation elements, and force protection elements.

Installation Action Plan - An environmental cleanup plan that identifies the cleanup requirements at each site of concern and proposes a comprehensive approach to conduct necessary remedial actions.

Installation Image - The messages that an installation's infrastructure convey to various stakeholder groups who use the installation, based upon the infrastructures appearance, condition, and user-friendliness.

Land Use - The dominant activity that occurs on a piece of land.

Liability - A characteristic of installation infrastructure that detracts from the goals stated in this IDG

Major Stationary Sources (air emissions) - In a nonattainment area, any stationary pollutant source with potential to emit more than 100 tons per year.

Primary Gathering Building - Inhabited buildings routinely occupied by 50 or more DoD personnel and family housing with 13 or more family units per building. This designation applies to the entire portion of a building that meets the population density requirements for an inhabited building.

Stakeholders - Parties who are impacted by or who have any impact upon installation design. This includes tenants, designers, contractors, employees, and community users.

Sustainability - A principle of management that promotes the ability to sustain a mission over the long term, without adversely affecting the environmental conditions (soil conditions, water quality, climate) necessary to support those same activities in the future.

Visual Element - A defining design feature of an installation, often associated with a specific function. Visual elements include natural characteristics, edges and boundaries, buildings and structures, activity nodes, landmarks, entrances and gates, circulation system, trees and vegetation, views and vistas, open spaces, signage, and utility corridor.

Visual Theme - An area of an installation consisting of one or more visual zones that has or should have a design consistency to create a unified sense of place.

Visual Zone - An area of an installation that is governed by a visual consistency in terms of materials, scale, proportion, form, colors, textures, look or feel.

Zeroscaping – Low-water landscaping utilizing native plants and succulents, often including rocks, gravel, and sculptural features to create a simple look

List of Acronyms

AAFES – Army and Air Force Exchange Service
ACP - Access Control Point
ACM – Asbestos Containing Materials
ACSIM - Assistant Chief of Staff for Installation Management
ADAAG - Americans with Disabilities Act Accessibility Guidelines
ADEM - Alabama Department of Environmental Management
AFMAN - Air Force Manual
AHB - Attack Helicopter Battalion
AHP – Army Heliport
AMF – Army Modular Force
ANSI - American National Standards Institute
AR - Army Regulation
AT/FP - Anti-terrorism/Force Protection

BDE HQ - Brigade Headquarters
BN HQ - Battalion Headquarters
BOD - Beneficial Occupancy Date
BPA - Blanket Purchase Agreement
BRAC – Base Realignment and Closure
BSC – Bulk Storage Containers

CCDR - Combatant Commander
CCTV - Closed-Circuit Television
CDMP - Community Development and Management Plan
CEHNC – Corps of Engineers – Huntsville Center
CERL - Construction Engineering Research Laboratory
CFR - Code of Federal Regulations
CFSC - Community and Family Support Center
COF - Company Operations Facilities
CONUS - Continental United States
COS – Centers of Standardization
CSPC - US Consumer Product Safety Commission

CWW - Columbus Water Works

DA - Department of the Army
DA PAM - Department of the Army Pamphlet
DAMO-ODL - Department of the Army Material Office, Office of Defense Logistics
DAMO-TRS - Department of the Army Material Office, Training Support Systems
DECA – Defense Commissary Agency
DFAC - Dining Facility
DG - Design Guide
DIS – Directorate of Installation Support
DNR – Department of Natural Resources (State of Georgia)
DoD - Department of Defense
DoDDS – Department of Defense Dependent Schools
DPW - Directorate of Public Works

EA – Environmental Assessment
EIS - Environmental Impact Statement
EPA - Environmental Protection Agency
EPD - Environmental Protection Division (Georgia)
ER - Engineering Regulation
ESPCP – Erosion Sedimentation and Pollution Control Plan
ETL - Engineering Technical Letter

FOUO - For Official Use Only

HALO – Hazards of Asbestos and Lead Optimal Management System
HQDA - Headquarters, Department of the Army

I3A - Installation Information Infrastructure Architecture
IBC – International Building Code
IDG - Installation Design Guidelines
IDM - Interior Design Manual
IMCOM – Installation Management Command
ICRMP – Integrated Cultural Resource Management Plan
INRMP – Integrated Natural Resource Management Plan

IPB - Installation Planning Board

KSA - Knowledge, Skills, and Attitude

LAAF - Lawson Army Airfield
LEED - Leadership in Energy and Environmental Design
LHMPP – Lead Hazard Management Program Plan

MCA – Military Construction Authority
MCoE – Maneuver Center of Excellence
MEDCOM – Medical Command
MHPI - Military Housing Privatization Initiative
MILCON - Military Construction
MOU - Memorandum of Understanding
MOUT – Military Operations on Urban Terrain
MPI - Master Planning Instructions
MS4 - Municipal Separate Storm Sewer System
MTMC - Military Traffic Management Command
MUTCD - Manual of Uniform Traffic Control Devices
MUTCD - Manual of Uniform Traffic Control Devices
MWR - Morale, Welfare, and Recreation

NEPA - National Environmental Policy Act
NFPA - National Fire Protection Codes
NHPA - National Historic Preservation Act
NPDES - National Pollution Discharge Elimination System

OASA (FM&C) - Office of the Assistant Secretary of the Army for Financial Management and Comptroller
OCONUS - Outside the Continental United States
ODCSOPS - Office Deputy Chief of Staff Operations

PM-PSE - Product Manager, Physical Security Equipment
POL – Petroleum/Oil/Lubricant
POV - Privately Owned Vehicle

RCI - Residential Communities Initiative

REC – Record of Environmental Consideration

RETS - Remote Target Systems

RFP - Request for Proposal

RPPB - Real Property Planning Board

RTB/RTBn - Ranger Training Brigade/Ranger Training Battalion

SCB – Soldier Community Building

SPCC – Spill Prevention, Control, and Countermeasure

SPiRiT - Sustainable Project Rating Tool

SRM - Sustainment, Restoration, and Maintenance

SRP - Sustainable Range Program

TI - Technical Instructions

TM - Technical Manual

TND – Traditional Neighborhood Development

TRADOC - Training and Doctrine Command

UFAS - Uniform Federal Accessibility Standards

UFC - Unified Facilities Criteria

UFGS - Unified Facilities Guide Specifications

USACE - United States Army Corps of Engineers

USAIS - United States Army Infantry School

VCSA - Vice Chief of Staff of the Army

WBDG - Whole Building Design Guide

Links

Go to Section 1

Go to Table of Contents

SECTION 1 - Introduction

1.1 Purpose

1.1.1 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.

1.1.2 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, but also the impact of projects on the total built and natural environment. Improving the quality of design and development and using sustainable design and development practices directly impact the quality of life of those who live in, work in, or visit the installation.

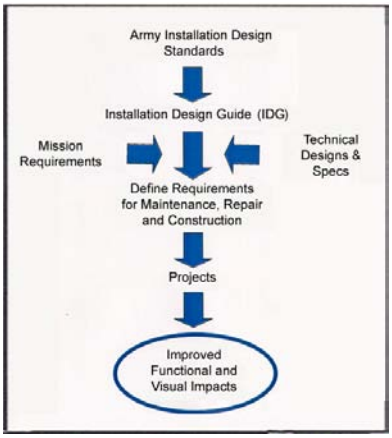


Figure 1.1 - The Army Installation Design Guide is a tool to implement Army standards.

1.1.3 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 address sustainable design, quality of design, historical and cultural considerations, durability, safety, compatibility, and anti-terrorism and maintenance concerns.

1.2 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 design standards. This is accomplished by providing a systematic development process comprised of description, analysis, synthesis, and implementation. Figure 1.1 diagrams the goal and inputs of the IDG.

1.3 Objectives

The objectives of the IDG are:

1.3.1 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 that are part of the installation.

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

1.3.3 To provide guidance for accomplishing sustainable development. See Appendix D.

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

1.3.5 To provide guidance on integrating Anti-Terrorism/Force Protection (AT/FP) standards.

1.4 Audience

1.4.1 The IDG is to be used by all individuals involved in decision-making, design, planning, construction, and maintenance of facilities (Figure 1.2). The primary users include the following:

- Senior Commander
- Garrison Commanders and Staff
- Installation facility planning and design personnel
- Installation facility maintenance personnel
- Installation Management Command 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
- Privatized utilities

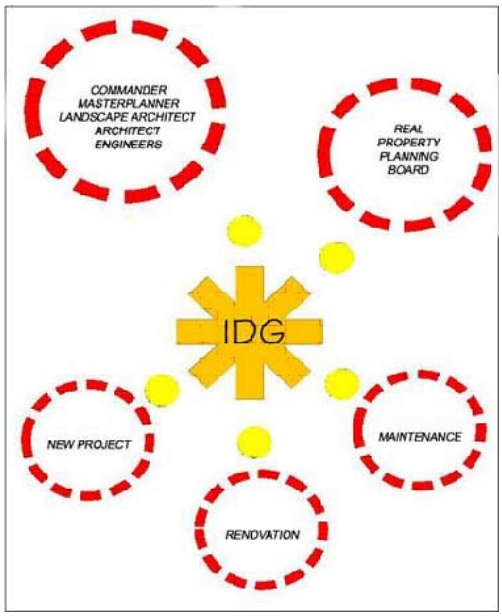


Figure 1.2 - Design Guide audience

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

1.5 Organization

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

1.5.2 Sections 2 and 3 discuss the process, use, and implementation of the IDG and ensure that designs conform to Army standards, including those for sustainability.

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

1.5.4 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 for each zone.

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

1.5.6 Sections 7 through 12 discuss the six design components of Site Planning, Buildings, Circulation, Landscape, Site Elements, and Force Protection. These components also provide the categories used for the review and analysis during the visual inventory of the installation. The visual impressions of each zone are categorized according to these six design components.

1.6 When to Use the Army Installation Design Guide

1.6.1 This IDG provides installation-specific design guidance. 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 furnishings, signage, lighting, and utilities. Proper design and placement of each of these components is addressed. Also, the installation and demolition of landscaping, such as plant materials, will be based upon the guidance herein.

1.7 Maintaining the Army Installation Design Guide

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

1.7.2 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 Commander will chair an Installation Planning Board (IPB) to review and approve the RPPB's actions.

1.8 Responsibilities

1.8.1 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:

1.8.1.1 **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.

1.8.1.2 **Installation Management Command (IMCOM):**

- 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.

1.8.1.3 **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).
- Submit Prioritized Improvements Projects List for approval and funding in accordance with Director IMCOM instructions after review and approval by Senior Commander.
- Enforce IDG standards.

1.8.1.4 **Senior Commander:**

- Review and approve IDG.
- Review and approve RPPB Prioritized Improvement Projects List prior to submission to IMCOM Region Director.

1.8.1.5 **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 Prioritized Improvement Projects List.

1.9 Sustainable Design and Development

1.9.1 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 by creating high-performance, healthy (Figure 1.3), energy efficient (Figure 1.4), and safe buildings.

1.9.2 The Integrated Design Process

Critical to the success of sustainable design and development is the organization and commitment of the Master Planning team – including architects, engineers, planners, future building users, and facility managers – to engage in the Integrated Design Process. To effectively change 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).

1.9.3 Appendix D, Sustainable Design, elaborates upon the sustainable design concept and its application to Army projects. Paragraph D.3 discusses the Leadership in Energy and Environmental Design (LEED) as developed by the United States Green Building Council. Per the Sustainable Design and Development Policy Update - Sustainable Project Rating Tool (SPiRiT) to LEED Transition, dated 05 January 2006 and USACE Army LEED Implementation Guide, dated 15 January 2008, the LEED rating system will be used by design professionals in all vertical new construction and major renovation projects located on Army property for rating sustainability, from FY08 projects and beyond.

Figure 1.3 – Measuring CO2 for indoor air quality assists in creating a healthy environment

1.9.4 The LEED document (Appendix E) was compiled from the U.S. Green Building Council LEED 2.0 (Leadership in Energy and Environmental Design) Green Building Rating System Workbook.

1.9.5 Army Rating Standard

The LEED rating of "Silver" is the standard for all FY08 and beyond vertical new construction and major renovation projects located on Army property. See Assistant Secretary of the Army Memorandum Subject: Sustainable Design and Development Policy Update - SPiRiT to LEED Transition, dated 05 January 2006 and USACE Army LEED Implementation Guide, dated 15 January 2008.

Figure 1.4 - Energy efficient lighting contributes to sustainability

1.9.6 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 websites.

U.S Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory (CERL), Engineering Knowledge Online Website.

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

1.10 Army Standards

1.10.1 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
- Appendix M, Historic Preservation Guidelines

Links

Go to Section 2

Go to Table of Contents

SECTION 2 – Introduction to the IDG

2.1 Introduction

Military installations are hometowns for many of our military Families, resources for many veterans and retirees, and an integral part of their surrounding communities. The Army Installation Design Guide (IDG) provides direction for achieving a sense of community, order, tradition, and pride in 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

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

2.2.2 **Setting Goals and Objectives.** The Master Planner develops a set of goals and objectives that address the visual requirements of the installation. The goals and objectives define a clear installation image that helps to create a visually pleasing and optimally functional environment.

2.2.3 **Conduct Visual and Spatial Surveys.** Two visual surveys are performed in the preparation of the IDG. The first survey establishes the visual zones and themes of the installation. The second survey 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.

2.2.4 **Establish Visual Zones and Themes**

2.2.4.1 The information gathered during the first survey is used to establish the visual zones of the installation. The visual zones are delineated by the visual characteristics of an area. This includes the "look and feel" of an area as well as 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 motifs. Typical visual characteristics that are evaluated during this process include unique buildings, vehicular and pedestrian corridors, functional uses, natural features, and spatial relationships.

2.2.4.2 Visual zones with similar characteristics are then grouped together to form a broader category called a theme. Example themes include: community life, operations support, buffer/open space, and industrial.

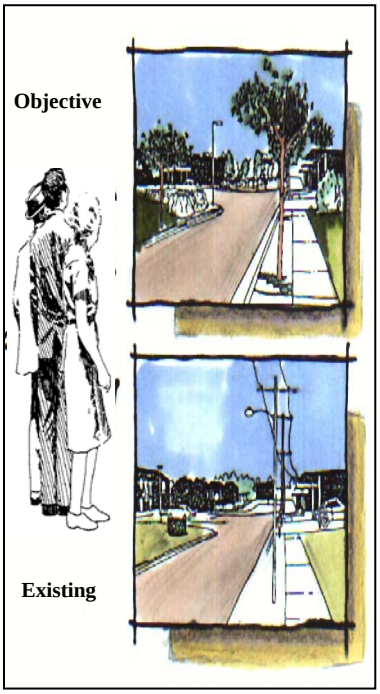


Figure 2.1 – Include Positive Visual Elements

2.2.4.3 **Determine Assets and Liabilities.** The second survey is a visual zone inventory. During the survey each visual zone is analyzed for the quality of its design features and their compliance with Army standards. The objective of the inventory is to define the assets and liabilities within the visual zone.

2.2.4.4 **Assets.** Assets are positive visual elements, design elements, or features that enhance their surroundings, either visually or functionally (Figure 2.1). For example, in the case of historic districts, assets are often comprised of contributing historic structures or non-historic features that reinforce the historic character of the visual zone.

2.2.4.5 **Liabilities.** Liabilities are negative visual elements, design elements, or features that detract from the visual image or functionality of their surroundings. In historic districts, liabilities may include non-contributing structures that are considered intrusive or that significantly detract from the historic character of the zone. Liabilities should be corrected through appropriate design measures, and are often the basis for recommendations for improvement.

2.2.4.6 **Recommendations and Implementation Plan.** The assessment of each visual zone includes recommendations to correct liabilities and to enhance assets. The recommendations are in the form of specific projects and are described in detail in Section 6, Improvement Projects.

2.2.4.7 **Design Components.** The following six design components, described in sections 7 through 12, provide detailed guidelines for 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

2.2.5 **Design Principles.** The visual inventory and analysis requires an understanding of basic design principles. These design principles are discussed in Section 3, paragraph 3.4.

2.2.6 **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 visuals elements) and "not so good" (negative visual elements) design.

2.3 Using the Design Guide

2.3.1 Use this IDG to determine the general design and construction considerations 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.

2.3.2 The following steps illustrate how the design guide is to be used for the preparation of plans for new construction, renovation, maintenance, and repair projects on the installation (Figure 2.2).

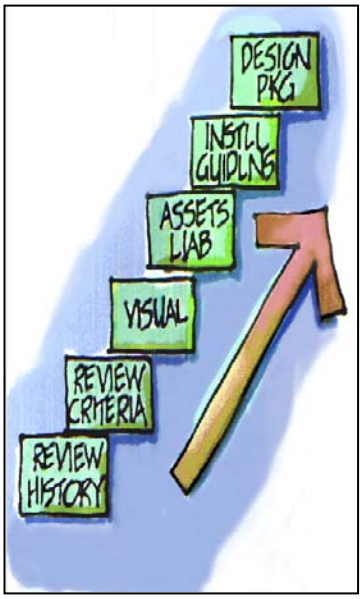


Figure 2.2 – Using the Design Guide

2.3.2.1 Step 1: Review the Installation Profile information included in this IDG (Section 4).

2.3.2.2 Step 2: Review the IDG analysis criteria information (Section 3) including design goals and objectives, visual elements, and design principles.

2.3.2.3 Step 3: Review the applicable references, guidelines, and standards for each of the relevant design components. These components may include site planning, buildings, circulation, landscaping, site elements, and force protection and are discussed in Sections 7 through 12 respectively.

2.3.2.4 Step 4: Review the information and description of the installation image and visual themes in Section 5.

2.3.2.5 Step 5: Identify the zone where the project will be located from Section 5, Visual Themes and Zones. Review the assets, liabilities, and recommendations for that zone.

2.3.2.6 Step 6: Select the appropriate guidelines or standards from the design components addressed in Sections 7 through 12.

2.3.2.7 Step 7: Assemble all materials gathered in steps 1 through 5 above.

2.4 Implementation

2.4.1 IDG Review and Approval

- Enforcement Authority
  - Approval, Denial, Waiver
    - Authority to approve, deny, or waive rests with the RPPB
    - Approval by the Assistant Chief of Staff for Installation Management, Facility Policy Division is also required for a variance if Army Standards are involved
  - Actions can be taken by the Master Planner or designee to enforce IDG, but projects are still subject to RPPB approval, etc.
- Ensuring Compliance
  - A copy of the IDG should be given by the Master Planner to the Designer of Record, and the Designer of Record should ensure that all members of the design team are aware and familiar with guidelines
  - IDG is to be provided to any entity whom work is outsourced to along with other documents and materials, i.e. contract documents
  - The IDG Design Team Checklist is the basic tool for ensuring compliance
  - Process:
    - A Signed IDG Checklist is given to the Master Planner by the Designer of Record at each submittal (even in cases in which a variance is being sought)
    - IF MASTER PLANNER CONCURS: IDG Checklist is forwarded to Real Property Planning Board with each submittal (i.e. 35%, 65%, 95%, etc.)
    - IF MASTER PLANNER DOES NOT CONCUR: Submittal must be resubmitted to the Master Planner's specifications or a formal waiver must be applied for

- Waivers
  - Reviewed first by the Master Planner (and by IMCOM regional director in some cases)
  - Submitted next to the RPPB with comments from the Master Planner
  - The IDG Design Team Checklist is included along with the waiver request, and areas in which variance approval is sought are clearly indicated, along with anticipated benefits and disadvantages associated with potential waiver approval
  - RPPB may grant or deny waivers to specific IDG standards except in cases in which the standard in question is reflective of DoD/Army-wide or IMCOM standards
  - In cases in which IDG standards are not installation-specific, RPPB forwards the waiver request along with comments to the IMCOM regional director for final review
- Maintaining and Updating the IDG
  - The IDG is a living document
  - The Master Planner is responsible for recommending changes/updates to the IDG
  - The RPPB must approve any updates or changes the IDG

2.4.2 **Compliance**

2.4.2.1 For the IDG to work optimally as a management tool, it is essential that the Master Planner or designated representative 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) Master Planner or designated representative 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 and utilities, in the design of additions or alterations to existing facilities, or in the maintenance of existing facilities.

2.4.2.2 The Master Planner or designee, 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.

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

2.4.2.4 The Installation Planning Board chaired by the Senior 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.

2.4.2.5 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.

2.4.3 **Project Approval.** Projects and other requests for action 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.

2.4.4 **Design Team IDG Checklist**

2.4.4.1 The Design Team IDG Checklist is to be completed by the design team consisting of the Master Planning office and project architects, engineers, and planners to assure the guidelines and standards have been considered in the design process. The Design Team IDG Checklist is provided in Appendix A.

2.4.4.2 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 should be submitted along with concept site plans and elevations for each design submittal. If the Master Planner or designated representative concurs, the plan and the signed checklist are forwarded to the RPPB for final approval.

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

2.4.4.4 Self-Help Projects and Occupant Purchased and Installed Site Furnishings and Features Projects are to follow the standards of the IDG.

2.4.5 Request for Waiver

2.4.5.1 A request of waiver from the Design Team IDG Checklist (Appendix A) shall be submitted to the Master Planning office for approval by the RPPB.

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

2.4.6 Checklists (optional)

2.4.6.1 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 Project Requirements IDG Checklist is provided in Appendix B.

2.4.6.2 Interior Design Review Checklist (Optional)

It is recommended that the Interior Design Review Checklist be used during reviews of Request for Proposal (RFP) submissions, consultant designs, or in-house designs prior to solicitations. The Interior Design Review Checklist is provided in Appendix C.

Links

Go to Section 3
Go to Table of Contents

SECTION 3 - Design Guide Analysis Criteria

3.1 Introduction

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

3.1.1 Basic design principles are used to assess, define, and classify visual elements. This assessment, based upon design criteria, determines the appropriate visual character of the installation. These design criteria are used for design decisions in the review of existing visual context and in developing project recommendations.

3.2 Goals, Objectives, and Recommendations

Chapter 4 of the UFC 2-600-01 discusses the goals, objectives, and recommendations process and provides examples.

3.3 Identification and Classification of Visual Elements-

3.3.1 Basic design principles define visual elements and assist with the assessment of their character.

3.3.2 The assessment and classification of visual elements follows basic design principles describing "good" and "not so good" design. Their assessment serves as the design analysis data used to determine the visual character of the installation.

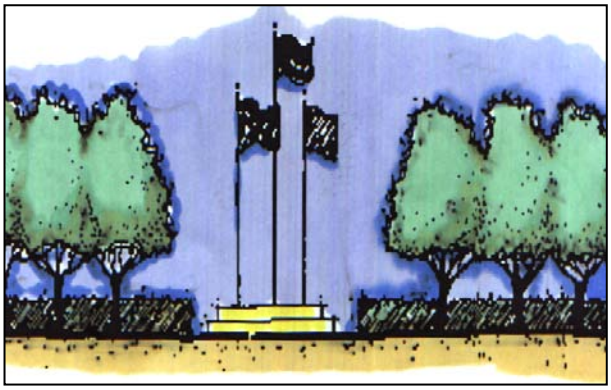


Figure 3.1 – Symmetrical elements

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).
- **Texture –** All elements of the visual environment have texture. The use and

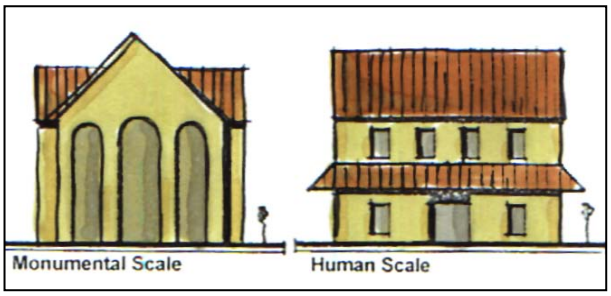


Figure 3.2 – Monumental and human scale building forms

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.
- **Form –** The size and shape of mass. Individual forms should be designed to complement one another and the environment (Figure 3.2).
- **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 determines the visual impact of all elements.
- **Framing –** All views include a ground plane, side planes, and an overhead plane. The relationship of these planes changes as the individual moves through the environment (Figure 3.3).
- **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 (Figure 3.3).
- **Balance –** Visual elements are composed to be symmetrical or asymmetrical. In either case, visual elements should be sized and located to provide visual balance.
- **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).

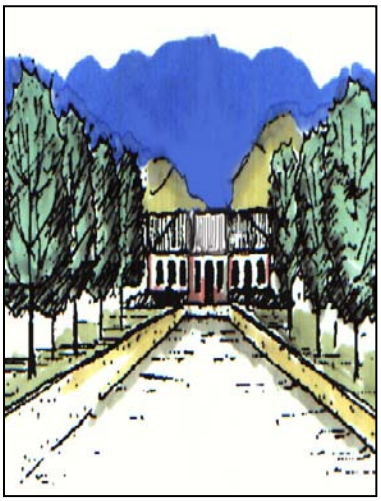


Figure 3.3 – Parade ground axis with building as terminus; also note ground, side, and overhead planes.

3.5 Visual Elements

The visual elements, described below, include manmade and natural features and their inter-relationships. This Army Installation Design Guide provides guidance on how to recognize the visual impacts of the installation and how to improve upon these elements 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 uses and activities.
- **Buildings and Structures -** Typically the most dominant features of an installation. Their location and design characteristics determine the primary visual image (Figure 3.4).

Figure 3.4 - Buildings are typically the dominant feature on an installation

- **Activity Nodes -** Centers of activity that attract people on a daily basis.
- **Entrances and Gates -** Provide the first and last impression of the installation and a sense of transition between districts.
- **Street Trees -** Street trees soften, complement, and define the road hierarchy, and improve the overall visual quality of the installation.

- **Landmarks -** Visually or historically prominent features such as towers, statues, static displays, or buildings that provide identity and orientation of place (Figure 3.5).
- **Views and Vistas -** Scenic and attractive views and vistas should be enhanced. Unattractive views should be screened.
- **Open Spaces -** Open space areas create visual impact and can be designed to either separate or integrate adjacent uses.
- **Signage -** Coordinated signage, both interior and exterior, can facilitate circulation and provide useful information.
- **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.
- **Trees and Other Vegetation -** Trees and other vegetation frame views, provide visual screens, shade, color, and interest in the installation (Figure 3.6).
- **Utility Corridors -** Utilities should be in designated corridors and unsightly above-ground utilities should be minimized.
- **Other Elements -** Visual elements other than those above may occur within an installation and should be evaluated.

Figure 3.5 – Landmarks provide orientation of place

Figure 3.6 – Street trees help define spaces and visual lines

Links

Go to Section 4

Go to Table of Contents

SECTION 4 - Installation Profile

4.1 Setting

4.1.1 Physical Setting

Fort Benning

Fort Benning covers approximately 182,000 acres of river valley and rolling terrain in eastern Alabama and western Georgia, adjacent to the city of Columbus, Georgia. Fort Benning falls within consolidated Columbus-Muscogee County and consolidated Cusseta-Chattahoochee County in Georgia, and Russell County in Alabama. Surrounding counties include Harris County to the north, Talbot County to the northeast, Marion County to the east, and Stewart County to the south. The communities of this region form the rapidly growing Columbus, GA-AL Metropolitan Statistical Area.

Lands on Fort Benning are part of two ecologically distinct regions: the Piedmont and the Coastal Plain. The transition between Piedmont and Coastal Plain is spread over a relatively large area of the installation. The result is a mosaic of Piedmont- and Coastal Plain-influenced habitats and the occurrence of a variety of plant and animal communities. The moderate climate and various terrains are well suited for infantry training and support missions.

Virtually all of the training facilities and 93 percent of the total land area are in Georgia with the remaining seven percent in Alabama. About 300 acres of the post consists of open water including ponds, streams and rivers. The Chattahoochee River divides Fort Benning between Georgia and Alabama and is navigable up to the installation area from the Gulf of Mexico.

Fort Benning is divided into two primary land uses: military training areas and installation cantonment areas. Most of the 182,000-acre reservation is undeveloped and is primarily used as military training areas, weapons ranges, drop zones, and landing zones. Approximately 101,700 acres are dedicated to maneuver training and 10,500 acres to ranges and exclusion areas.

The primary developed portion of the post consists of the Installation Cantonment, which is made up of four distinct cantonment areas. Installation Cantonment at Fort Benning is comprised of approximately 12,500 acres with an additional 1,095-acre recreation area located along Uchee Creek on the western bank of the

Chattahoochee River. The four main cantonment areas at are Main Post, Sand Hill, Kelley Hill, and Harmony Church:

- **Main Post** is the largest and most developed of the cantonment areas, containing Post Headquarters, the Infantry School and the barracks complex known as the Cuartels. Main Post includes Lawson Army Airfield, Martin Army Community Hospital, the Post Exchange, the Commissary, and various family housing areas.
- **Sand Hill** contains barracks, dining facilities, classrooms, and other facilities supporting two training brigades.
- **Kelley Hill** contains barracks and facilities primarily supporting the 3rd Heavy Brigade Combat Team.
- **Harmony Church** is undergoing a major construction effort and will become the primary location for the Armor School. The area also contains facilities to support the Ranger Training Brigade and CONUS Replacement Center missions.

The facilities on Fort Benning include approximately 3,000 buildings with a total of over 21,000,000 square feet on 11,035 acres of improved grounds. The installation has nearly 500 miles of paved roads, 700 miles of gravel road and over 1,000 miles of dirt roads. There are 40 miles of tank trails and railroad tracks cover five miles.

Fort Benning currently has over 4,000 housing units for married personnel. All family housing at Fort Benning is privately owned and operated under the Residential Communities Initiative (RCI).

Fort Benning has consistently been recognized as an Army Community of Excellence, with recent Chief of Staff, Commander in Chief, and President's awards for the installation. Training areas provide Soldiers with opportunities to practice various combat techniques. Fort Benning has a number of basic marksmanship ranges, direct fire gunnery ranges, collective live fire ranges, indirect fire ranges, and special live fire ranges. The installation also has a series of both light and heavy maneuver-training areas as well as non-live fire range facilities.

In addition to the military training areas, Fort Benning also contains the Lawson Army Airfield (LAAF) which is a strategic Power Projection Platform and supports Training and Doctrine Command (TRADOC) institutional training for Airborne and Ranger schools. The airfield has two paved runways, one of which is capable of handling the Air Force's C5 and C17, all commercial passenger jets, smaller fixed-wing aircraft, and all types of helicopters. The secondary runway is currently not in use.

The installation further maximized its strategic location along the southeastern rail lines by completing the Ochillee Railroad Head in 1999 for loading military vehicles onto railroad cars. This marshalling yard greatly expanded the rail deployment capability of the post by adding four railroad spurs with end ramps, 180,000 square yards of paved area and the ability to handle eighty 89-foot rail cars.

Fort Benning is currently in the midst of major transformations, particularly as a result of the Department of Defense Base Realignment and Closure (BRAC) process. The most significant of these transformation activities is the relocation of the US Army Armor School and Center from Fort Knox, Kentucky to Fort Benning. Once relocated, the Armor School and Infantry School will be combined to form the US Army Maneuver Center of Excellence.

Camp Merrill

Camp Frank D. Merrill is a sub-installation of Fort Benning nestled within the mountainous terrain of the Chattahoochee National Forest in Dahlonega, Georgia, approximately 70 miles northeast of Atlanta. The installation sits on roughly 300 acres of National Forest land, the Army use of which is governed by a 1994 Memorandum of Understanding (MOU) with the US Forest Service. The camp's location leaves it protected from adjacent land use compatibility constraints; however, it is nonetheless limited by topography and the MOU.

Topography is the most distinctive physical feature present at Camp Merrill. Most of the camp's buildings exist within a valley surrounded by steep mountain slopes, which are utilized for the Mountain Phase of Ranger training. Most of the training at Camp Merrill occurs outdoors and thus few training facilities exist; however, one exception is the Lower Mountain training facility, which includes a 30-foot vertical climbing wall and a 60-foot cliff for mountaineering training.

The installation includes two training and range areas and one cantonment area. A small airfield, Mosby Army Heliport (AHP), is located along the southern boundary of the installation and supports rotary wing aircraft. The size and capacity of the airfield is largely a product of site constraints. No hangar is available at Mosby AHP.

Camp Merrill contains approximately 50 structures ranging from instructional facilities to permanent party housing. A majority of the buildings at Camp Merrill are located either within the cantonment area or at the airfield; however, a permanent housing area also exists off post at Porter Village near the city of Dahlonega.

Two privately owned properties also exist within Camp Merrill's boundaries—the Mount Zion Church, located southeast of the Main Entrance, and a small family cemetery south of the Motor Pool.

4.1.2 Mission Summary

Fort Benning

Fort Benning seeks to be the Army's premier installation and home for Soldiers, Families, civilian employees, and military retirees. Its mission is to train infantry Soldiers and combat-ready units and serve as a Power Projection Platform capable of deploying and re-deploying Soldiers and units anywhere in the world on short notice.

Fort Benning is currently the initial training area for the U.S. Army Infantry and the home of the United States Army Infantry School and Center. The primary military activities at Fort Benning include training entry-level Soldiers, providing the Army's premier facility for training the Infantry, conducting Airborne and Ranger training, providing a home for the Noncommissioned Officer Academy and the Officer Candidate School, hosting the Western Hemisphere Institute for Security Cooperation, and providing a Power Projection Platform for rapid deployment. Fort Benning also provides training facilities for several Army Forces Command units, Special Operations Command units, as well as active Army units from other installations and U.S. Army Reserve, National Guard and Air Force units.

Training activities include the movement of personnel through wooded and open areas on foot, the movement of wheeled vehicles on dirt and gravel roads, and the establishment of bivouac sites. The sparse distribution of suitable terrain to support movement of heavy vehicles limits activities conducted by the mechanized infantry and armor units at Fort Benning. These activities include tactical movements, such as driving tracked vehicles on tank trails throughout the installation, cross-country training, driving tracked vehicles within maneuver areas, and fording streams in heavy vehicles. Additionally, Fort Benning features a Military Operations in Urban Terrain (MOUT) site that supports training for urban warfare environments, which is a growing area of emphasis for the Army.

Other readiness activities include training in the operation and maintenance of vehicles, academic military training, and physical training. Various supporting units, including transport units and signal units, also participate in training activities. Across the installation, existing heavy maneuver training areas accommodate armored and mechanized vehicles, while dismounted training is supported by the many light maneuver training areas.

While current mission-related activities at Fort Benning are generally expected to continue, major transformations associated with BRAC and the Army Modular Force (AMF) initiative will substantially impact the mission in terms of personnel structure and composition, training, and the installation's built environment. The most significant transformation activity scheduled for Fort Benning is the BRAC action to relocate the Army's Armor School and Center from its current location at Fort Knox to Fort Benning by 2011. The action includes the consolidation of the Armor School and Center with the existing Infantry School and Center to form the Maneuver Center of Excellence (MCoE). The MCoE will serve as a major training institution for Infantry and Armor Soldiers and will augment the installation's role as a Power Projection Platform. The MCoE transformation will bring over 13,000 additional personnel to Fort Benning. Coupled with other, more minor, transformation activities anticipated for the installation, Fort Benning will gain nearly 14,500 new personnel in upcoming years.

Camp Merrill

Camp Merrill is home of the 5th Ranger Training Battalion, known as the Mountain Phase of ranger training. Mountain Phase is the second of three ranger training phases and seeks to train small unit leaders in mountaineering skills. Soldiers are trained to carry out and lead small unit combat missions in a mountainous environment under extreme physical and psychological conditions.

During Ranger training, students learn to sustain themselves and their subordinates in an environment of continuous combat operations on a mountainous terrain. Ranger students are trained to plan and execute a range of combat missions in order to develop platoon leadership abilities under realistic, high-stress combat conditions. Training includes mountaineering skills, small unit tactics, patrol infiltration and ex-filtration, raids, ambushes, night vision training, and other skills required for close combat and direct fire missions.

4.1.3 History of Fort Benning and Camp Merrill

Fort Benning

Fort Benning was established in 1918 when the Infantry School of Arms was moved from Fort Sill, Oklahoma to Columbus, Georgia. Named after General Henry L. Benning, a Columbus attorney and Confederate hero of the Civil War, Camp Benning was first located along Macon Road. However, the area proved to be too small to accommodate the school and as a result the camp was moved in 1919 to a second, larger site southeast of Columbus. Its first mission was to provide basic training for units participating in World War I. An airstrip was constructed at the new location and Camp Benning was authorized as a permanent military post in 1920. In 1922 its name was changed to Fort Benning.

During the mid-1930s, Fort Benning enjoyed a construction boom due to federal work projects during the Great Depression. In 1931, the airstrip was named Lawson Army Airfield (LAAF) for the World War I veteran and Georgia native, Captain Walter Lawson, who died in a flying accident. World War II spurred continued growth and land acquisition at the installation, as well as the expansion of LAAF (Figure 4.1). Troop strength swelled with the arrival of the First Infantry Division and the establishment of the Officer Candidate School and Airborne School.

With the increased reliance on airborne infantry, Fort Benning was the training ground for many of the troops who later served in Korea in the 1950s, Vietnam in the 1960-70s, and in Kuwait and the Middle East in the 1990s and the 2000s. Soldiers trained on the post have participated in every major U.S. military engagement since World War I.

Today, Fort Benning is the largest military training installation in the U.S. and one of the premier projection platforms capable of deploying Soldiers, civilians, and units anywhere in the world on short notice by air, rail, and roadway. Lawson Army Airfield is Fort Benning's primary Force Projection Platform. The main runway is 10,000 feet in length and is served by an instrument landing system and ground controlled approach radar. A self-sustaining military community, the post supports in excess of 100,000 military, family members, reserve component Soldiers, retirees, and civilian employees on a daily basis.

Figure 4.1 - Lawson Army Airfield (LAAF)

Camp Merrill

The history of Camp Merrill is closely linked to that of Fort Benning. In 1950, Ranger training began at Fort Benning coincident to the formation of 17 Airborne Ranger companies. The Ranger Department was established as a branch of the Infantry School at Fort Benning in October of 1951 by the Commandant of the US Army Infantry School. The first Ranger class graduated in March of the following year.

By 1952, the Mountain Phase of Ranger Training was being conducted around Dahlonega, Georgia in the north Georgia Mountains—first at Pine Valley and then at Camp Wahsega, which was leased from the state 4-H Club for nine months out of the year. The Army built Mosby Army Airfield at the current site of Camp Merrill in order to provide access to Camp Wahsega. In 1960, the first buildings were constructed at Camp Merrill, then known as Black Farms, and included a barracks and a mess hall. The following year, major additional construction projects were carried out, including five new barracks, an Operations Center, an Infirmary, and Officer's Quarters.

The Ranger training installation was officially designated Camp Frank D. Merrill on February 2, 1972 in honor of Major General Frank D. Merrill. During World War II, Brigadier General Merrill trained and led a long-range penetration unit known as the 5307th Composite Unit that was employed behind enemy lines in Japanese-occupied Burma.

The Army began major renovations and new construction at Camp Merrill in 1987, resulting in the demolition of 19 structures and the construction of a number of new buildings, including a two-story student barracks, a two-story unaccompanied enlisted personnel housing facility, and a gym. Also in that year, the Army Ranger Department was reorganized into four Ranger Training Battalions (RTBn), each responsible for a different phase of ranger training. Camp Merrill is the location of the 5th RTBn and is responsible for the Mountain Phase of training. There are now only three phases in ranger training: Benning Phase, Mountain Phase, and Swamp (or Florida) Phase.

4.1.4 Regional Setting

Fort Benning

Fort Benning, the city of Columbus, GA, and the city of Phenix City, AL together are known as the Tri-Community. Fort Benning is located just south of the city of Columbus and just east of Phenix City. As such, the Fort Benning community is highly integrated into the Columbus metropolitan area. The city of Columbus offers a number of cultural and entertainment amenities that serve as destinations for the Fort Benning community, and many members of the Fort Benning community reside in or near either the city of Columbus or

in Phenix City. Land use along Fort Benning's northwestern flank is predominantly low density single family use, but along most of its perimeter Fort Benning adjoins largely rural lands (Figure 4.2).

Figure 4.2 - Rural lands and rivers border the installation

Fort Benning's impact on the surrounding regional community is substantial. The region's economy benefits from the procurement activity that occurs on the installation and from the population growth spurred by the planned growth in the installation's mission. As a massive land use close to the city of Columbus, Fort Benning effectively serves as a boundary for urbanized development and a constraint on automobile travel through the region.

Fort Benning is primarily accessible via Interstate 185 as well as US 27/280, which connects the city of Columbus with the city of Cusseta and is the only route that passes through the installation. Fort Benning has various other minor access points, primarily in the vicinity of Main Post.

Camp Merrill

Camp Merrill is located within the Chattahoochee National Forest in Lumpkin County, Georgia. Most of the installation's immediate surroundings are mountainous forest land (Figure 4.3). The closest city to Camp Merrill is Dahlonega, Georgia, which lies approximately fourteen miles southeast of the installation. Camp Merrill is integrated into the small surrounding community in a number of ways. The installation's permanent housing area, Porter Village, is also located off post just west of Dahlonega. The Camp also has an annual open house in

Figure 4.3 - Camp Merrill setting

which the Lumpkin County community is invited to the installation for demonstrations and festivities.

Camp Merrill is not accessible by any major road or highway. Three small National Forest roads provide access to the installation: Hightower Church Road, Coopers Gap Road, and Camp Wahsega Road. Two of the roads connect the installation to more major routes. Hightower Church Road links Camp Merrill to GA 52 and Camp Wahsega Road offers a connection to GA 19.

4.2 Existing Land Use

Fort Benning

Land use at Fort Benning is highly diversified. Dominant land uses include residential, commercial, office/administrative, recreational, forestry, and training. Most of the land uses reflect Fort Benning's long history. For example, much of the Main Post area reflects an era prior to the dominance of vehicular travel, with a large amount of commercial, office, residential, and even training fields abutting one another. Other areas show a similar pattern of land uses, where commercial and training areas have developed around population centers. These centers, such as Kelley Hill and Sand Hill, contain large populations of new army personnel and related support services.

Other areas of the post reflect the more modern era where land uses are largely separated from one another. This is reflected by the large pockets of residential land use in the RCI Housing Areas. Finally, the majority of land at Fort Benning is undeveloped and is often utilized for training or is maintained as forest, supporting wildlife habitat.

Camp Merrill

Camp Merrill is relatively small and includes only one general cantonment area, two training areas, and one airfield. The cantonment area and its associated land uses are clustered around the southwestern portion of the installation. Army Standard installation land use categories at Camp Merrill include Airfield, Training, Administrative, Housing, Community Facilities, Supply/Storage, Maintenance, Medical/Emergency, and Industrial.

Many of the structures at Camp Merrill were built as a result of a series of renovation and construction projects that took place in the late 1980s. Development at Camp Merrill is limited by the area's mountainous topography as well as the 1994 Memorandum of Understanding between the US Army and US Forest Service governing military use of the Chattahoochee National Forest Land.

4.3 Future Land Use

Fort Benning

Future land use and building development projects for Fort Benning are outlined in the Real Property Master Plan. Notable increases in development can be seen in the Sand Hill and Harmony Church areas, which have large amounts of land to accommodate growth. The consolidation of the Armor and Infantry School and Centers into the Maneuver Center of Excellence and other anticipated BRAC-related transformations will have tremendous impact on land use, as the installation will be accommodating nearly 14,500 additional personnel. Substantial increases in housing, Community Facilities, and Training among others are anticipated at Fort Campbell as the transformations are implemented. Major infill and expansions are planned for each of the four cantonment areas, the most significant of which is Harmony Church which will approximately double its footprint as a result of new development.

Camp Merrill

Although future development at Camp Merrill is limited by the mountainous topography and the MOU governing military use of the Chattahoochee National Forest Land, a number of new buildings are currently planned or proposed for the installation. The Camp Merrill Future Development Plan is being revised to outline future building projects and land uses. The plan will identify demolition and new construction projects in order to modernize Camp Merrill. Completion of the revised Future Development Plan is scheduled for the fall of 2010. The planned development will take place in six phases over a 20 year period, and is expected to include new operational facilities, a dining facility, emergency service facilities, and training and barracks facilities.

Links

Go to Section 5

Go to Table of Contents

SECTION 5 - Visual Themes and Zones

5.1 Introduction

5.1.1 A “sense of place” can be created by using visual cues that serve to reinforce a person’s identification of their surroundings. Moreover, continuity and cohesiveness of those visual cues strengthen a place’s identity with reliable signifiers. By establishing visual themes and zones, the Installation Design Guideline (IDG) can help unify the “look” of the installation and establish a strong, clear, and consistent image. An installation can have a number of visual themes, and each visual theme can encompass a number of visual zones. Thus, it is important that certain characteristics such as materials, colors, and forms are similar amongst themes so as to present a holistic image for the entire installation.

5.1.2 Visual themes and zones were determined based on a number of visual surveys mentioned in Section 2, Paragraph 2.2. These surveys were conducted using installation maps, on-site visual investigations, stakeholder interviews, and photographs to develop impressions of visual characteristics. The data captured was used to define the visual themes and zones for Fort Benning and Camp Merrill. Figure 5.1 (Fort Benning Visual Zones) and Figure 5.2 (Camp Merrill Visual Zones) are a graphic portrayal of the installation's visual zones.

5.2 Installation Image

5.2.1 Fort Benning

Fort Benning presents numerous disparate visual cues accumulated throughout its lengthy history as an Army installation. The installation’s many facilities and residential units reflect its decades of continual growth within which a multitude of design approaches have been prevalent. Furthermore, the post contains a variety of cantonment areas and land uses ranging from offices, commercial, residential, recreational, medical, warehouses, and education to large-arms training areas. The land use and design variety on the installation complicates efforts to unify the installation visually. Yet, the installation is a self-contained community and should be reflected as such in the IDG.

5.2.2 Camp Merrill

Camp Merrill is a sub-installation of Fort Benning and is located in the Chattahoochee National Forest near Dahlonega, Georgia. The camp was created to fulfill the mission of the U.S. Army Infantry School’s (USAIS) Ranger Training Battalion. The first construction efforts began in 1960 with the area’s steep mountainous topography limiting development on post. Currently, Camp Merrill’s visual character is fairly unified, with

small scale buildings and the wooded mountain environment creating a consistent image. Some disparities do however exist, which have been generated through different eras of construction.

5.3 Visual Themes

5.3.1 Visual themes are generalized groupings of visual zones that have complementary uses and/or similar visual characteristics. Themes are not limited to one use type and can include a range of activities.

Visual themes include broad scale activities that occur on the installation, from training to recreation to deployment activities. These activities are similar in design and layout characteristics. Over the years, Fort Benning has sought to enhance the educational nature of the installation as well as its historic setting. Thus, the installation's primary visual themes relate to design that helps create a "campus-like" atmosphere.

Knowledge, Skills, and Attitude (KSA) Concept. KSA are the three domains of educational activity according to Benjamin Bloom's taxonomy of learning. KSA also forms a conceptual foundation for the recommended visual unification of Fort Benning by reflecting the educational and training missions of the installation. Each domain of educational activity represents a visual theme, and each theme includes its own rationale, set of goals, and recommendations for realizing those goals.

Planning a successful campus-like installation requires adherence to a number of design principles that facilitate growth, learning, and efficacy. These principles fall into three categories: promote intellectual and social interaction, respect historic resources, and value mission-specific design.

Specific design practices can be built around these campus planning principles and implemented throughout Fort Benning. Examples of these principles of campus design include creating a pedestrian-friendly environment and enhancing visual zone identity through a hierarchy of streets, thematic streetscape design and well-defined edges. These are just a few examples of opportunities for Fort Benning to capitalize on these campus design and planning principles.

5.3.1.1 Knowledge Visual Theme

The Knowledge Visual Theme reflects the diversity of Fort Benning's training opportunities. Institutions such as the Western Hemisphere Institute of Security Cooperation and the Maneuver School of Excellence help promote Fort Benning's focus on knowledge and active learning. Buildings and landscapes within this theme focus on developing cognitive mental skills. Characteristics of this theme are:

- Formality
- Human-scale buildings
- Detailed building facades
- Classroom learning environments

5.3.1.2 **Skills Visual Theme**

The Skills Visual Theme reflects the training and readiness missions of Fort Benning. Many of the installation's assets are outdoor environments that require dedicated land and functional open space. Buildings and landscapes that support the Skills Visual Theme tend to be used primarily for the development of manual or physical/psychomotor skills. Characteristics of this theme include:

- Functional priority
- Large-scale spatial design
- Structural focus
- Outdoor learning environments

5.3.1.3 **Attitude Visual Theme**

The Attitude Visual Theme reflects Fort Benning's commitment to quality of life for Soldiers, Families, and civilians employed and/or living at the installation. Fort Benning's administration considers personal growth and development for those who live and work on post to be high priority. Several land uses are dedicated to supporting quality of life aims such as morale, welfare, and recreation. Characteristics of this theme include:

- Informality
- Human-scale buildings and landscapes
- Pedestrian-friendly environments
- Detailed building facades
- Varied textures

5.4 Visual Zones

5.4.1 Visual zones are areas within the installation that share common or unified visual characteristics. Visual characteristics define and contribute to one's perception of being in a particular place with a few dominant features that define its image. Unique buildings, historic character, vehicular and pedestrian corridors, landscape treatment, natural features or open space, and spatial relationships are typical features that contribute to a visual zone. Frequently, visual zones correspond to land use, although not exclusively. Fort Benning has three historic districts: Main Post Historic District, Lawson Army Airfield Historic District, and Parachute Jump Towers Historic District. Each represents its own visual zone; however, the residential component of Main Post Historic District represents a unique visual zone called RCI Housing–Historic. The visual zones for Fort Benning are:

- Harmony Church
- Main Post Historic District
- Kelley Hill
- Lawson Army Airfield
- Lawson Army Airfield Historic District
- Main Post
- Suburban Main Post
- Parachute Jump Towers Historic District
- RCI Housing
- RCI Housing - Historic
- Sand Hill
- Training Area/Ranges

Table 5-1 shows the theme/visual zone relationship throughout Fort Benning.

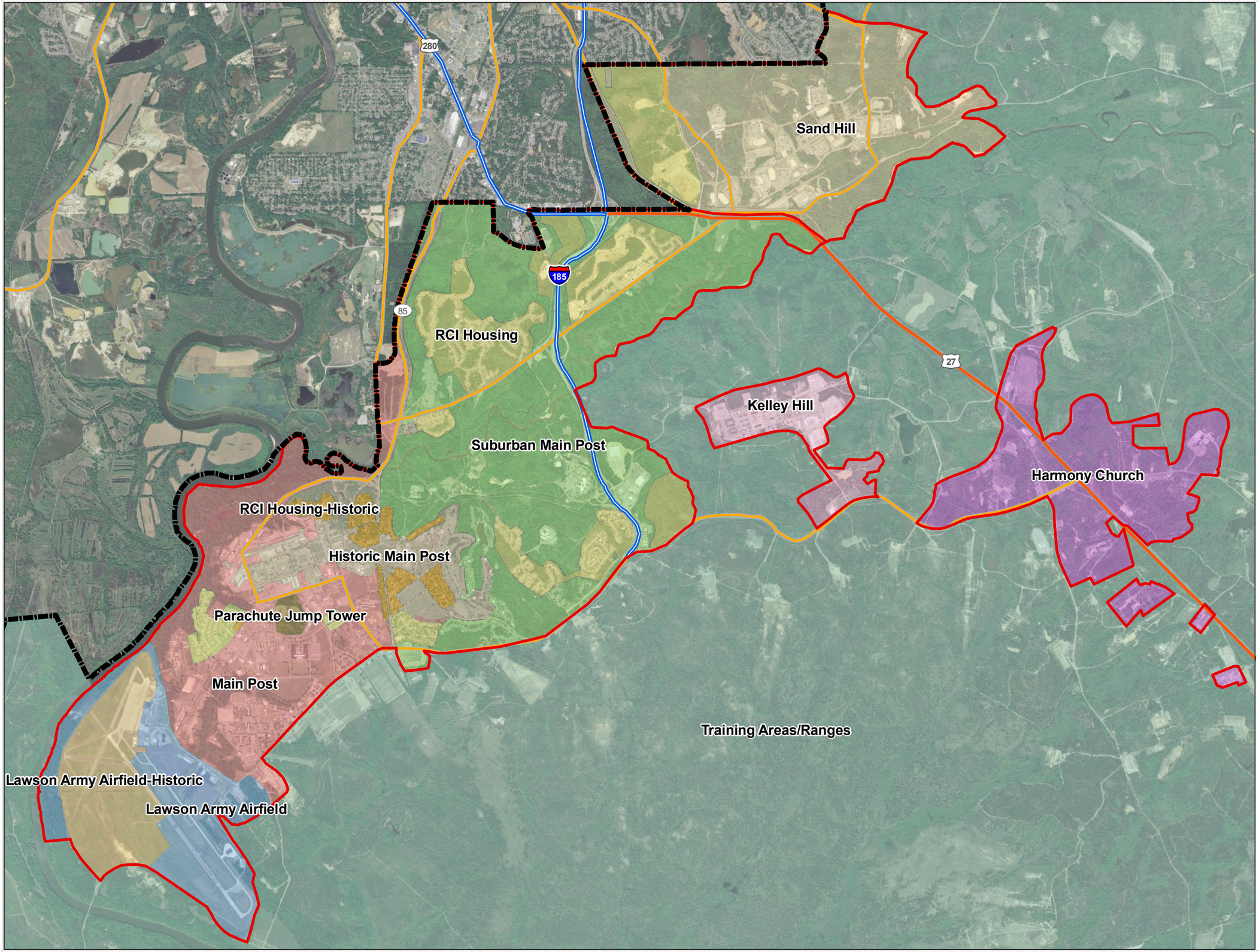
Table 5-1 Fort Benning Image

Fort Benning Image		
Knowledge Theme	**Skills Theme**	**Attitude Theme**
Harmony Church	Harmony Church	Harmony Church
Main Post Historic District		Main Post Historic District
Kelley Hill		Kelley Hill
	Lawson Army Airfield	
	Lawson Army Airfield Historic District	
Main Post		Main Post
	Parachute Jump Tower	
		RCI Housing
		RCI Housing-Historic
Sand Hill		Sand Hill
Suburban Main Post		Suburban Main Post
	Training Areas/Ranges	

The visual zones map illustrates the features and constraints that comprise the visual character of each zone. The following map shows the Fort Benning Visual Zones (Figure 5.1).

Figure 5.1

Fort Benning
Visual Zones



Legend

- Installation Boundary
- Cantonment Area

Visual Zones

- Harmony Church
- Historic Main Post
- Kelley Hill
- Lawson Army Airfield
- Lawson Army Airfield-Historic
- Main Post
- Parachute Jump Tower
- RCI Housing
- RCI Housing-Historic
- Sand Hill
- Suburban Main Post
- Training Areas/Ranges

0 2,000 4,000 8,000
Feet

August 2010
Visual Themes and Zones

Figure 5.2

Camp Merrill
Visual Zones

Legend

Visual Zones

- Airfield
- Camp Merrill
- Training Areas/Ranges
- RCI Housing

0 250 500 1,000
Feet

August 2010
Visual Themes and Zones

Table 5-2 shows the theme/visual zone relationship throughout Camp Merrill.

Table 5-2 Camp Merrill Image

Camp Merrill Image		
Knowledge Theme	**Skills Theme**	**Attitude Theme**
	Airfield	
Camp Merrill		Camp Merrill
		Camp Merrill RCI Housing
	Training Areas/Ranges	

The visual zones map illustrates the features and constraints that comprise the visual character of each zone. The following map shows the Camp Merrill Visual Zones (**Figure 5.2**).

Fort Benning

The following sections present a functional analysis for each of the visual zones. The Fort Benning Visual Zones (Section 5.4.2 through 5.4.12) are presented first, followed by Camp Merrill Visual Zones (Section 5.4.13 through 5.4.16). This analysis includes a description of the visual character, a visual analysis map, assets, liabilities, and recommendations for each zone.

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

Recommendations are made for the correction of liabilities or the enhancement of assets. These recommendations are a source for generating projects that are listed in Section 6, Improvement Projects.

5.4.2 Harmony Church

Harmony Church is a roughly 776-acre self-contained cantonment area consisting of a variety of land uses and activities. The area is located about 5 miles southeast of Main Post with its outer border framed by Highway 27. Uses are scattered throughout the area and include housing, administrative, storage, maintenance, industrial, and community facilities. Most of the facilities are low-density and include semi-permanent barracks, motor pool facilities, vehicle maintenance, training, and recreational facilities.

Figure 5.3 – Bldg 5124 is an example of new construction at Harmony Church

Of the four cantonment areas, Harmony Church is seeing the most new development resulting from BRAC and other transformation activities. The area has been experiencing both infill redevelopment as well as expansion projects which are roughly doubling the developed area. By 2011, Harmony Church will include two new trainee barracks complexes complete with mixed uses, including housing and community facilities, designed with the intent of promoting a sense of community, an Army Reserve Center, and large warehouse space. A 100-acre training support brigade complex and an access control point are also being built on what is has historically been forested land on the southeastern side of Highway 27. These actions significantly impact the visual experience of Harmony Church, particularly in terms of viewsheds.

5.4.2.1 Visual Character

The visual character of Harmony Church is defined primarily by the following (Figure 5.3):

- A mixture of older small-scale buildings and new larger-scale buildings
- Heavily forested surroundings

5.4.2.2 Assets

- Natural wooded landscape
- Open space
- Forested edges

5.4.2.3 Liabilities

- Topography
- Lack of utilities
- Distance from other cantonment areas

5.4.2.4 General Recommendations

- Encourage massing, scale, and material palettes used for new development that respect existing visual character
- Protect and enhance natural buffer between the road and new construction in order to preserve existing viewsheds
- Encourage walkability through master planning

5.4.3 **Main Post Historic District**

The Main Post Historic District contains many of the installation's historic and cultural resources, and currently serves a number of uses, including administrative, educational, and recreation. The District has largely maintained its historic character despite adaptation to successive land use demands at various stages in its history. Conforming to many of the planning ideals of the American City Beautiful and Garden City movements, the Main Post Historic District features monumental-scale buildings organized in axial relationships, tree-lined streets, and vistas. The cuartels are the central feature of the Main Post Historic District. Their large-scale massing and linear layout provide a focus to the visual zone. Other distinctive buildings include the Old Infantry School, Doughboy Stadium, and the Old Hospital Complex.

5.4.3.1 Visual Character

The visual character of Main Post Historic District is defined primarily by the following (Figure 5.4):

- Monumental-scale and iconic buildings
- Formal arrangement of buildings and other features
- Axial, rectilinear street layout
- Material unity (brick and stucco)
- Heavy activity nodes
- Diversity of land uses
- Commercial signage and structures

Figure 5.4 - Historic and iconic buildings define Main Post Historic District character

5.4.3.2 Assets

- Iconic buildings provide identity
- Historic structures and landscape
- Diversity of architectural styles
- Rational, grid-like street layout

5.4.3.3 Liabilities

- Intrusive elements, such as smoking gazebos
- Disorganized parking
- Vehicular circulation problems
- Inconsistency of signage and utility structures

5.4.3.4 General Recommendations

- Upgrade and repair existing sidewalks and public spaces
- Introduce landscape elements that clearly define the boundaries of open space, public realm, and parking areas
- Reinforce pedestrian linkages from commercial areas to administrative and office areas
- Replace intrusive elements with character-sensitive comparables
- Screen utility boxes and garbage dumpsters
- Ensure future construction respects existing architecture, including major themes, styles, and materials and follows guidelines set out in Design Guidelines for Department of Defense Historic Buildings and Districts
- Ensure awareness of historic preservation standards and relevant treatment plans (available through Cultural Resource Manager's office) among all parties involved in the modification of existing historic structures

5.4.4 **Kelley Hill**

Kelley Hill is an approximately 400-acre cantonment area located roughly four miles off Main Post dedicated to troop housing and training. The area additionally supports maintenance and community facilities. The visual zone also includes commercial retail uses, advanced training classrooms, courtyards, motor pools,

and residential areas. Kelley Hill is relatively small compared with other cantonment areas, but also provides the most visually consistent zone at the installation. While the area is primarily composed of relatively new construction, a handful of historic buildings have been preserved and were clearly referenced in terms of materials and architectural themes during the design of the newer development.

5.4.4.1 Visual Character

The visual character of Kelley Hill is defined primarily by the following (Figure 5.5):

- Beige palette accented with brick
- Landscaping accents
- Orderly arrangement of buildings
- Commercial and industrial uses limited to perimeter

Figure 5.5 - Barracks display consistency of design and materials at Kelley Hill

5.4.4.2 Assets

- Consistency of design
- Barracks and classrooms have consistent signage
- Restored historic buildings and the prominence of monuments help promote military character

5.4.4.3 Liabilities

- Isolated from Main Post
- Lack of pedestrian linkages between residential and commercial area

5.4.4.4 General Recommendations

- Ensure pedestrian connections to gathering places are created to encourage social interaction
- Ensure new development continues to respect existing character
- Define gateways and entrances with signage and/or landscape features

5.4.5 **Lawson Army Airfield**

The Lawson Army Airfield Visual Zone encompasses the portion of the airfield not designated an historic district and is a major component of current operations. The airfield is located south of the Main Post within a lowland curve of the Chattahoochee River and has a largely linear layout with buildings stretching along the runway. The character of buildings and other visual features, such as street character and parking areas, at Lawson Army Airfield are not entirely unlike those found at Main Post; however, the two visual zones are separated by a forested buffer northeast of Indianhead Road which effectively contains the visual experience of LAAF, distinguishing it as a unique visual zone. The area consists of a developed area,

containing hangars and other buildings, and a runway area. Vegetation is sparse, although aging water oaks serve as an important character-defining feature. The airfield and its immediate surroundings also support critical training operations.

5.4.5.1 Visual Character

The visual character of Lawson Army Airfield is defined primarily by the following (Figure 5.6):

- Large-scale structures
- Linear site layout
- Readily apparent training modules
- Distinctive features such as historic runways and hangers
- Large set backs of buildings and parking areas from steets
- Wide scenic viewshed

Figure 5.6 - Hangar buildings characterize LAAF

5.4.5.2 Assets

- Unique architecture of both old and new flight facilities, particularly hangars
- Separation from living quarters
- Pleasant viewsheds
- Water oaks and other old growth trees
- Forested edges and buffers

5.4.5.3 Liabilities

- Limited development opportunities due to flight paths
- Disorganized parking
- Numerous curb cuts and generally disorganized vehicle circulation
- Aging character trees
- Inappropriate planting choices, such as crape myrtles planted as shade trees

5.4.5.4 General Recommendations

- Maintain existing forested edges where appropriate
- Clearly delineate parking areas
- Replace inappropriate and aging trees with appropriate character trees

5.4.6 **Lawson Army Airfield Historic District**

The Lawson Army Airfield Historic District comprises a portion of LAAF, including the original runway dating to 1941, a small built up area, and a training field south of the runway. Eleven contributing buildings,

structures, and sites are located in the district, including two pre-WWII hangars and the 1935 Air Corps Double Hangar. Building styles reflect both pre- and post-WWII approaches to military architecture and include utilitarian structures as well as Art Deco and International styles. Dominant materials are structural steel and reinforced concrete framing, structural clay tile with stucco, brick, and corrugated asbestos cement. Aside from its importance as an historic landscape, the Lawson Army Airfield Historic District still supports major training and operations at LAAF.

5.4.6.1 Visual Character

The visual character of Lawson Army Airfield is defined primarily by the following (Figure 5.7):

- Historic runway
- Open training fields
- Historic hangars and other buildings
- Expansive viewsheds

Figure 5.7 - Viewshed at Lawson Army Airfield Historic District

5.4.6.2 Assets

- Historic buildings built between 1921 and 1945 reflect function and technology at various points in installation's history
- Unique architecture of flight facilities
- Separation from living quarters
- Pleasant viewsheds

5.4.6.3 Liabilities

- Limited development opportunities due to flight paths
- Undefined perimeter
- Aging facilities in need of maintenance

5.4.6.4 General Recommendations

- Create edge treatments and maintain existing forested edges where appropriate
- Preserve and enhance historic structures, such as The Air Corps Double Hanger built in 1935
- Ensure future construction respects existing architecture, including major themes, styles, and materials and follows guidelines set out in Design Guidelines for Department of Defense Historic Buildings and Districts
- Ensure awareness of historic preservation standards and relevant treatment plans (available through Cultural Resource Manager's office) among all parties involved in the modification of existing historic structures

5.4.7 Main Post

The Main Post is the largest cantonment area at Fort Benning and is characterized by a diversity of land uses and design elements. Training areas, barracks housing, eating and entertainment establishments, educational institutions, and administrative facilities can all be found at Main Post. The post has a strong, storied history evident in many of the historic buildings in the Main Post Visual Zone, which also has several new structures that reflect the installation's continued growth. Main Post is also characterized by numerous large open spaces, often the result of force protection design considerations. These spaces are often dotted by old-growth oak trees, but usually poorly defined at their edges. While the design of buildings is greatly varied, the zone is unified largely through its centralized location.

5.4.7.1 Visual Character

The visual character of the Main Post is defined primarily by the following (Figure 5.8):

- Prominent buildings
- Varied design themes and elements
- Large parking areas
- Large open spaces
- Mix of commercial, office, training, and residential uses

Figure 5.8 – Much of the architecture for administrative buildings is of the modernist era

5.4.7.2 Assets

- Commercial and recreational uses
- Open spaces
- Activity centers

5.4.7.3 Liabilities

- Inadequate pedestrian connectivity between land uses
- Traffic circulation is a problem in the Main Post area due to curb cuts, growing traffic volumes, and the intensity of uses along primary roadways
- New building designs lack consistency and continuity with existing structures
- Poor spatial articulation of open spaces

5.4.7.4 General Recommendations

- Apply standards utilizing Section 11 of this IDG for site furnishings, site lighting, and thematic site character to unify the campus identity
- Determine locations for future parking needs that support a pedestrian-friendly environment and preserve visually important open spaces

- Create an open space and greenspace master plan
- Develop a transportation plan that creates a hierarchy of streets and roads

5.4.8 Suburban Main Post

Suburban Main Post is located east of Main Post and Historic Main Post and has a largely hilly forest character, exemplified by winding roads running through dense vegetation. However, large scale development with expansive surface parking can be found in Suburban Main Post near I-185. Developments include Martin Army Community Hospital and PX Mall. The horse stables are also located in Suburban Main Post Visual Zone. Suburban Main Post is scaled for the automobile, with very little pedestrian design consideration.

5.4.8.1 Visual Character

The visual character of the Main Post is defined primarily by the following (Figure 5.9):

- Forested landscapes
- Large-scale suburban-style development
- Large surface parking lots

Figure 5.9 – Martin Army Community Hospital

5.4.8.2 Assets

- Scenic forest roads
- Activity centers

5.4.8.3 Liabilities

- Inadequate pedestrian circulation
- New development lacks human scale
- Abundance of impervious surfaces
- Traffic concentrated on a limited number of roads

5.4.8.4 General Recommendations

- Ensure capacity of transportation infrastructure and explore alternative modes of transportation
- Develop a transportation plan that creates a hierarchy of streets and roads
- Install landscape islands and plant shade trees in large parking lots to improve aesthetic quality and control microclimate

- Plan for sustainable stormwater management, including detention, retention, and filtration through landscape or engineered features

5.4.9 Parachute Jump Towers Historic District

Constructed in 1941 and 1942, the three historic steel Parachute Jump Towers stand at 250 feet and are situated in a triangular layout on an approximately 50-acre field. The towers serve as a defining landmark in Fort Benning's landscape, providing identity and contributing to the installation's historic viewsheds. The Parachute Jump Towers Visual Zone is an historic district and has been nominated for designation on the National Register of Historic Places. In addition to their historic value, the jump towers also function as essential training facilities for Airborne School students.

5.4.9.1 Visual Character

The visual character of the Parachute Jump Towers is defined primarily by the following (Figure 5.10):

- Monumental steel vertical structures
- Readily apparent training modules
- Large field

Figure 5.10 – Parachute Jump Towers Historic District

5.4.9.2 Assets

- Abundant space
- Easily identifiable structures
- Low landscaping maintenance burden
- Major identifiable landmark for installation

5.4.9.3 Liabilities

- Lack of building edge definition

5.4.9.4 General Recommendations

- Encourage vertical edge treatments to help visually differentiate the area from the surrounding Main Post
- Maintain historic integrity
- Continue to pursue National Register designation
- Ensure any future modification follows the guidelines set out in Design Guidelines for Department of Defense Historic Buildings and Districts
- Ensure awareness of historic preservation standards and relevant treatment plans (available through Cultural Resource Manager's office) among all parties involved in the modification of existing historic structures

5.4.10 **RCI Housing**

The RCI Housing Visual Zone occurs in pockets throughout Fort Benning. The zone seeks to establish a sense of place by implementing community planning principles known as traditional neighborhood design (TND). Among other things, TND seeks a balanced relationship between public and private space. In TND, the street emerges as an important public space and is designed to be accessible to pedestrians, cyclists, and automobiles alike. Streets are often lined by trees and sidewalks and visually reinforced by minimally setback, street-oriented buildings. New development within the RCI Housing zone is characterized by a calm and welcoming public realm framed by single-family homes. Older (non-historic) housing areas that do not currently reflect TND are planned to be reconfigured, moving away from conventional automobile-oriented housing characterized by many of the existing RCI Housing areas.

5.4.10.1 Visual Character

The visual character of the RCI Housing Area is defined primarily by the following (Figure 5.11):

- Street-oriented neighborhood design
- Pedestrian-friendly street and sidewalk features (ie. lighting, trees, and landscaping)
- Homes featuring elements from an eclectic mix of traditional architectural styles
- Balanced design of public and private spaces

Figure 5.11- Sidewalks and street frontage represent a focus on elements of traditional neighborhood design

5.4.10.2 Assets

- Sidewalks
- Tree lawns and street trees
- Street-oriented houses
- New structures
- Narrow, calm residential streets

5.4.10.3 Liabilities

- Isolated from other services and amenities
- Some older housing areas still reflect conventional automobile-oriented suburban design

5.4.10.4 General Recommendations

- Connect to existing open space network
- Continue utilizing traditional neighborhood design (TND)
- Encourage mixed uses in or within close proximity to residential neighborhoods
- Provide multi-modal access into and out of residential areas connecting with major destinations, including Main Post and various training areas.
- Re-design more conventional suburban-style subdivisions

5.4.11 **RCI Housing-Historic**

The existing RCI Housing-Historic Visual Zone occurs in pockets in and around Main Post Historic District. Most of the historic housing dates to the early 1930s. The houses and subdivisions in the zone were laid out in a manner that generally reflects the Garden City principles popular at the time of construction.

Streets are curvilinear and organized in a functional hierarchy, ranging from narrow residential streets to wide thorough-fares. Buildings are often oriented internally, backing onto open spaces and rear alleys, which form the main access.

Most of the houses in a given neighborhood or cluster are architecturally similar, as design emphasis was placed on the community instead of on individual buildings. Architectural styles in the RCI Housing-Historic Visual Zone are primarily Dutch Colonial Revival, evidenced by the wide dormers associated with that style, and Spanish Colonial Revival, which is easily identifiable by the prominence of stucco exterior and mission-tile roofs.

Figure 5.12 - Historic homes and streets help create a distinctive setting

5.4.11.1 Visual Character

The visual character of the RCI Housing Areas - Historic is defined primarily by the following (Figure 5.12):

- Shaded curvilinear residential streets
- Rear alleyways
- Walkable environment

- Abundant open space
- Dutch and Spanish Colonial Revival architecture

5.4.11.2 Assets

- Pleasant street environment
- Established tree canopy
- Architectural and material unity
- Garden City-style neighborhood design
- Rare historic concrete roads

5.4.11.3 Liabilities

- High maintenance costs
- Lack of edge definition in some areas
- Adjacent non-historic buildings and/or non-residential uses
- Lack of landscaping and street trees in many areas
- Homemade signs disrupts historic streetscapes

5.4.11.4 General Recommendations

- Preserve historic neighborhood design
- Frame neighborhoods with street trees and landscaping
- Provide edge definition through screening and landscaping
- Screen incompatible adjacent uses to protect views and visual character
- Encourage signage that provides identity and respects the neighborhood character
- Ensure awareness of historic preservation standards and relevant treatment plans (available through Cultural Resource Manager's office) among all parties involved in the modification of existing historic structures

5.4.12 **Sand Hill**

The Sand Hill Visual Zone comprises a small portion of the post and contains a significant concentration of personnel. Sand Hill is the basic training area and many of the required skills for military service are honed and developed here. The visual zone is characterized by a high degree of architectural consistency, expressed by nearly identical three-story concrete and red brick training barracks. Other facilities at Sand Hill are one- to two-story brick structures.

Transformation actions are bringing new construction to Sand Hill. By 2011, Sand Hill will have new dining facilities as well as the completion of two phases of a trainee barracks complex, similar to those being built at Harmony Church, with a cohesive community feel and complete mix of uses. A number of infrastructure improvements are also planned for Sand Hill, including improvements at the primary intersection entering into Sand Hill and expansion and repaving of areas near the transportation motor pool.

5.4.12.1 Visual Character

The visual character of Sand Hill is defined primarily by the following (Figure 5.13):

- "Starship" barracks
- Brick and mortar construction

5.4.12.2 Assets

- Architectural and visual unity
- The area has a number of auxiliary community facilities

5.4.12.3 Liabilities

- Lack of human scale environment
- Poor pedestrian infrastructure
- Inconsistent signage

5.4.12.4 General Recommendations

- New parking should support a pedestrian-friendly environment
- Waste disposal should be screened
- Parking areas should be landscaped with trees
- Streetscaping along streets, including sidewalk improvements, trees, and street furniture

Figure 5.13 - Brick and mortar construction for most buildings establishes continuity of design

5.4.13 **Training Areas/Ranges**

The Training Areas/Ranges comprise a large and critical portion of the post. In this visual zone, much of the required skills for military service are honed and developed.

Figure 5.14 – Natural wooded areas and unimproved roads characterize the training areas/ranges

5.4.13.1 Visual Character

The visual character of the Training Areas/Ranges is defined primarily by the following (Figure 5.14):

- Small-scale structures
- Natural environment
- Wooded areas
- Open space

5.4.13.2 Assets

- Space for training exercises
- Natural environment

5.4.13.3 Liabilities

- Lack of utilities
- Undefined edges

5.4.13.4 General Recommendations

- Articulate areas with signage

Camp Merrill

The following sections present a functional analysis of each of the Camp Merrill Visual Zones. This analysis includes a description of the visual character, a visual analysis map, assets, liabilities, and recommendations for each zone.

Assets and liabilities are determined according to the following criteria: installation visual goals and objectives (Section 3, Paragraph 3.2), design principles (Section 3, Paragraph 3.3) and visual elements (Section 3, Paragraph 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 liabilities or enhance assets. These recommendations are used to generate projects that are listed in Section 6, Improvement Projects.

Figure 5.15 – Airfield provides a wooded mountain vista

5.4.14 **Camp Merrill Airfield**

The airfield zone at Camp Merrill consists of a 3,000-foot runway and helicopter landing pad, although the airfield only serves rotary-wing aircraft. The helicopter landing pad serves as an informal ceremonial gathering spot. A running track surrounds the runway while training facilities are located along the eastern edge near the Etowah River, which serves as the border of the airfield. The bridge crossings of the Etowah River signify entrance/exit from the airfield.

5.4.14.1 Visual Character

The visual character of the Airfield is defined primarily by the following (Figure 5.15):

- Open space/mountain vista
- Wooded boundaries
- Simple training structures

5.4.14.2 Assets

- Natural character
- Simple structures
- Flexible space for multiple activities
- Well-defined boundaries

- Separation from living quarters

5.4.14.3 Liabilities

- Not useable by fixed-wing aircraft
- Erosion control fencing and sandbags detract from natural environment

5.4.14.4 General Recommendations

- Maintain natural setting
- Create landscape edge treatment that reduces the use of erosion control fencing and sandbags to protect the Etowah River

5.4.15 **Camp Merrill**

Camp Merrill is a self-contained community consisting of a variety of land uses and opportunities. The area includes a mix of uses including administrative, housing, storage, maintenance, industrial, and community facilities.

5.4.15.1 Visual Character

The visual character of Camp Merrill is defined primarily by the following (Figure 5.16):

- Small-scale buildings
- Forested, mountainous edges
- Hilly terrain
- Rural roads with minimal engineering

Figure 5.16- Small-scale buildings in natural, wooded mountain landscape

5.4.15.2 Assets

- Natural wooded mountain landscape setting
- Open space
- General consistency of structure size, material, and color palette

5.4.15.3 Liabilities

- Entry gate image
- Undersized facilities
- Topography limits development opportunities
- Erosion control fencing/sandbags

- Use of brick on buildings does not fit with natural environmental setting
- Surface parking lots detract from the visual character
- Lack of utilities
- Transmission line corridor
- Non-native landscape treatments
- Visual clutter of utilities, port-a-potties, jersey barriers, trash receptacles

5.4.15.4 General Recommendations

- Create improved entry gate image/guard shack
- Create road hierarchy
- Work with topography to site new buildings
- Use native landscape treatments
- Reduce grass lawn areas
- Reduce hardscape and use natural stormwater filtration such as bioswales
- Create landscape edge treatment that reduces the use of erosion control fencing and sandbags to protect the Etowah River
- Encourage consistency of massing and scale for new buildings
- Reduce nighttime light pollution with “dark-sky” light fixtures
- Preserve open space, Ranger cemetery setting, and mountain vistas
- Ensure future development plan and design guidelines are followed during new construction

5.4.16 **Camp Merrill RCI Housing**

The RCI Housing Visual Zone is located off of US-19 north of downtown Dahlonega, approximately ten miles from Camp Merrill. The original Porter Village design is a single-family, large-lot suburban development. With the completion of construction, the RCI Housing area creates a Visual Zone characterized by traditional neighborhood design (TND), providing an inviting, walkable residential community.

Figure 5.17 - Large single-family lots currently represent suburban approach to design

5.4.16.1 Visual Character

The visual character of Porter Village is defined primarily by the following (Figure 5.17):

- Single-family, large-lot homes
- Automobile-oriented design

- Sidewalks on one-side of street
- Smaller-scale neighborhood

5.4.16.2 Assets

- Wooded, hilly setting
- Smaller-scale, walkable neighborhood
- Preserved open space
- Future traditional neighborhood design

5.4.16.3 Liabilities

- Isolation/removed from Camp Merrill
- Disconnected from surrounding community
- Topography
- Automobile-oriented access/design
- Lack of street trees, landscape design
- Monotonous structures, little design variety

5.4.16.4 General Recommendations

- Create traditional neighborhood design
- Create visual and pedestrian connections to larger community
- Site buildings to minimize impact to topography and forested landscape

5.4.17 **Camp Merrill Training Areas/Ranges**

The Training Areas/Ranges comprise a small but critical portion of Camp Merrill for mountaineering skill development. Adjacent National Forest Land serves as added training space.

5.4.17.1 Visual Character

The visual character of the Training Areas/Ranges is defined primarily by the following (Figure 5.18):

- Small-scale structures
- Natural building materials
- Wooded, mountainous terrain
- Open space

5.4.17.2 Assets

- Natural wooded environment
- Space for training activities
- Newer training structures with natural materials

5.4.17.3 Liabilities

- Topography
- Erosion control fencing/sandbags
- Scattered fire pit barrels

5.4.17.4 General Recommendations

- Maintain natural setting
- Avoid non-native landscape features
- Use natural building materials
- Create landscape edge treatment that reduces the use of erosion control fencing and sandbags to protect the Etowah River

Figure 5.18- Rock climbing wall in the mountaineering training area

Links

Go to Section 6

Go to Table of Contents

Section 6 – Improvement Projects

6.1 Introduction

6.1.1 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. These improvement projects are broadly defined to encourage consistent thinking at the installation scale and are intended to address liabilities identified in Section 5.

This improvement project list is intended to be a living document. The current list contains possible projects, and the RPPB may prioritize and program projects from this improvement project list at its discretion. Furthermore, as new needs and deficiencies are identified, or as old issues become obsolete, projects may be added or dropped from this recommended improvement project list. The RPPB should review this list at least biannually.

6.1.2 The paragraphs below discuss each project at length and include existing conditions, project descriptions, design concepts, cost estimates (based on rough order-of-magnitude costs of similar projects), recommended funding sources, photographs, sketches and maintenance impact as applicable.

6.1.3 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 designed to be altered as circumstances affecting the prioritization scheme change.

6.2 Fort Benning – Suburban Main Post/Hospital Sub Area Master Plan

6.2.1 Existing Conditions:

The replacement of Martin Army Community Hospital with a new hospital building in Suburban Main Post will have a significant impact on both the function and visual character of Suburban Main Post. Existing development in this 3,400-acre zone, including the current hospital and PX Mall, is characterized by an auto-oriented, sprawling suburban pattern of internally-oriented buildings and expansive parking lots with little functional relationship to their surroundings and with little accommodation for alternative forms of transportation. With the area being scaled for the automobile, the result is an unfriendly pedestrian environment. While large-scale development is planned to occur in the area, no overall vision currently exists to ensure that future development is coordinated to maximize opportunities for improving the efficiency, functionality, and aesthetic quality of the visual zone's built environment and public realm.

6.2.2 Project Description:

Develop a sub area master plan for the Suburban Main Post Visual Zone with specific focus given to the future hospital site and PX Mall area. The master plan should begin with the establishment of a coordinated vision and needs assessment informed by the Real Property Master Plan and a planning charrette process. The master plan should consider the current and future needs of the area and use this assessment as a lens through which to view future development plans. The plan should develop an urban design framework that establishes a coherent and efficient arrangement of buildings, roadways and parking areas, and supports multiple modes of travel.

The sub area master plan should address (also see Figure 6.1):

- Estimated/potential future space needs
- Areas for future development by land use
- The scale and character of buildings, public spaces, streets, and parking areas
- Connections of pedestrian paths within and between developments
- Maintenance of edge treatments and screening of adjacent land uses that impact visual character

6.2.3 Design Concept:

The sub area master plan will create a cohesive, pedestrian friendly layout for future built-up areas that meets the needs of the installation with an efficient use of land.

6.2.4 Cost Estimate: $200,000

6.2.5 Site Plan: See Figure 6.1

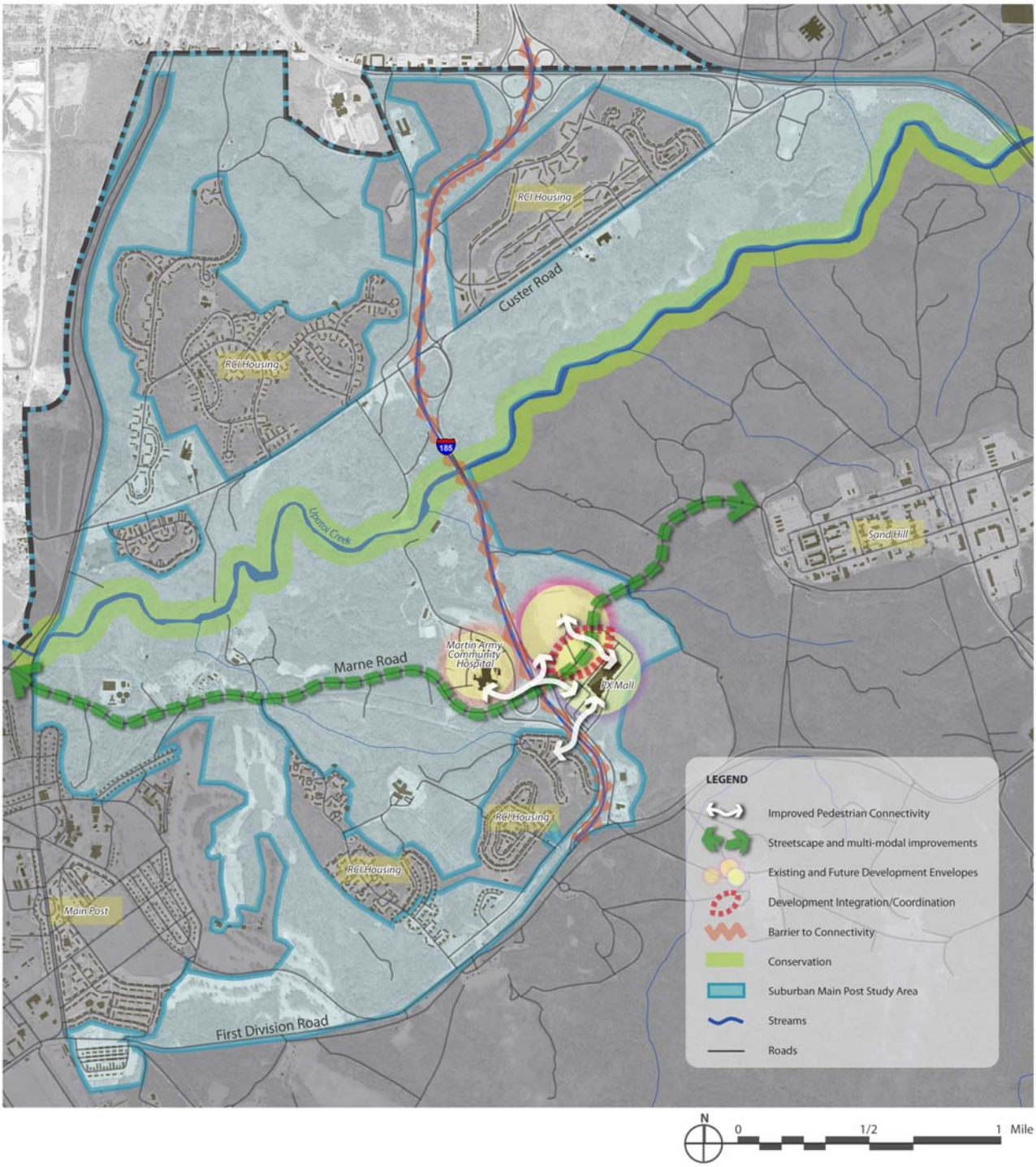
6.2.6 Maintenance Impact: None

6.2.7 Recommended Funding Source: Operations and Maintenance

Figure 6.1

Suburban Main Post Sub Area Master Plan

Planning Issues



6.3 Fort Benning – Lawson Army Airfield Sub Area Master Plan

6.3.1 Existing Conditions:

The Lawson Army Airfield area is an important and identifiable part of the Fort Benning landscape. The LAAF exhibits high-quality views, which are contained by the forested edges of the Chattahoochee River, including the naturalistic edge between LAAF and Main Post running along the north side of Indianhead Road, as well as the forested boundary surrounding the southern and western parts of the airfield perimeter. These edges ensure the visual character of LAAF.

However, parts of LAAF are disorganized and visually cluttered. Poor parking lot design at LAAF results in a lack of visual clarity and illegal parking conditions. Drivers often park outside of designated parking areas due to a lack of definition of parking lots by paving, markings, or curb and gutter. Parking lots are also often inadequately landscaped, which can diminish the aesthetic quality, create unfavorable microclimate conditions (lack of shade, heat island effect, and stormwater runoff) and make walking between parking areas and buildings less comfortable.

Figure 6.2 – Disorganized and poorly defined parking at LAAF

Finally, vehicular circulation is a liability at Lawson Army Airfield due to confusing routes, lack of spatial clarity, and a over abundance of curb cuts. Buildings are substantially set back from Indianhead Road and lack well defined circulation connections between them, encouraging drivers to depart from paved surfaces and drive over grassy areas in order to access adjacent parking areas.

Figure 6.3 – Forest buffer contains the visual experience at LAAF

6.3.2 Project Description

The Lawson Army Airfield area has several assets, including a designated historic district, several historic buildings, and high quality viewsheds. However, liabilities threaten to compromise the visual character and functional efficiency of the area. With numerous issues to consider, a sub area master plan for the 875-acre Lawson Army Airfield Visual Zone should be developed in order to set a coordinated vision for the area and identify action steps to preserve existing character-defining features and improve inefficient and poor quality circulation design.

The sub area master plan should begin with the establishment of a coordinated vision and needs assessment informed by the Real Property Master Plan and a planning charrette process, and taking into account the existing and future operational needs of the airfield area. The plan should inventory existing physical assets and liabilities, with specific focus given to viewshed containment, visual character preservation, parking organization, and improved circulation. The following issues should be addressed in the master plan (also see Figure 6.4):

- Maintain and preserve the existing forested edges of LAAF along:
  - the northeast side of Indianhead Road
  - the southern and western parts of the airfield perimeter
- Parking lot design
  - Designate/define surface parking lots with paving and pervious paving materials
  - Define edges of surface parking lots with shade and screen trees, shrubs and ground cover around the perimeter of lots (see Appendix O: Plant Palette for plant material selection)
  - Plant shade trees in existing landscape islands and install new landscape islands within parking lots
  - Curb and markings to illustrate parking and circulation areas
- Circulation improvements
  - Create pedestrian connections between parking areas and buildings
  - Create connections between adjacent parking areas
  - Reduce excessive curb cuts/define curb cuts for entrances
- Steep slopes/erosion problems
  - Replant steep slopes along northeast side of Indianhead Road to prevent erosion
  - Use best management practices for stormwater
- Landscape improvements
  - Remove invasive species such as kudzu
  - Use desired species identified in the Fort Benning plant palette (Appendix O)
- Gateway/entrance treatments
  - Install gateway treatments such as signs, landscaping, and static displays at the Indianhead Road and Dixie Road entrances to LAAF

The Lawson Army Airfield sub area master plan should be compatible with existing and proposed planning documents, including the Real Property Master Plan, Treatment Plan for Historic Buildings/Districts, Planting Master Plan, and the IDG.

6.3.3 Design Concept

The sub area master plan will create a comprehensive vision for capitalizing on the assets and improving on the liabilities of the Lawson Army Airfield area. The master plan will address issues of visual character, circulation, landscape and site design, and cultural resource preservation.

6.3.4 Cost Estimate: $150,000

6.3.5 Site Plan: See Figure 6.4

6.3.6 Maintenance Impact: None

6.3.7 Recommended Funding Source: Operations and Maintenance

Figure 6.4

Lawson Army Airfield Sub Area Master Plan

Planning Issues

6.4 Fort Benning – Planting Master Plan

6.4.1 Existing Conditions:

Fort Benning contains several areas in which attractive plantings and street trees are a major asset; however, these areas are scattered and inconsistent. Trees in and around cantonment areas provide shade, define boundaries, contribute to aesthetic character, and aid in both stormwater and microclimate control. Fort Benning's historic districts contain a number of old-growth trees, particularly species of oak that serve as essential character-defining features. However, many of these trees are aging and dying. Furthermore, a number of areas in and around the Main Post and the RCI Housing areas are severely lacking in terms of significant tree cover, and new trees planted at the redeveloped RCI Housing areas are too small to provide sufficient shade and are species that will be too small even when they are at full maturity. Poor tree cover (Figure 6.5) creates an unpleasant environment and contributes to unfavorable microclimatic conditions (heat islands).

6.4.2 Project Description:

The Planting Master Plan should be a comprehensive and integrated effort that would address historic context, force protection, landscape maintenance, pest control, and sustainability.

Planting designs should be created for the various visual zones of the installation to meet a host of needs. Among these will be improved visual screening, landscaping for parking lots, and the definition of visual zones. Xeriscaping (reducing or eliminating the need for supplemental irrigation) should also be explored, with references to sustainability best practices and plant species best suited to the local climate. Mature vegetation will be designated for preservation where appropriate, and a tree replacement program will be developed for those trees that are either inappropriately planted or are near the end of their lifespan. A tree inventory for the main post is kept by the Land Management Branch, and can be used to develop a strategy for preserving and replacing trees based on their characteristics (Tables 6-1 and 6-2). Additionally, recommended designs for the treatment of open space edges will be developed in order to provide definition of boundaries and demarcation between visual zones and activities.

Figure 6.5 – Planting is often insufficient for the intended purpose

Table 6-1: Main Post Tree Inventory - Trees to Preserve

Condition	Life Cycle	Total to Preserve
Fair	Medium or Long	7,750
Good	Medium or Long	

Table 6-2: Main Post Tree Inventory - Trees to Replace

Condition	Life Cycle	Total to Replace
Dead	Short, Medium, or Long	1,632
Poor	Short, Medium, or Long	
Fair	Short	
Good	Short	

Source: Fort Benning, 2008.

The Planting Master Plan should be integrated into Sub Area Master Plans where appropriate.

6.4.3 Design Concept:

Consistent with the goals of the Fort Benning IDG, the Planting Master Plan will balance the needs for low-impact maintenance, historic integrity, and improved installation image. Designs should reinforce the character of the installation, reflect historic planting patterns, create a consistent landscape feel, and shield visual blight. At the same time, landscape designs should minimize maintenance and watering needs and conform to force protection requirements (see Section 12, Appendix O: Plant Palette, and Appendix F: Landscape Maintenance Schedule).

6.4.4 Cost Estimate: $1,050,000 ($250,000 Planting Master Plan; $800,000 Trees)

6.4.5 Site Plan: N/A

6.4.6 Maintenance Impact: Low

6.4.7 Recommended Funding Source: Operations and Maintenance

6.5 Fort Benning - Smoking Gazebo Model Project

6.5.1 Existing Conditions:

Smoking gazebos are a common fixture throughout the installation, often placed near buildings and other gathering areas. The gazebos at Fort Benning, particularly those located in historic districts, can detract from the visual character by contrasting with the styles, themes, and other character-defining features present in the landscape. Gazebo design and detailing is difficult to manage at the installation because these furnishings are usually purchased by individual units, and are therefore not the property of DPW.

6.5.2 Project Description:

DPW should develop and fund a model gazebo project to purchase materials and construct a gazebo or modify an existing gazebo in a historic district that is compatible with the architectural character of the zone in terms of form, scale, and materials. The model gazebo should avoid detailing, articulation, and formal expressions not directly associated with its function or structural integrity. The model gazebo should therefore be architecturally "anonymous" so as to minimize visual distraction and the suggestion of architectural themes not associated with the visual zone. The model gazebo should also attempt to demonstrate adherence to Section 11.3, Site Furnishings of the IDG. The model gazebo should replace an existing gazebo, and will ideally be located in a visually prominent area, such as the cuartels area.

The purpose of this project is to encourage units to adopt this design and to avoid the acquisition of gazebos that are architecturally incompatible with their visual zone.

6.5.3 Design Concept:

The design concept is a model gazebo project that will demonstrate both conformance to Section 11.3, Site Furnishings of the IDG and compatibility with historic architectural and visual character. See Figure 6.6– illustration of gazebo.

6.5.4 Cost Estimate: $3,500

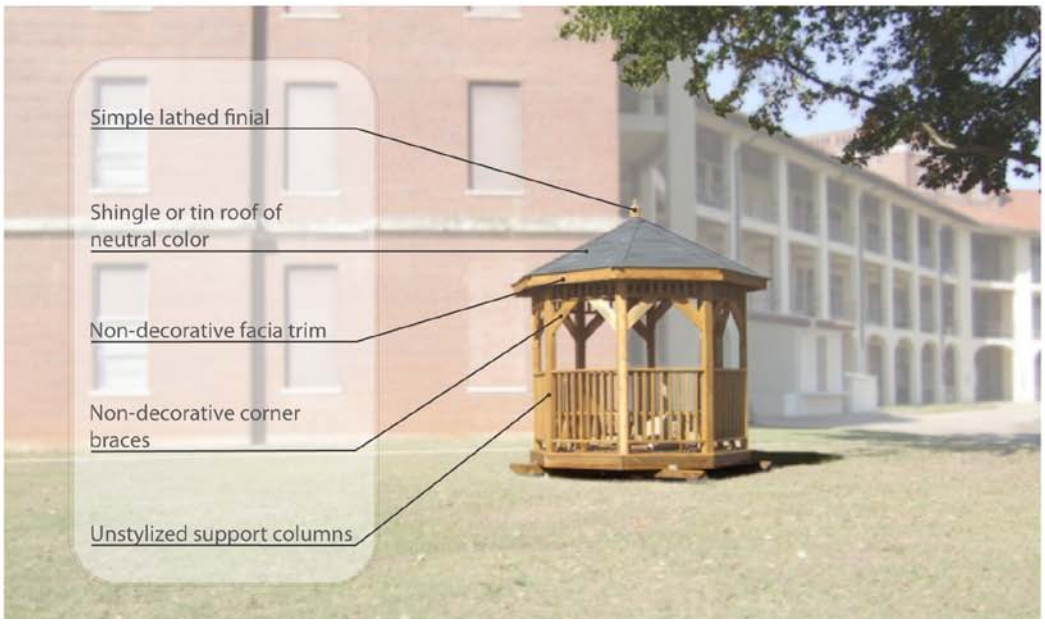
6.5.5 Site Plan: See Figure 6.6

6.5.6 Maintenance Impact: Low

6.5.7 Recommended Funding Source: Operations and Maintenance

Figure 6.6
DPW Model Gazebo Project

Existing Gazebo



6.6 Fort Benning – Force Protection Improvements at Buildings 358 and 479

6.6.1 Existing Conditions:

While force protection is an important function of installation design at Fort Benning, the temporary concrete Jersey barriers currently placed around buildings 358 and 479 dramatically contrast with the historic character of the Main Post Historic District (Figure 6.7).

6.6.2 Project Description: Create a force protection plan to replace the temporary Jersey barriers around buildings 358 and 479 with painted bollards, planters, suspended cable, and fencing in accordance with the standards found in Section 11.3, Site Furnishings**.** This project will require the installation of approximately 1,000 – 1,500 linear feet of acceptable force protection elements.

Figure 6.7 – Unsightly Jersey barrier used as force protection

6.6.3 Design Concept:

The design concept for bollards is illustrated in Section 11.3.13, Site Furnishings, Bollards**.**

6.6.4 Cost Estimate: $250,000

6.6.5 Site Plan: N/A

6.6.6 Maintenance Impact: Low

6.6.7 Recommended Funding Source: Operations and Maintenance

6.7 Fort Benning – Historic District/Visual Zone Identity and Gateway Program

6.7.1 Existing Conditions:

Visual zones at Fort Benning often lack identifying features which would otherwise communicate a distinct character. Entrances and gateways are rarely defined, leaving users without a clear sense of arrival or departure. While the Fort Benning Branding Study recommends gateway treatments for entrances to the installations and interior entrances to the cantonment areas of Sand Hill, Harmony Church, and Kelley Hill, no plan currently exists to establish gateways at entrances to the historic districts. Historic districts are particularly in need of identifying features in order to express their unique character and historical significance.

6.7.2 Project Description:

In addition to the gateways already identified in the Fort Benning Branding Study, install entrance/gateway features including signage, static displays, and landscape elements at the IDG-identified locations listed below that clearly define the boundaries of the installation's historic districts. Design and implementation of these gateways should refer to the Fort Benning Branding Study and Section 11, Site Elements of the IDG. These features will invoke the sense that one has entered or exited a distinct district within the installation. Below are eight gateway/entrance locations to historic districts which should receive identity treatments. The scale and character of gateway treatments should vary to be compatible with the character of the visual zone that they signify. These are shown in the map in Figure 6.8:

IDG- identified gateways to Historic Districts:

1. Main Post Historic District (Southbound): Lumpkin Road near intersection of Marne Road
2. Main Post Historic District (Westbound): First Division Road near the intersection of Baltzell Road
3. Main Post Historic District (Northbound/Westbound): Northwest of the intersection of Ingersoll Street, World Avenue, and Morrison Avenue
4. Main Post Historic District (Northbound): Edwards Street just south of the intersection of Wold Avenue
5. Lawson Army Airfield (Southbound): Indianhead Road at the intersection of Jecelin Road
6. Lawson Army Airfield (Southbound): Dixie Road entrance
7. Parachute Jump Towers (Westbound/Southbound): The southwest corner of the intersection of Marchant Street and Edwards Street
8. Parachute Jump Towers (Northbound): Edwards Street north of the intersection of Burr Street

Also shown in Figure 6.8 are the following gateway locations as identified by the Fort Benning Branding Study:

Branding Study-identified gateways to the Installation:

- Interstate-185 (Southbound): Terminates at the boundary of Fort Benning
- US Hwy 27/280 (Westbound): Enters at Fort Benning at the intersection of I-185
- US Hwy 27/280 (Eastbound): Enters Fort Benning just west of Cusseta
- Fort Benning Road (Southbound): Enters Fort Benning from the south side of Columbus just off Victory Drive
- South Lumpkin Road (Southbound): Enters Fort Benning vicinity of intersection of Fort Benning Boulevard and Custer Road
- Alabama Hwy 165: Enters Fort Benning vicinity of Fort Mitchell at 101st Airborne Division Road

Branding Study-identified interior gateways to Cantonment Areas:

- Sand Hill: Main entrance off Custer Road at 11th Airborne Division Road
- Sand Hill: Back entrance from 2nd Armored Division Road
- Harmony Church: Main entrance of US Hwy 27/280 at 1st Division Road

- Harmony Church: Back entrance from 8th Division Road
- Kelley Hill: Main entrance off 1st Division Road at Ivy Road
- Kelley Hill: Back entrance from Marne Road

6.7.3 Design Concept:

Provide for the distinct image and identity of each historic district visual zone by articulating gateways and entrances with signs, landscape features, site elements, and the installation of unique markers throughout the various zones.

6.7.4 Cost Estimate: $200,000 ($25,000 x 8 IDG-identified gateways) **NOTE: Cost does not include gateways identified in the Fort Benning Branding Study.**

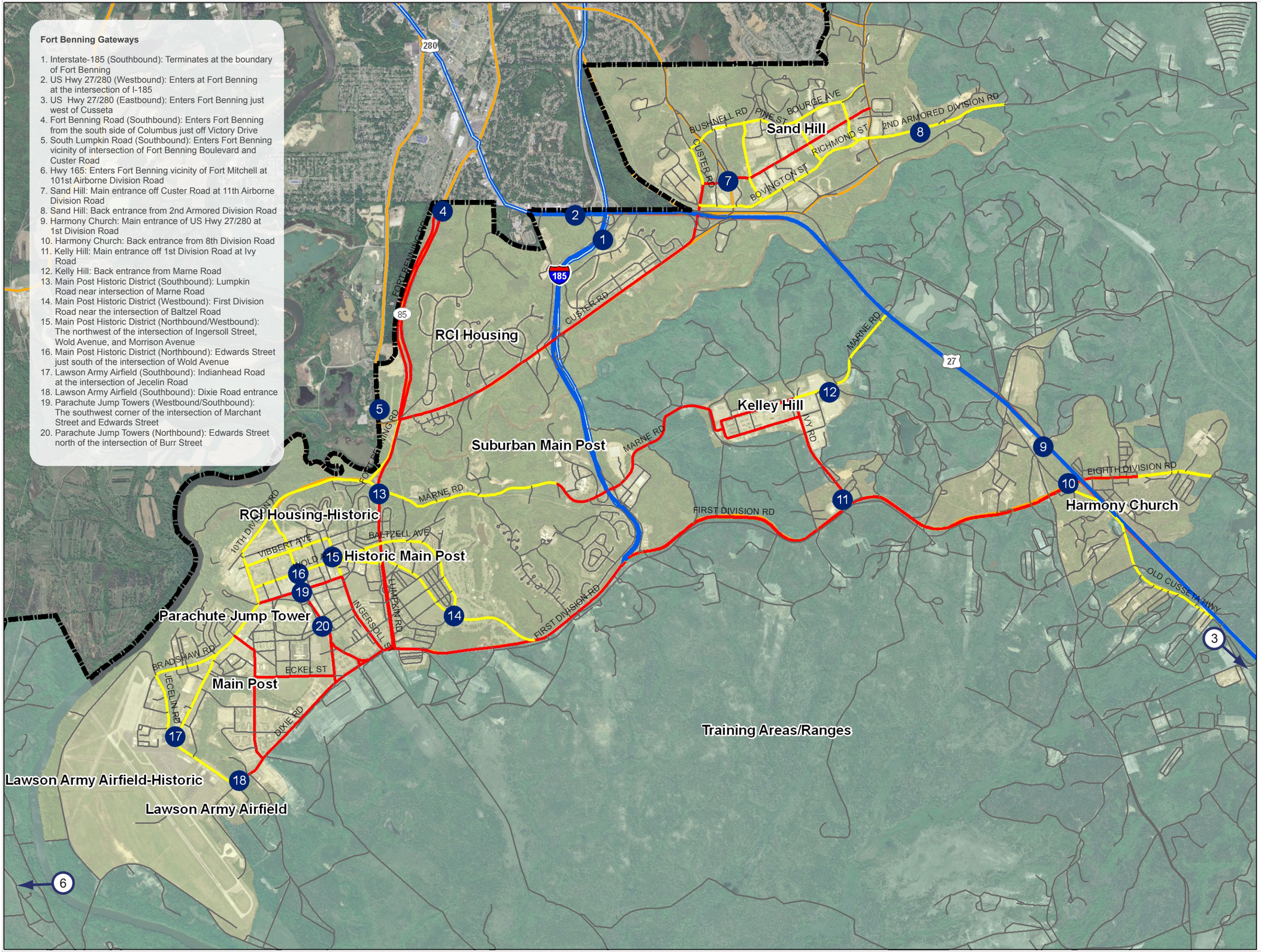
6.7.5 Site Plan: See Figure 6.8

6.7.6 Maintenance Impact: Moderate

6.7.7 Recommended Funding Source: Operations and Maintenance

Figure 6.8

Fort Benning Gateways



Fort Benning Gateways

1. Interstate-185 (Southbound): Terminates at the boundary of Fort Benning
2. US Hwy 27/280 (Westbound): Enters at Fort Benning at the intersection of I-185
3. US Hwy 27/280 (Eastbound): Enters Fort Benning just west of Cusseta
4. Fort Benning Road (Southbound): Enters Fort Benning from the south side of Columbus just off Victory Drive
5. South Lumpkin Road (Southbound): Enters Fort Benning vicinity of intersection of Fort Benning Boulevard and Custer Road
6. Hwy 165: Enters Fort Benning vicinity of Fort Mitchell at 101st Airborne Division Road
7. Sand Hill: Main entrance off Custer Road at 11th Airborne Division Road
8. Sand Hill: Back entrance from 2nd Armored Division Road
9. Harmony Church: Main entrance of US Hwy 27/280 at 1st Division Road
10. Harmony Church: Back entrance from 8th Division Road
11. Kelly Hill: Main entrance off 1st Division Road at Ivy Road
12. Kelly Hill: Back entrance from Marne Road
13. Main Post Historic District (Southbound): Lumpkin Road near intersection of Marne Road
14. Main Post Historic District (Westbound): First Division Road near the intersection of Baltzel Road
15. Main Post Historic District (Northbound/Westbound): The northwest of the intersection of Ingersoll Street, Wold Avenue, and Morrison Avenue
16. Main Post Historic District (Northbound): Edwards Street just south of the intersection of Wold Avenue
17. Lawson Army Airfield (Southbound): Indianhead Road at the intersection of Jecelin Road
18. Lawson Army Airfield (Southbound): Dixie Road entrance
19. Parachute Jump Towers (Westbound/Southbound): The southwest corner of the intersection of Marchant Street and Edwards Street
20. Parachute Jump Towers (Northbound): Edwards Street north of the intersection of Burr Street

Legend

- Gateways

Road Hierarchy

- Highway
- Primary
- Secondary
- Tertiary

Other Roads

- Limited Access
- Highway
- Major Road
- Cantonment Areas
- Training Areas/Ranges
- Installation Boundary

0 2,000 4,000 8,000
Feet

August 2010
Improvement Projects

6.8 Fort Benning – Harmony Church Roadway Screening

6.8.1 Existing Conditions:

The new barracks and training complexes being constructed at Harmony Church depart markedly from the scale and general character that currently defines the area. If screening and viewshed protection is not undertaken, the visual character of Harmony Church will be significantly altered. Forested buffers along roadway edges help to preserve the current visual character.

6.8.2 Project Description:

Enhance and preserve the natural forested buffers that exist between major new construction areas and surrounding roads and destinations. In order to maintain forested edges both to screen visual impacts and to define views, a planting project should be undertaken using Longleaf Pine or similar (see Appendix O: Plant Palette) along existing forested edges (see Figure 6.9). The project is estimated to include approximately 9 acres of planting.

6.8.3 Design Concept:

The visual character and integrity of the forested views currently associated with Harmony Church will be protected. These forested areas will enhance screening of undesirable views and edge preservation.

6.8.4 Cost Estimate: $35,000

6.8.5 Site Plan: See Figure 6.9

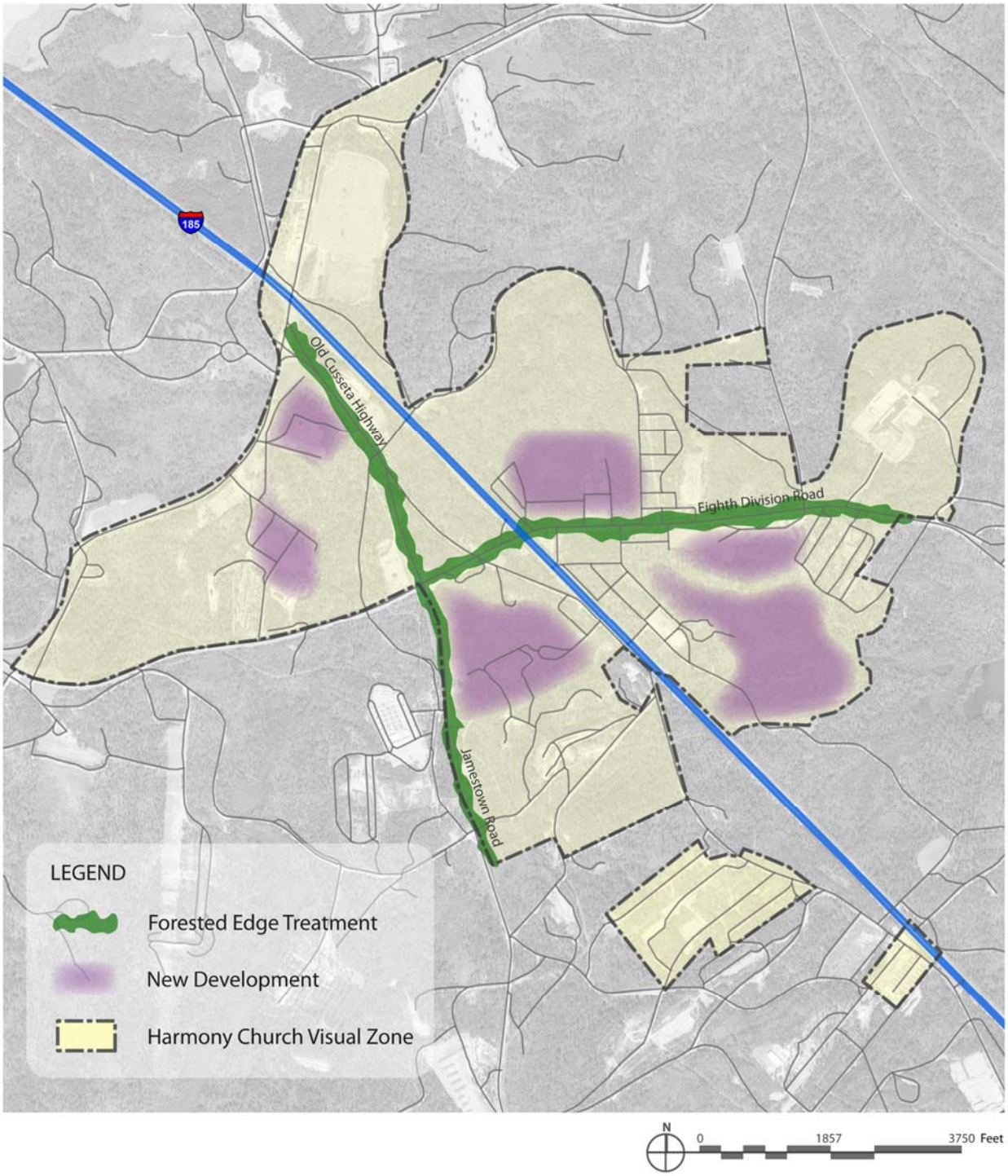
6.8.6 Maintenance Impact: Low

6.8.7 Recommended Funding Source: Operations and Maintenance

Figure 6.9

Forested Roadway Screening

Harmony Church



6.9 Camp Merrill – Streetscape Master Plan

6.9.1 Existing Conditions:

Streetscapes are generally lacking in quality at Camp Merrill. As a result, roadways lack definition and visual clarity, as well as basic pedestrian features.

Figure 6.10 – Existing non-native landscape elements

6.9.2 Project Description:

Develop a streetscape master plan for roads in the Camp Merrill Visual Zone based on their hierarchical classification as defined in Section 9.3, Circulation, Roadway Hierarchy, and shown in Figure 9.6. A streetscape design consists of the width and number of lanes, width and material of the sidewalk, the selection of street furniture and location, and the selection of plantings. Streetscape designs may need to adapt to changing topographic and building conditions around the street. A unified streetscape design promotes walking by making it comfortable and also promotes an orderly and unified image for the public realm by clearly defining pedestrian and vehicular spaces. The Streetscape Plan should reference the Camp Merrill Future Development Plan. See Table 6-3 for estimates on the linear measurement of each roadway classification within the Fort Merrill Visual Zone.

Table 6-3: Roadway Classification and Estimates

Roadway Classification	Linear Feet
Secondary	1,554
Tertiary	2,532

6.9.3 Design Concept

The design concept involves the installation of hard and soft landscape materials with the intent of improving the visual clarity, functional quality, and safety of the pedestrian environment within the Camp Merrill Visual Zone.

6.9.4 Cost Estimate: $4,100,000 ($1,000/linear foot)

6.9.5 Site Plan: See Figure 9.6

6.9.6 Maintenance Impact: Moderate

6.9.7 Recommended Funding Source: Operations and Maintenance

6.10 Camp Merrill – Planting Master Plan

Figure 6.11 – Existing erosion fencing at Camp Merrill

6.10.1 Existing Conditions:

Camp Merrill's setting is a naturally wooded mountainous landscape. Forest areas serve both training and recreational needs. Existing landscape treatments often fail to incorporate native landscape features. There is currently an overreliance on mowed lawns and other non-native landscaping in certain areas (Figure 6.10). Landscaping is underutilized as a means of enhancing the design environment. In addition to aesthetic considerations, vegetation can serve as a sustainable alternative in solving practical landscape problems. Specifically, erosion is a major liability at Camp Merrill due to steep slopes and the presence of impervious surfaces such as pavement. Sand bags and erosion control fences are currently being used to control erosion along the Etowah River, instead of the more sustainable, low-impact designs such as swales and natural plantings (Figure 6.11).

6.10.2 Project Description:

The Planting Master Plan should be a comprehensive and integrated effort addressing ecological context, force protection, landscape maintenance, erosion prevention, and pest control.

Planting designs should be created to meet various needs, and will focus on the roughly 50-acre more urban Camp Merrill Visual Zone, assuming the naturalistic appearance of the other visual zones is maintained. Among the needs to be addressed are improved visual screening, landscaping for aesthetic and ecological context, stormwater management, and erosion control. In addition, areas of significant natural vegetation will be designated for preservation. For erosion control, a project should specifically be designed to construct a bioretention system in the central green area near Army Ranger cemetery and the grassy areas east of the student and cadre barracks. These areas will be re-vegetated with absorptive native or like non-invasive plant species (see Appendix O: Plant Palette), which will effectively filter pollutants and slow peak discharge of stormwater to create natural erosion control.

6.10.3 Design Concept:

Consistent with the goals of the Fort Benning IDG, the Planting Master Plan will balance the needs for low-impact maintenance, sustainability, and improved installation image. Designs should reinforce the character of the installation, respect ecological conditions, create a consistent landscape feel, and shield visual blight. At the same time, landscape designs should minimize maintenance needs and conform to force protection requirements.

6.10.4 Cost Estimate: $75,000

6.10.5 Site Plan: N/A

6.10.6 Maintenance Impact: Low

6.10.7 Recommended Funding Source: Operations and Maintenance

6.11 Camp Merrill – Parking Lot Design Improvements

6.11.1 Existing Conditions:

Jersey barriers are currently being used to control parking and for force protection. Although the function they provide is necessary, Jersey barriers compromise the visual character of Camp Merrill (Figure 6.12).

6.11.2 Project Description:

Replace Jersey barriers with a more character-sensitive design. Define parking areas with a system of boulders and/or planters to define parking areas (Figure 6.13).

6.11.3 Design Concept:

Improve installation character by replacing Jersey barriers with a system that is less intrusive on the installation's visual character.

6.11.4 Cost Estimate: $25,000, 1 to 2 boulders to replace each Jersey barrier

6.11.5 Site Plan: N/A

6.11.6 Maintenance Impact: Low

6.11.7 Recommended Funding Source: Operations and Maintenance

Figure 6.12 – Use of jersey barriers to define parking areas

Figure 6.13 – Use boulders in place of jersey barriers to define parking areas at Camp Merrill

Links

Go to Section 7

Go to Table of Contents

Section 7 - Site Planning Design Standards

7.1 Introduction

7.1.1 Site Planning is the process of arranging an external physical environment in complete detail to include 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) 3-210-06A, *Design: Site Planning and Design* for detailed guidance on site planning to include program analysis, site analysis, site verification, and concept development. This Technical Manual (TM) 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* and the Army Sustainable Range Program at https://srp.army.mil/. Environmental documentation will be prepared prior to site selection to support the construction activity in accordance AR 200-2, *Environmental Effects of Army Actions*.

7.1.2 The site planning component guides the spatial arrangement of the installation and also applies to sites developed by private entities on the installation (Figure 7.1). The Real Property 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 installation master plan.

7.1.3 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 Standards

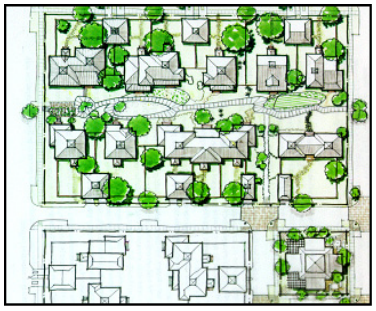


Figure 7.1 - Site plan

7.2 Site Planning Objectives

7.2.1 The goal of site planning for the installation is to produce an attractive, sustainable development. Sustainability requires that the built environment be designed and constructed to preserve and enhance the natural environment. Manmade facilities should be 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.

7.2.1.1 Preserve natural site features such as topography, hydrology, vegetation, and tree cover.

7.2.1.2 Locate facilities with consideration of climatic conditions such as wind, solar orientation, and microclimate.

7.2.1.3 Preserve the natural site by molding development to fill around existing land forms and features. This development approach minimizes extensive earthwork, preserves existing drainage patterns, and preserves existing vegetation.

7.2.1.4 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.

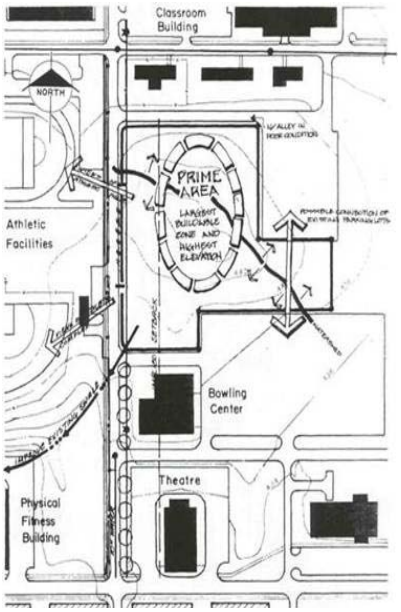


Figure 7.2 - Site opportunity and constraint plan

7.3 Site Planning Considerations

7.3.1 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 site planning (Figure 7.2).

7.3.2 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, Paragraph 2.8). This includes the avoidance of site barriers through the use of curb cuts, ramps, handrails, and grade-level entrances. 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.

7.3.3 Environmental

Environmental issues to consider in the preparation of a site plan include any action or proposal that has a detrimental effect on a site area's land, water, or air quality; cultural resources; or sensitive species and/or habitat. 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.

7.3.3.1 NEPA requires environmental documentation at one of three levels, depending upon the size, scope, and expected environmental impact of a project. The first level is the Record of Environmental Consideration (REC), which is used to determine the exemption of certain projects from further NEPA requirements. The FB-144R form serves as the REC at Fort Benning. The second level of documentation is the Environmental Assessment (EA), which is a document used to determine whether significant environmental impact may occur as a result of a proposed action. Finally, an Environmental Impact Statement (EIS) is prepared if the EA or other documentation suggests that a project may significantly impact the environment. The EIS submitted to the U. S. Environmental Protection Agency (EPA), which reviews and responds to filed impact statements. Information pertaining to the NEPA process can be found at the EPA's NEPA website and at Fort Benning's NEPA website.

7.3.3.2 Designs for facilities associated with maintenance operations, storage of Bulk Storage Containers (BSC) with capacity greater than 55 gallons, fueling operations, vehicle washing, food operations (i.e. dining facilities, kitchens operations, grease traps, grease rendering bins), and pretreatment facilities (i.e. oil/water separators, oil traps) must meet the design requirements set out in 40 CFR (Code of Federal Regulations) 112 SPCC (Spill Prevention, Control, and Countermeasure), 40 CFR 125 (Stormwater Discharge Prevention), Army Regulation (AR) 200-1, *Environmental Enhancement and Protection*, and the Columbus Water Works (CWW) Ordinance (see the Columbus, GA Code of Ordinances for additional information.)

7.3.3.3 Designs for facilities associated with storage of POL (petroleum/oil/lubricant) and/or hazardous material or waste containers with capacity less than 55 gallons must meet the design requirements in Army Regulation (AR) 200-1 and the National Pollution Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) program. See the EPA MS4 website for additional information.

7.3.3.4 Designs for installation of underground storage tanks are required to meet 40 CFR 280 and Army Regulation (AR) 200-1 design requirements.

7.3.3.5 An Erosion Sedimentation and Pollution Control Plan (ESPCP) is required for any design for construction involving land disturbance of an area greater than one acre (less than one acre if part of development) in order to comply with the Georgia Environmental Protection Division (EPD) or Alabama Department of Environmental Management (ADEM) National Pollution Discharge Elimination System (NPDES) permit programs. Additional information regarding the state NPDES permit programs can be found at the following websites:

- Georgia Environmental Protection Division Water Protection Branch
- Alabama Department of Environmental Management NPDES

7.3.3.6 An Erosion Sedimentation and Pollution Control Plan (ESPCP) is required for any design for construction involving land disturbance of an area less than one acre in order to meet basic erosion controls during implementation and including pollution prevention measures to meet the Georgia Environmental Protection Division (EPD) municipal separate storm sewer system (MS4) permit program for stormwater management. Projects are to be designed to provide site runoff control for post-construction stormwater management.

7.3.3.7 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, and information regarding the processing of permits can be obtained at the following Corps of Engineers website.

- Statutory, Administrative, and Judicial Materials

7.3.3.8 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 Real Property Master Plan and environmental overlay and the Installation Natural Resources Management Plan (INRMP) should be reviewed prior to the development to determine potential impacts on areas identified as threatened and endangered species habitat areas.

7.4 Site Planning Design Criteria

7.4.1 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 are 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 related to site planning.

7.5 Natural Conditions

7.5.1 Topography

The natural terrain is 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 (Figures 7.3 and 7.4).

7.5.1.1 Maintain natural ground slopes and elevations.

7.5.1.2 Align roadways and buildings along topographic lines.

7.5.1.3 Locate facilities that have expansive ground coverage on relatively flat terrain.

7.5.1.4 Use moderately sloping areas for buildings with less ground coverage area.

7.5.1.5 Avoid development on steep slopes.

7.5.1.6 Avoid development in natural drainage ways and flood plains.

7.5.1.7 Provide a reasonable balance of cut and fill.

7.5.2 Hydrology

The site planning team will consider the following hydrologic concerns related to natural drainage corridors, floodplains, and waterways during the site planning process.

7.5.2.1 Preserve and maintain natural drainage areas and floodplains.

7.5.2.2 Limit development in floodplains to open spaces and recreation uses.

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

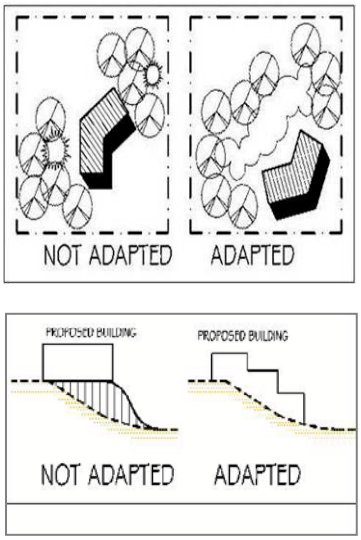


Figure 7.3 - Accommodate natural conditions

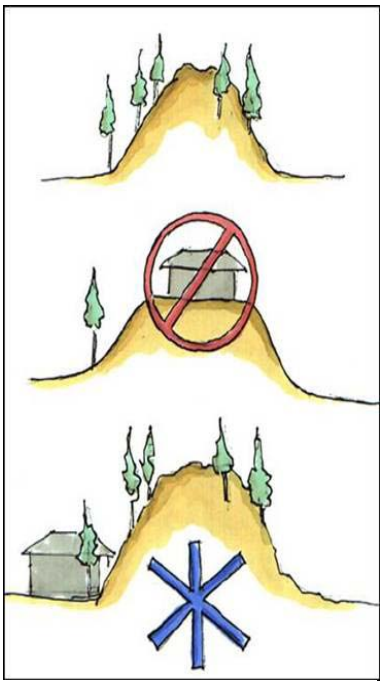


Figure 7.4 - Develop around natural landforms

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 (Figure 7.5).

7.5.3.1 Cool Regions

Design and site development by maximizing the warming effect of solar radiation in winter and reduce the impact of cold winter winds.

7.5.3.2 Temperate Regions

Design and site development to balance the effects of seasonal thermal variations promoting both winter heating and summer cooling in terms of seasonal solar orientation and prevailing winds.

7.5.3.3 Hot Arid Regions

Design and site development to minimize solar heat gain, maximize shade and encourage humidity in outdoor spaces.

7.5.3.4 Hot Humid Regions

Design and site development to minimize solar heat gain and promote air movement and cross ventilation.

7.5.4 Views and Vistas

The installation should be designed to preserve and enhance scenic and other attractive views and vistas, and to screen unattractive views and vistas. Views through open spaces provide a sense of orientation, relief, and enjoyment.

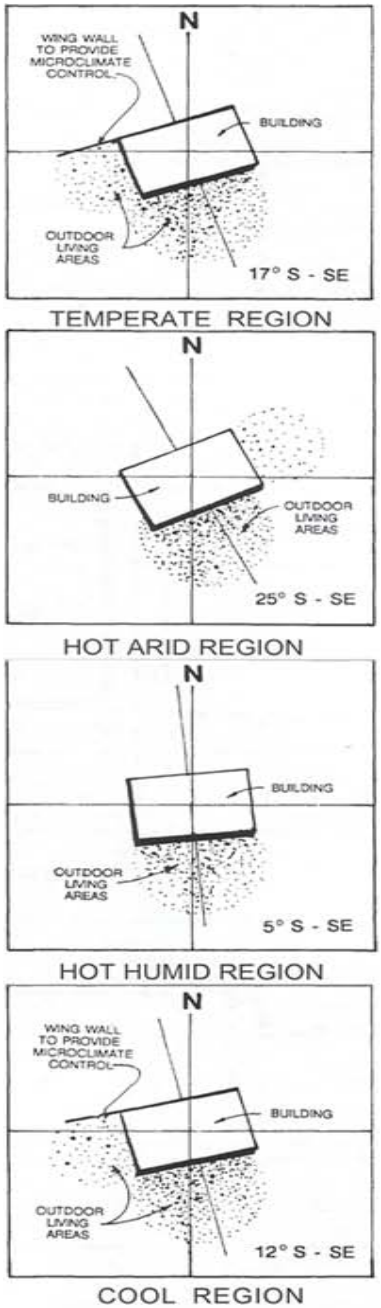


Figure 7.5 - Building oriented for passive solar heating and cooling

7.5.5 Vegetation

The installation will be designed to protect and preserve existing native vegetation. 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

7.6.1 The site plan provides the locations for manmade development to 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.

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

7.6.2.1 Cluster buildings to reduce impact on the natural environment, and to reduce roadways and utility corridors needed to serve the development; however, at the same time fully consider antiterrorism and force protection requirements.

7.6.2.2 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).

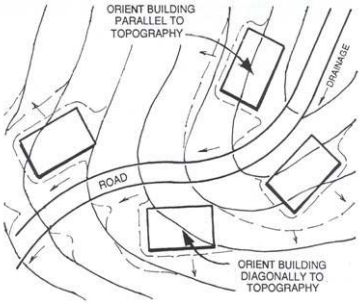


Figure 7.6 - Orient buildings and roads to topography

7.6.2.3 Minimize solar heat gain for cooling and maximize solar heat gain and retention for heating.

7.6.2.4 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.

7.6.2.5 Orient outdoors pedestrian areas for most comfortable exposure.

7.6.2.6 Utilize lighter colored building surfaces exposed to the sun and darker colors on recessed surfaces to absorb radiation.

7.6.2.7 Orient windows according to impact of climatic conditions.

7.6.2.8 Locate development on leeward side of hills.

7.6.2.9 Design and locate roads to provide a hierarchy of traffic carrying capacities.

7.6.2.10 Locate roads to blend with topography and vegetation.

7.6.2.11 Design and locate parking lots to minimize visual impact of broad expanses of pavement and vehicles (Figure 7.7).

7.6.2.12 Design and locate pedestrian walkways and bicycle paths to fit the site design, and provide a comfortable pedestrian experience, limiting conflicts with vehicular traffic.

7.6.2.13 Locate trees and shrubs to buffer harsh conditions (Figure 7.7).

7.6.2.14 Deciduous vegetation provides for sun in the winter and shade in the summer. Evergreen vegetation provides a windbreak for cold north winds.

7.6.2.15 Design and locate site elements to blend with and enhance the natural environment.

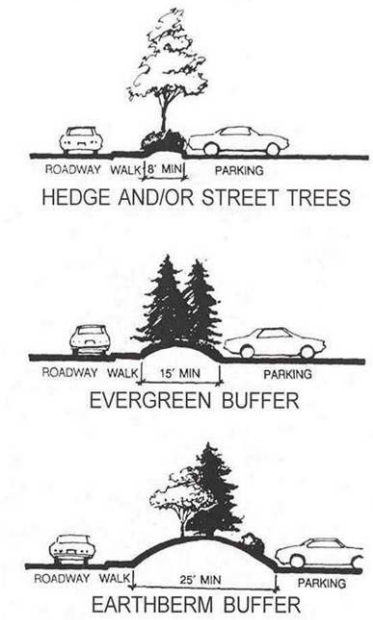


Figure 7.7 - Screen parking areas

7.6.2.16 Force Protection requirements should be designed and located to blend with the natural environment.

7.6.2.17 Define edges between spaces, such as parking lots and open spaces, with vertical landscape and other buffer elements.

7.6.2.18 Cultural Resources

Design and site development should consider the location of cultural and historic sites and resources and avoid encroachment upon or conflict with such sites. Site planning in historic districts should consider relevant treatment plans.

7.7 Army Standards

7.7.1 The following Army Standards shall be met.

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

7.8 References

7.8.1 The following references are provided for guidance.

- Army Regulation (AR) 200-1, *Environmental Enhancement and Protection*
- Army Regulation (AR) 200-2, *Environmental Effects of Army Actions*
- Army Sustainable Range Program. https://srp.army.mil/.
- Master Planning Instructions (MPI)
- Technical Instructions (TI) 800-01, *Design Criteria*
- Technical Instructions (TI) 801-02, *Family Housing*
- Unified Facilities Criteria (UFC) 3-210-01A, *Design: Area Planning, Site Planning, and Design*
- Unified Facilities Criteria (UFC) 3-230-17FA, *Design: Drainage for Areas Other than Airfields*
- Unified Facilities Criteria (UFC) 3-400-01, *Design: Energy Conservation*
- 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) 2-600-01, *Installation Design, Chapter 7*
- 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) 3-230-15FA, *Design: Subsurface Drainage Facilities for Airfields and Heliports*
- Whole Building Design Guide

Links

Go to Section 8
Go to Table of Contents

Section 8 – Building Design Standards

8.1 Introduction

8.1.1 The design character of an installation's buildings, including those built by private entities on the installation affect the installation's 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 (Figures 8.1 and 8.2).

Figure 8.1 – Sand Hill Visual Zone

8.1.2 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.

8.1.3 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.

Figure 8.2 – Historic Main Post Visual Zone

8.1.4 This section provides the objectives and visual determinants that should be utilized to identify and assess the building design quality of the installation. The section also provides standards and guidance pertaining to the development and maintenance of the various interiors and exteriors of buildings on the installation.

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.

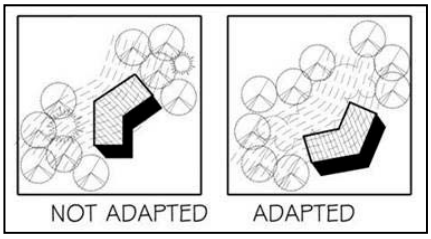


Figure 8.3 – Adapt building design to site conditions

8.2.2 Building Design Objectives:

8.2.2.1 Adapt building designs to natural site conditions (Figure 8.3).

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

8.2.2.3 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.

8.2.2.4 Design buildings to include more floors in a vertical structure that results in a smaller footprint and more efficiently utilizes limited installation land areas.

8.2.2.5 Combine multiple and compatible activities in one building to reduce the number of buildings required and for more efficient utilization of limited installation land areas.

8.2.2.6 Design multiple use facilities with the capability to quickly change interior layouts to accommodate changing requirements. Consider the impact that the building's structural system will have on floor plan options.

8.2.2.7 Use indigenous construction materials and practices that require less energy to produce and transport and may be recycled at the end of their usefulness (Figure 8.4).

8.2.2.8 Locate windows to maximize natural light, ventilation and outward views.

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

Figure 8.4 – Use of indigenous construction materials reduces transportation cost

8.3 Structural Character

8.3.1 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.

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

8.3.3 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:

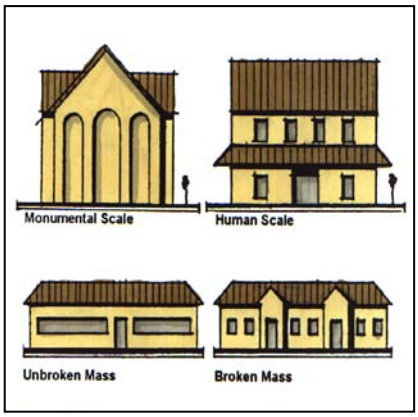


Figure 8.5 – Structure scale and massing

8.3.3.1 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 (Figures 8.5, 8.6 and 8.7). 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 and headquarters complexes. These buildings make use of large, glazed areas at entrances and oversized fenestration elements to create a scale appropriate to the building's use. Scale and relief should be provided through roof form, fenestration, building articulation and landscape plantings.

Figure 8.6 – Example of monumental scale

Figure 8.7 – Example of human scale

8.3.3.2 Massing. Massing refers to the overall bulk or volume of a building or buildings (Figure 8.8). The size and proportion of the individual buildings in a grouping of buildings should be designed to be proportionally compatible with the adjacent structures.

8.3.3.3 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.

8.3.3.4 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 8.9). However, color schemes throughout the installation often vary according to the visual zone and visual theme in which the structure is located.

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

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

8.3.3.7 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. 8.8).

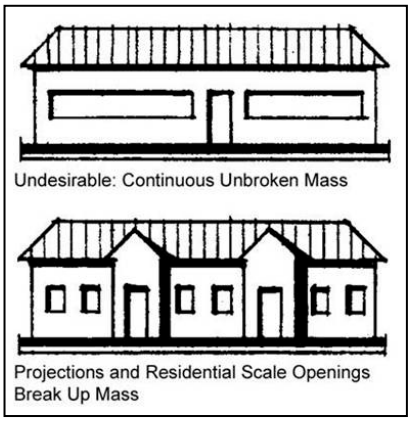


Figure 8.8 – Fenestration breaks up a building's mass

Figure 8.9 – Color and form contribute to a sense of place

8.4 Building Entrances

8.4.1 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 (Figure 8.10).

8.4.2 The entrance to a building should be in a prominent location and should be oriented toward the primary adjacent public spaces such as a courtyard, lawn, parking lot, or street.

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

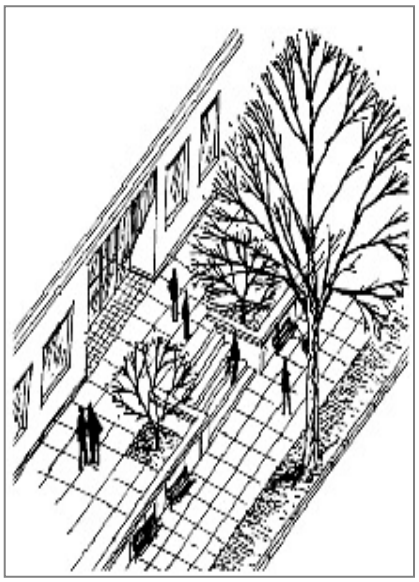


Figure 8.10 – Entrance is a positive visual experience

8.5 Service Areas

8.5.1 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.

8.5.2 Service areas should be screened as an enclosure by using walls and landscaping (Figure 8.11). Screen walls should be between six and eight feet high and should be in harmony with the adjacent building.

8.5.3 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 shall be placed a minimum of 10 meters (33 feet) from all other inhabited structures (UFC 4-010-01, Table B-1).

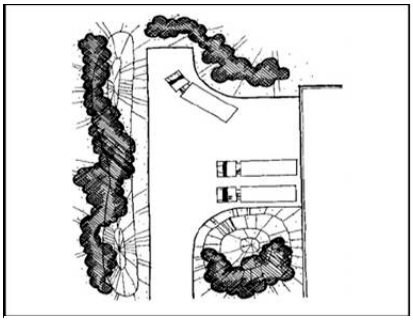


Figure 8.11 – Plants and berms in service area as a positive visual image

8.6 Building Accessibility

8.6.1 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 (Figure 8.12).

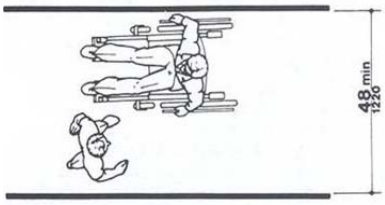


Figure 8.12 – Facilities must meet accessibility standards

8.6.1.1 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.

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

8.7 Building Code and Seismic Policy

8.7.1 The building code for Fort Benning and Camp Merrell is the International Building Code (IBC). 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.

8.7.2 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.

8.7.3 Exceptions to Seismic Evaluations. Existing facilities are exempt from seismic evaluation if:

- The original design was done according to the provisions of the 1992 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.

8.7.4 New Facilities or Additions or Extension of Existing Facilities.

8.7.4.1 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 (Figure 8.13). Indigenous design elements should be utilized in the design of new buildings.

Figure 8.13 – Use of locally available building materials reduces transportation cost

8.9 Historic Architecture

8.9.1 The Department of Defense follows a number of laws, regulations, and policies in order to ensure cultural resources management at its facilities. Protecting and preserving historic resources is consistent with Department of Defense and Fort Benning installation goals. The Army serves as a steward of an important part of our nation's cultural heritage, those cultural resources that are contained within Army installations.

Maintaining historic buildings, districts, and resources is not merely the responsibility of the historic preservation planner or master planner but all staff actively involved in installation management Figures 8.14 and 8.15). All activities related to installation management, including construction, rehabilitation, preservation, maintenance, demolition, and installations are part of this purview. Historic preservation concerns range far beyond a particular historic building or resource. Activities affecting master planning, site design, buildings, interiors, landscapes, utilities, lighting, site elements, access, force protection, and accessory structures are all of potential concern for maintaining historic resources and should follow the relevant design guidance. Any installation management activity that occurs in an historic district or in the vicinity of an historic building should consult the relevant design guidance with the presumption that this design guidance applies.

Figure 8.14 – Fort Benning historic building

All those engaged in installation management activities should be aware of the general standards for historic preservation published by the Department of the Interior (Reference to Chapter 5: Design Standards). In addition, persons engaged in activities that have an impact on ***views and viewsheds*** should be aware of the particular historic resource preservation standards relevant to that activity. All installation management activities should be conducted in a manner that complements existing historic resources wherever feasible and minimizes visual impacts to or around these resources.

Figure 8.15 – Fort Benning historic building

8.9.2 The visual integrity of historic buildings or districts on the installation will be preserved and protected. Treatment Plans for all historic

buildings exist and should be consulted during the design process (see ftp://ftp.benning.army.mil/CulturalRes). The Army's management of historic properties is pursuant to the duties and responsibilities established by Congress under the National Historic Preservation Act of 1966 as amended (NHPA) and the National Register of Historic Places (NRHP). The NHPA 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:

8.9.2.1 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 or National Register (Figures 8.14 and 8.15).

8.9.2.2 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.

8.9.2.3 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 (Figure 8.14).

8.9.3 For further guidance use Army Regulation 200-1 and the Fort Benning Integrated Cultural Resource Management Plan (ICRMP). 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. For cultural resources management, see Department of Defense Instruction Number 4715.16.

8.9.4 See Appendix M, Historic Preservation Guidelines and DoD-Wide Historic Guidelines.

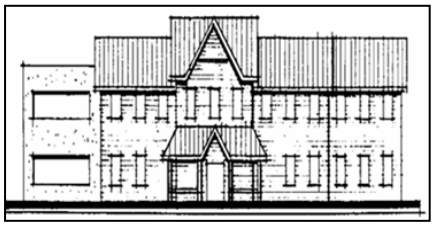


Figure 8.16 – Example of incompatible addition

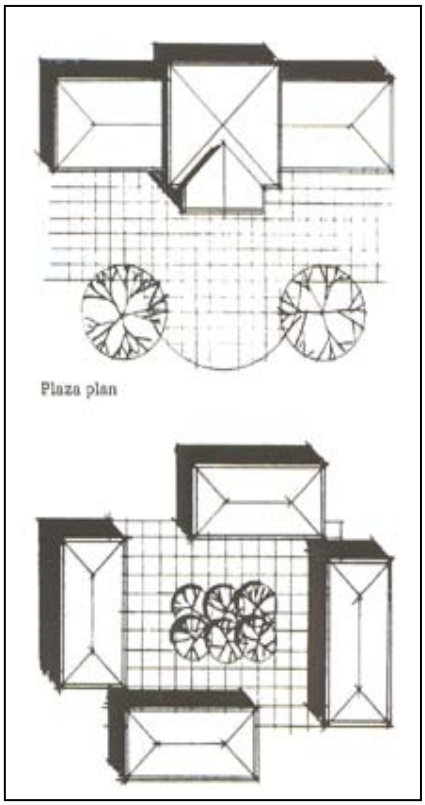


Figure 8.17 – Plazas and courtyards as design elements

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 (Figure 8.16). 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 8.17). 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 is required on building construction and renovation projects regardless of the funding source. Fort Benning DPW is not in the business of interior design or approval of office furnishings and furniture. The U.S. Army Corps of Engineers pays for interior design consultants for these services on all but small projects. 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 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.

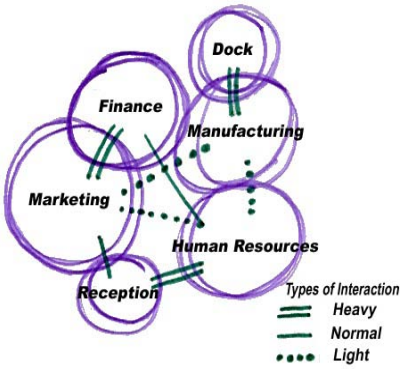


Figure 8.18 – A typical bubble diagram indicating group relationships

8.13.4 Space Planning.

8.13.4.1 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.

8.13.4.2 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.

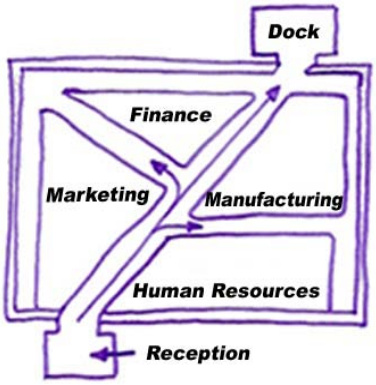


Figure 8.19 – A typical blocking diagram demonstrating the fit into the building footprint

8.13.4.2.1 Bubble Diagrams. Bubble diagrams show the working relationship of one group to another (Fig 8.18). 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 or service provided is analyzed. Bubble diagrams assist in organizing an existing facility as well as a new facility.

8.13.4.2.2 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 (Figure 8.19).

8.13.4.2.3 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.

8.13.5.1 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.

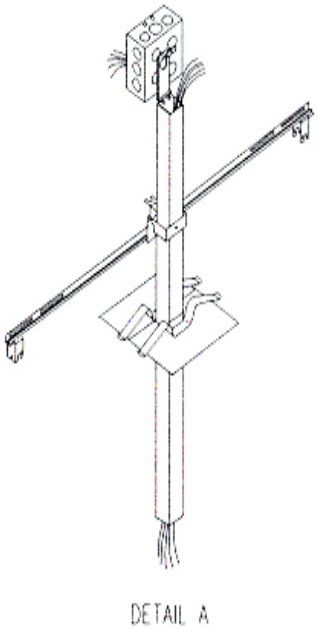


Figure 8.20 – System furniture utility column for electrical and communication distribution

8.13.5.1.1 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.

8.13.5.1.2 Facilities outside the United States must comply with the applicable host nation standards; refer to Technical Manual 5-688, *Foreign Voltages and Frequencies Guide*, for additional information.

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

8.13.5.2.1 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.*

8.13.5.3 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 (Figure 8.20). Underground electrical would typically only be for new construction or major renovations that replace the electrical system of the building, and not for older or historic structures.

8.13.6 Color.

8.13.6.1 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.

8.13.6.2 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.

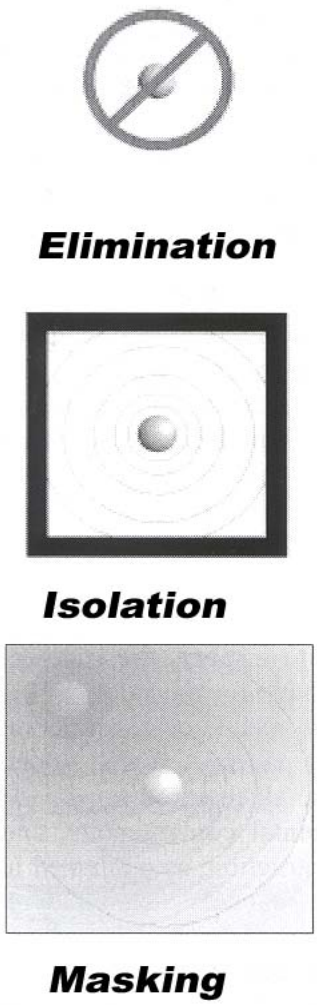


Figure 8.21 – Control noise sources

8.13.7 Acoustics.

8.13.7.1 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 (Figure 8.21).

8.13.7.2 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.

8.13.8.1 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.

8.13.8.2 For Army installation buildings to achieve a high quality lighting environment, lighting equipment/systems selected must satisfy both performance and aesthetics (Figure 8.22). 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.

8.13.8.3 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.

8.13.8.4 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.

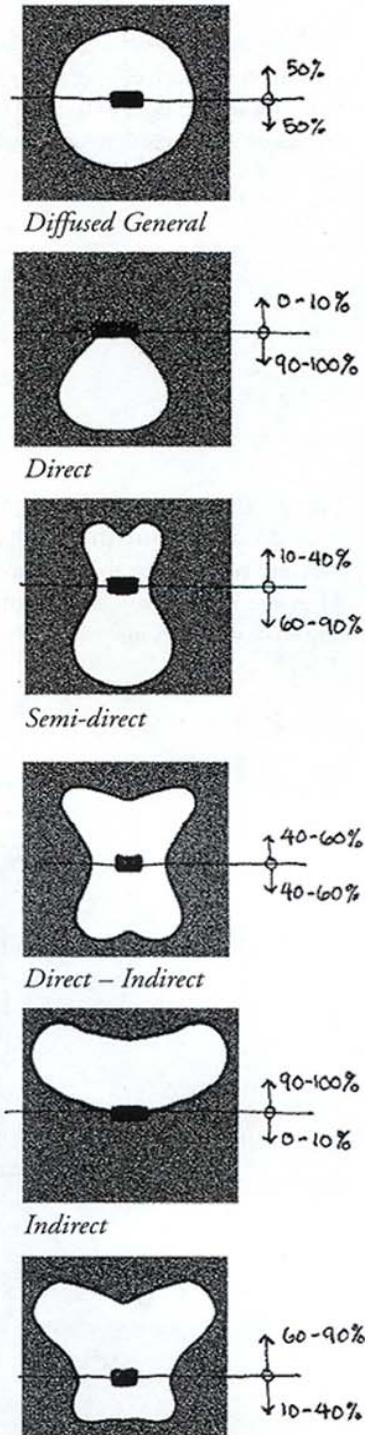


Figure 8.22 – Typical distribution of light

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.

8.13.11 Furnishings. Furnishings are elements added to a building for utility or ornamentation following construction. These include furniture such as chairs, 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.

8.13.11.1 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 (Figure 8.23). 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.

8.13.11.1.1 Systems Furniture. Systems furniture is ergonomically designed to meet a variety of conditions and requirements (Figure 8.24). 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 were they are needed. Provisions for furniture systems electrical and data requirements must be made a part of the construction documents. See paragraphs 8.13.5.1.1 and 8.13.5.2.1 for interior design standards for electrical and communications wiring respectively. Surface mounted conduit and power poles are unsightly and should be avoided.

8.13.11.1.2 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 110-3-122, respectively.

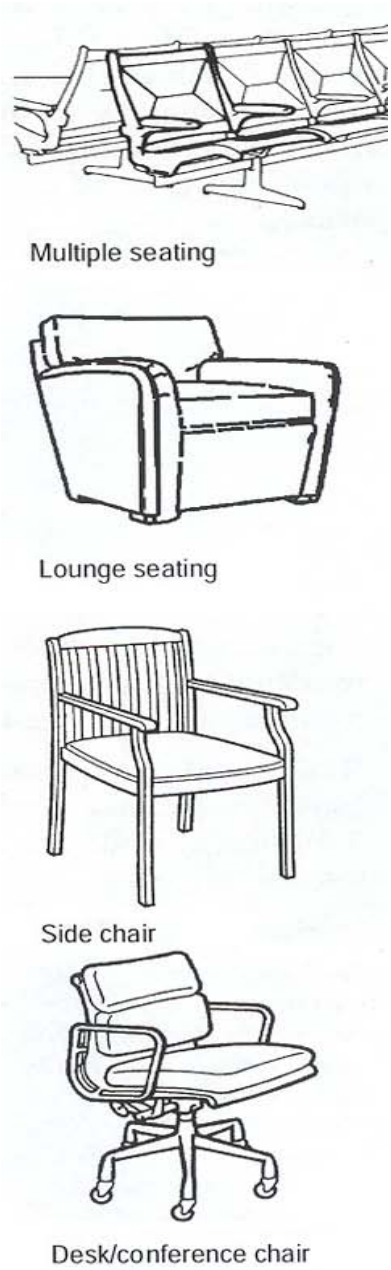


Figure 8.23 – Contract seating, various chair classes

8.13.11.1.3 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.

8.13.11.1.4 Systems Furniture Design Guidelines.

8.13.11.1.4.1 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

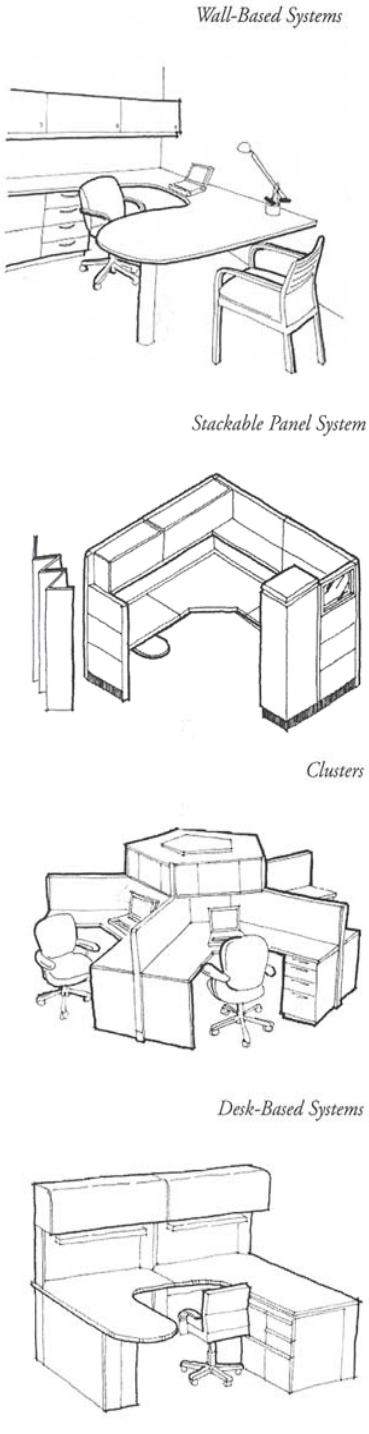


Figure 8.24 – Systems furniture options

- Special security requirements
- Budget constraints
- Flexibility to allow future changes
- Schedules of design, delivery, and installation
- Air conditioning
- Acoustic performance requirements

8.13.11.1.4.2 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.
- 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.

8.13.11.1.4.3 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.

8.13.11.2 Window Treatments.

8.13.11.2.1 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 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.

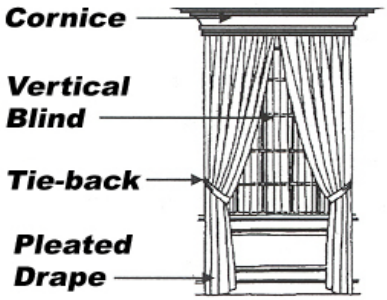


Figure 8.25 – Window treatments should complement the interior space

8.13.11.2.2 Window treatments should complement and support the interior design of a space (Figure 8.25). 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

8.13.11.3 Signage.

8.13.11.3.1 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 8.26).

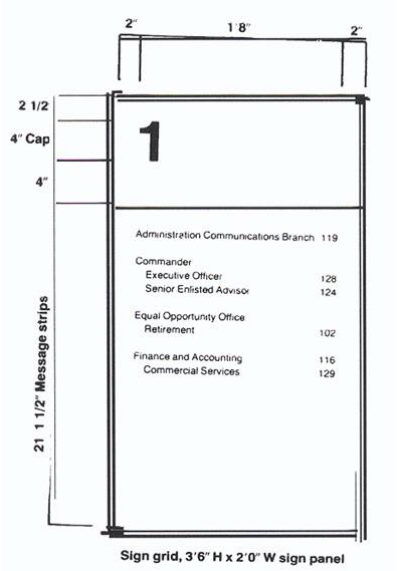


Figure 8.26 – Directional signage directs circulation

8.13.11.3.2 Interior signage is covered in detail in Unified Facilities Criteria (UFC) *3-120-01, Air Force Sign Standard*. The manual includes graphics for the following: directional, identification signs, information, and pictograms.

8.13.11.4 Accessories.

8.13.11.4.1 Accessories may be either functional or decorative. Whatever the purpose, accessories serve to make a room appear inviting and personal. Accessories should be selected and placed by professional interior designers.

8.13.11.4.2 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.

8.13.11.4.3 Decorative Accessories. Decorative accessories are objects such as artwork and plants (Figure 8.27).

8.13.11.5 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.

Like this.

Not this.

Figure 8.27 – Decorative accessories can add a sense of uniqueness

8.13.11.6 Plants.

8.13.11.6.1 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.

8.13.11.6.2 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.

8.13.11.6.3 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 found in Appendix J, Interior Furnishings Standards of this guide.

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 (See Appendix N, Housekeeping Rules (Example) :

- 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. The following are Army standards to follow:

- 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.
- 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.

8.14 Exterior Building Materials and Color

8.14.1 Exterior Building Materials.

8.14.1.1 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 expressions, 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. The following guidelines also apply to buildings constructed by private entities on the installation.

Figure 8.28 – Harmony Church Visual Zone

8.14.1.2 Use the following guidelines when selecting exterior building materials.

8.14.1.2.1 Choose materials for their longevity and maintenance characteristics.

8.14.1.2.2 Use materials with integral colors - avoid painting exterior colors.

8.14.1.2.3 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 facade.

8.14.1.2.4 Use pre-finished material where possible - gutters, window frames, doorframes, etc.

8.14.1.2.5 Use blended colors on pitched roofs.

8.14.1.2.6 Where paint is used on exterior walls, the use of light-colored coatings containing titanium dioxide is encouraged for energy conservation.

8.14.2 Fort Benning has a number of visual zones that, for the most part, utilize common building materials for unity within the viewshed. LEED requirements, BRAC changes and design-build construction methods make it difficult to utilize stringent requirements in regard to specific building materials. The design of renovations, additions, and new facilities, including those by private entities should demonstrate sensitivity to the desirable, immediate context within each visual zone. These visual zones within Fort Benning are as follows:

8.14.2.1 Harmony Church Visual Zone

(Figure 8.28)

8.14.2.2 Kelley Hill Visual Zone

(Figure 8.29)

8.14.2.3 Lawson Army Airfield Visual Zone

(Figure 8.30)

8.14.2.4 Lawson Army Airfield – Historic Visual Zone

(Figure 8.31)

Figure 8.29 – Kelley Hill Visual Zone

Figure 8.30 – Lawson Army Airfield Visual Zone

Figure 8.31 – Lawson Army Airfield - Historic Visual Zone

Figure 8.32 – Main Post Visual Zone

8.14.2.5 Main Post Visual Zone

(Figure 8.32)

8.14.2.6 Main Post Historic Visual Zone

(Figure 8.33)

8.14.2.7 Suburban Main Post Visual Zone (desired character from Main Post Visual Zone)

(Figure 8.34)

8.14.2.8 Parachute Jump Tower Visual Zone

8.14.2.9 RCI Housing Visual Zone

(Figure 8.35)

8.14.2.10 RCI Housing-Historic Visual Zone

(Figure 8.36)

8.14.2.11 Sand Hill Visual Zone

(Figure 8.37)

8.14.2.12 Training Area/Ranges Visual Zone

8.14.3 Exterior Building Color.

8.14.3.1 Exterior color selections should give consideration to climate, geography, culture, facility function, historical context, architectural character, etc (Figure 8.38). The exterior colors proposed should be coordinated with the predominate materials and colors found in the view shed of the project unless specific design requirements and/or Government regulations overrule the need and desire for this uniformity. During design, the designer is required to follow the information and submittals required in Appendix L, Exterior Color Checklist).

8.14.3.2 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.

Figure 8.33 – Main Post Historic Visual Zone

Figure 8.34 – Suburban Main Post Visual Zone (desired character)

Figure 8.35 – RCI Housing Visual Zone

Figure 8.36 – RCI Housing-Historic Visual Zone

8.14.3.3 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.

Figure 8.37 – Sand Hill Visual Zone

8.15 Key Facility Types and Standardization

8.15.1 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 (RCI).

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

8.15.2.2 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.

Figure 8.38 – The geographical areas for exterior color

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

8.15.3.1 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.

8.15.3.2 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).

8.15.4 Unaccompanied Personnel Housing (Army Barracks Modernization Program).

8.15.4.1 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 (DFAC). 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.

8.15.4.2 Army Barracks Standards. The Army Barracks Modernization Program design criteria give commanders and contractors the direction to incorporate best business practices around a modular floor plan. Appendix I, Army Barracks Standards, of the Army Barracks Master Plan 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 were 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 Army Standards for detailed guidance.

8.15.4.3 Furnishings.

8.15.4.3.1 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).

8.15.4.3.2 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 color board plans with color schemes. The manual includes information on waiver requirements, the procurement process, order forms, and final inspection checklist.

8.15.4.4 Construction design criteria for COFs, BBN HQ buildings, BDE buildings, and DFAC facilities can be viewed on the web at ProjNet.

8.15.5 Army Lodging.

8.15.5.1 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.

8.15.5.2 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 Family, Morale, Welfare, and Recreation (FMWR) Branded Theme Operations.

8.15.6.1 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.

8.15.6.2 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.

8.15.7.1 The Army Sustainable Range Program (SRP), https://srp.army.mil/, 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 DLL-CEHNC-RTLP@usace.army.mil**.**

8.15.7.2 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, CEHNC 1110-1-23 Manual.
- 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 Out-lease of Army Assets

8.17.1 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.

8.17.2 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 out-lease 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;
- Out-lease of Real Property; and
- Out-lease of Personal Property.

The guide provides hyperlinks to Sale and Out-lease governing regulations and legal and informational references.

8.18 Army Standards

8.18.1 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 Standards
- Quality Standards for New and Replacement Residential Communities Initiative (RCI) Family Housing
- Army Lodging Standards
- Design Manual for Remoted Target Systems (RETS) Ranges, CEHNC 1110-1-23 Manual
- Unexploded Ordinance Considerations in the Planning, Design, and Construction of Ranges, Supplement to CEHNC 1110-1-23 Manual

8.18.2 New construction, additions and major renovations at Fort Benning and Camp Merrill shall follow the requirements and guidance of the U.S. Green Building Council. Fort Benning and Camp Merrill must meet the LEED Silver Standard level.

8.19 References

8.19.1 The following references are provided 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) *3-120-01, Air Force Sign Standard*
- 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

- Department of Defense (DoD) Instruction for Cultural Resources (DoDI) 4715.16
- 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*
- Air Force Sustainable Facilities Guide
- Air Force Interior Design Guides
- Assistant Chief of Staff for Installation Management, Sustainable Design and Development Website
- Engineering and Construction Bulletins
- Office of the Assistant Secretary of the Army for Financial Management and Comptroller (OASA (FM&C)) Sales and Outlease of Army Assets - Installation Guide
- Treatment Plans for Historic Buildings, ftp://ftp.benning.army.mil/CulturalRes
- U.S. Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory (CERL), Engineering Knowledge Online Website
- Unified Facilities Guide Specifications (UFGS), "Division 12 - Furnishings", Construction Criteria Base
- Whole Building Design Guide

Links
Go to Section 9
Go to Table of Contents

Section 9 – Circulation Design Standards

9.1 Introduction

9.1.1 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 its impacts.

9.1.2 The circulation system provides a primary vantage point from which all installations are viewed. Safe and efficient vehicular movement results in better traveler 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 to identify specific characteristics of the circulation system that provide visual zone and theme identity.

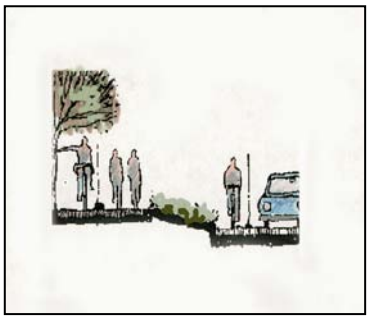


Figure 9.1 – Vehicular and pedestrian system

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

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

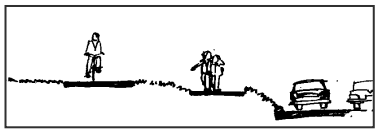


Figure 9.2 – Separate pedestrian/bicycle/ vehicular access

9.2 Circulation Objectives

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

- Provide circulation that meets force protection and security requirements.
- Design a circulation system that promotes public health and safety.

- Provide a system of circulation that includes a variety of forms of vehicular and pedestrian circulation (Figure 9.1).
- Provide a system that includes hierarchies of vehicular and pedestrian traffic flow (Figure 9.2).
- Adapt the circulation system to the natural conditions of the site (Figure 9.3).
- Improve the existing circulation network to meet growing transportation demand
- Improve the circulation system's safety, wayfinding and appearance.
- Promote efficient maintenance and repair of existing and proposed circulation systems.

9.3 Roadway Hierarchy

9.3.1 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 roadway (Figure 9.4). The roadway classifications for Fort Benning and Camp Merrill are shown in Figures 9.5 and 9.6, respectively.

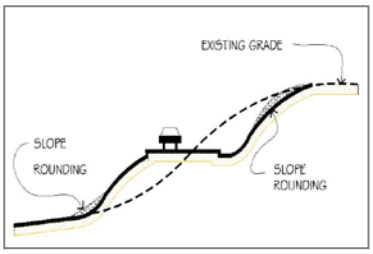


Figure 9.3 – Adapt circulation to topography

9.3.1.1 Highways

Highways provide primary high-speed traffic access to, around, or through a military installation. The design includes:

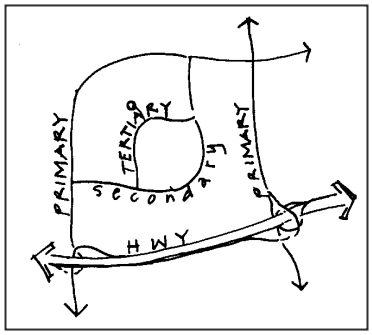


Figure 9.4 – Roadway hierarchy

9.3.1.1.1 Continuous, relatively straight or large radii curvilinear alignments that carry high-speed through-traffic movement between major activity centers within a region.

9.3.1.1.2 A minimum of two lanes in each direction, typically divided by a median or median divider.

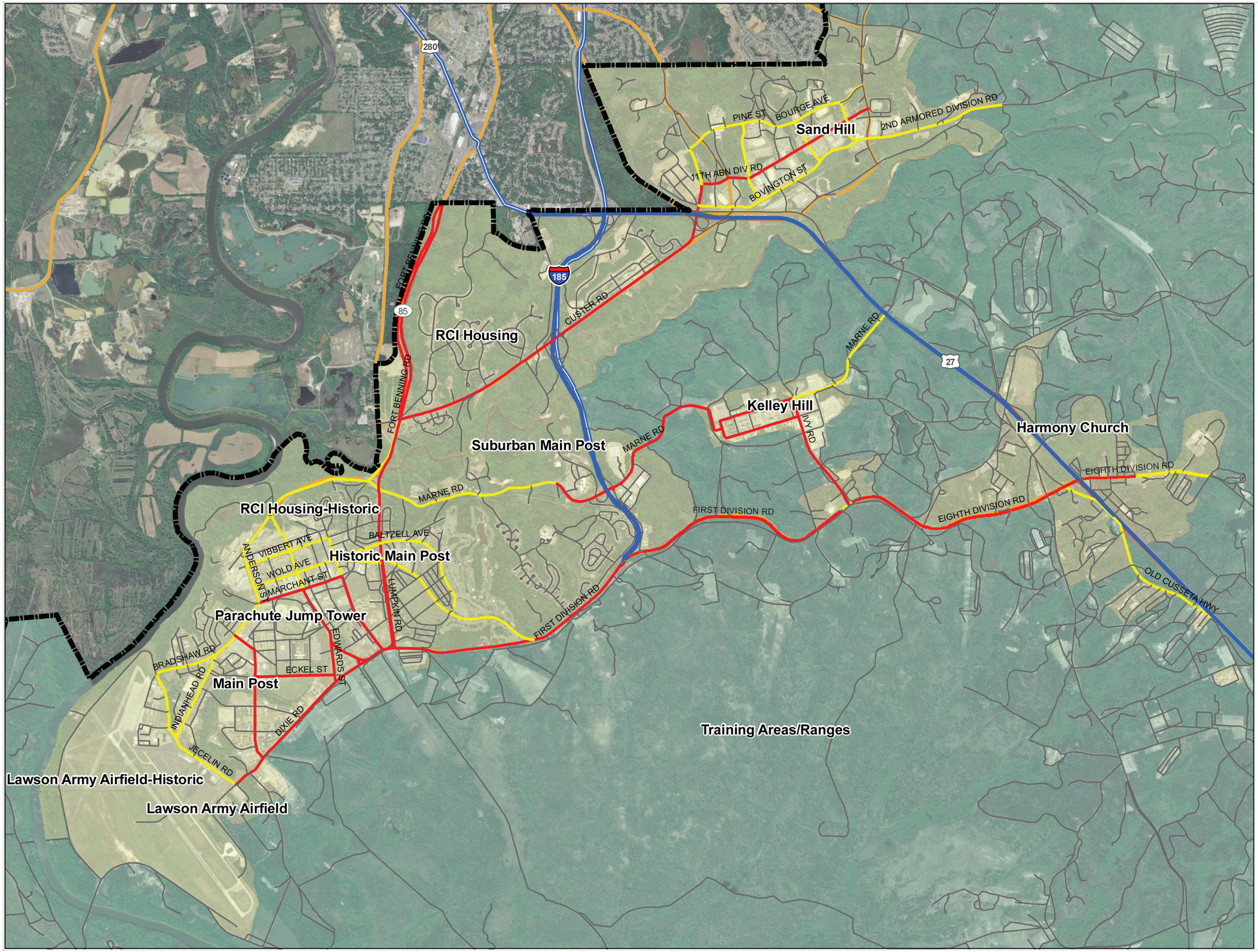
9.3.1.1.3 Alignments that border land use areas rather than bisect them, and green space buffers between the road and adjacent uses.

9.3.1.1.4 Controlled access onto the road with access provided only to other highways and primary roadways.

9.3.1.1.5 Either grade-separated or at-grade channelized intersections with traffic signal controls.

Figure 9.5

Fort Benning Roadway Hierarchy



Legend

Road Hierarchy

- Highway
- Primary
- Secondary
- Tertiary

Other Roads

- Limited Access
- Highway
- Major Road
- Cantonment Areas
- Training Areas/Ranges
- Installation Boundary

0 2,000 4,000 8,000
Feet

August 2010
Circulation Design Standards

Figure 9.6

Camp Merrill
Roadway Hierarchy

Legend

Road Hierarchy

- Secondary
- Tertiary

Visual Zones

- Airfield
- Camp Merrill
- Training Areas/Ranges

0 250 500 1,000
Feet

9.3.1.1.6 Shoulders for emergency stopping but strict prohibition of on-street parking.

9.3.1.1.7 Street signing, lighting, and planting that reflects the high-speed nature of traffic movement.

9.3.1.2 Primary Roadways

These are arterial routes that connect the installation's major activity centers, provide the primary circulation through the installation, and provide the means by which most people view the installation (Figure 9.7). These roadways often traverse the entire installation and carry the heaviest volume of traffic (other than highways), resulting 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 parkways in rural and suburban areas (Figure 9.8). Design characteristics include:

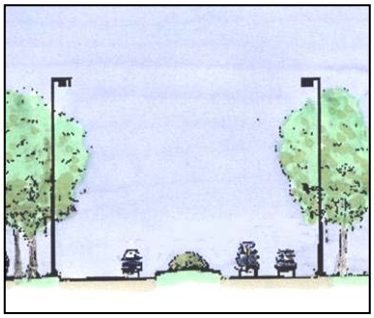


Figure 9.7 – Primary roadway section

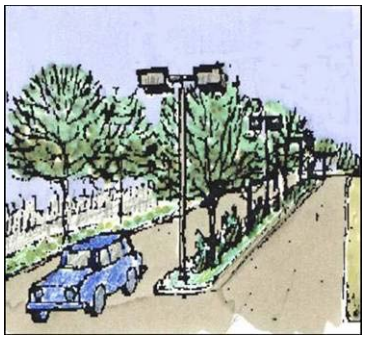


Figure 9.8 – Boulevard

9.3.1.2.1 Continuous, through-traffic alignments that are relatively straight or large-radii curvilinear to handle moderate-to-heavy traffic.

9.3.1.2.2 Alignments that form the boundary between different land uses are preferable to alignments that bisect a land use zone.

9.3.1.2.3 Two or more moving lanes in each direction typically divided by a median.

9.3.1.2.4 Controlled access and a minimum of curb cuts limited to entranceways to major facilities or building groups.

9.3.1.2.5 At-grade intersections with signal controls.

9.3.1.2.6 On-street parking prohibited.

9.3.1.2.7 Medians, street lighting, signing, and planting that enforces the moderate- to high-speed nature and importance of the road.

9.3.1.2.8 Curbs, gutters, and sidewalks provided in all cantonment area and other residential areas with densities greater than two dwelling units per acres.

9.3.1.3 Secondary Roadways

Secondary roadways (Figures 9.9 and 9.10) serve as connectors between primary roads and tertiary roads and typically connect primary roads to adjacent land use zones. 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:

9.3.1.3.1 Continuous through-traffic alignment between primary roads, either straight or curvilinear based upon the design speed, topography, and land pattern.

9.3.1.3.2 Direct access to abutting property.

9.3.1.3.3 A maximum of two moving traffic lanes in each direction, either undivided or as a boulevard with planted median.

9.3.1.3.4 On-street parking generally prohibited except for traffic calming uses.

9.3.1.3.5 Sidewalk separated from the road by a planting strip.

9.3.1.3.6 Street lighting, signing, and planting that reflect the moderate-to-slow speed nature of traffic and the character of the land use area they are in.

9.3.1.3.7 Curbs, gutters, and sidewalks provided in all cantonment area and other residential areas with densities greater than two dwelling units per acres.

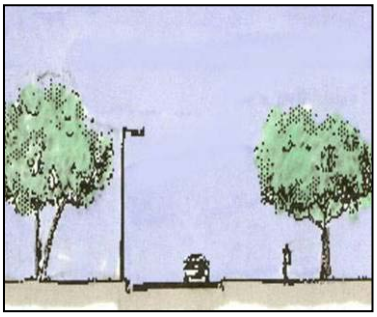


Figure 9.9 – Secondary street section

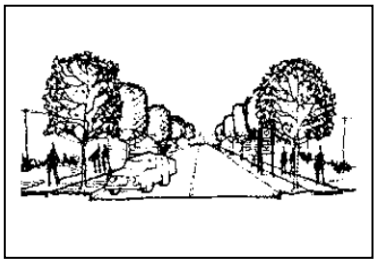


Figure 9.10 – Improved, visually appealing street

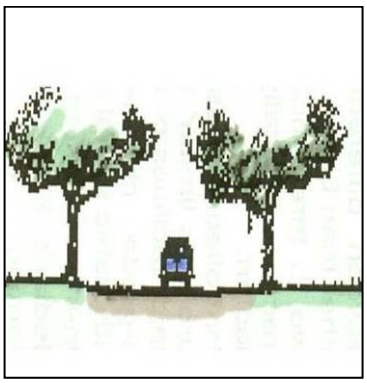


Figure 9.11 - Tertiary street section

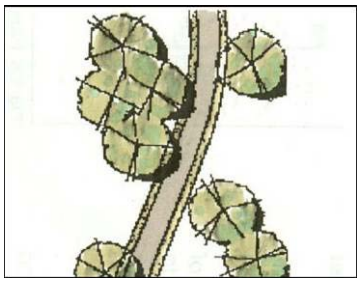


Figure 9.12 - Tertiary street plan

9.3.1.4 Tertiary Roadways

Tertiary roadways (Figures 9.11 and 9.12) provide access to individual facilities, parking and service areas. They are designed to handle low-speed, low-volume traffic, with one lane in each direction. 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:

9.3.1.4.1 Alignments designed to discourage through-traffic.

9.3.1.4.2 Alignments are relatively short, straight or curvilinear keeping with topography, land use, and slow speed nature of traffic.

9.3.1.4.3 Generally a maximum of two moving traffic lanes, one in each direction.

9.3.1.4.4 On-street parking allowable by the addition of a parallel parking lane or bay.

9.3.1.4.5 Curbs, gutters, and sidewalks provided in all cantonment area and other residential areas with densities greater than two dwelling units per acre.

9.3.1.4.6 Sidewalks may be limited to only side, depending upon need.

9.3.1.4.7 Street lighting, signing, and planting in character with slow-speed nature of traffic and the land use area within which the road is located.

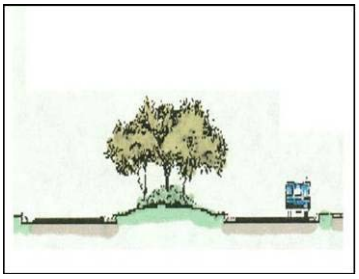


Figure 9.13 - Cul-de-sac section - may incorporate plantings

9.3.1.5 Cul-de-sacs

Cul-de-sacs are short, dead-end tertiary streets located primarily in residential areas (Figure 9.13). 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 characteristics include:

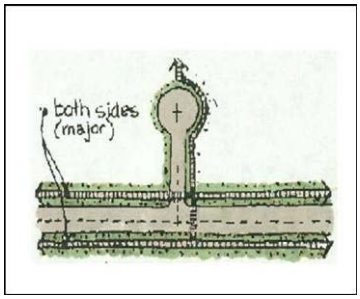


Figure 9.14 - Cul-de-sac plan

9.3.1.5.1 Short, straight, or curvilinear alignment to serve abutting property (Figure 9.14).

9.3.1.5.2 Generally a maximum of two traffic lanes, one in each direction.

9.3.1.5.3 Generally a maximum length of 600 feet, except in areas where terrain and low density justify a longer length.

9.3.1.5.4 Turnarounds must include a diameter to accommodate fire and garbage trucks.

9.3.1.5.5 Turnarounds can be either symmetrical or offset.

9.3.1.5.6 Turnarounds should have center planting islands to reduce the expanse of paved area (Figure 9.14).

9.3.1.5.7 Overflow parking can be provided in parking bays on street or within center of turnarounds.

9.3.1.5.8 Sidewalks, if any, are generally limited to one side of the road.

9.3.1.5.9 Street lighting, signing, and planting is in character with the slow-speed nature of traffic and the land use area being served.

9.3.1.6 Tactical Vehicle Trails

Tactical vehicle trails provide alternative access for armored vehicles and other vehicles utilized in combat readiness training. They are recommended for installations with high use of armored vehicles to enhance the movement of the vehicles and reduce traffic congestion on other installation roadways. These trails provide one lane access for vehicles between motor pools and maneuver areas. It is recommended that these trails be hard surfaced within developed areas, with concrete of a thickness to withstand the weight of armored vehicles. The hard service will reduce dust pollution. These trails should be designed to provide as direct access as possible while minimizing crossings with primary, secondary, or tertiary roads. All crossings with the other roadway systems should be paved with concrete to support the weight of the vehicles and clearly marked with signage.

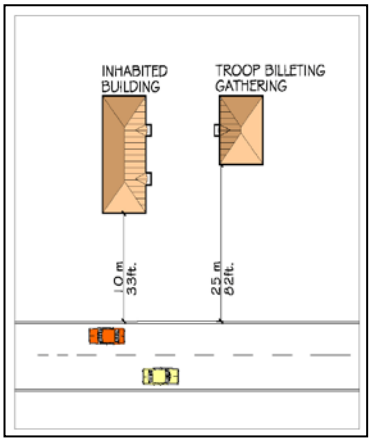


Figure 9.15 - Anti-terrorism roadway setbacks within a controlled perimeter

9.4 Roadway Setbacks

Department of Defense anti-terrorism standards state that all inhabited buildings within a controlled perimeter will be set back a minimum of 10 meters (33 feet) from roadways, and that troop billeting and primary gathering spaces shall be set back a minimum of 25 meters (82 feet) from roadways (Figure

9.15). For 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). (See, Unified Facilities Criteria (UFC) 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*, Table B-1).

9.5 Circulation System Design

9.5.1 The location and design of new circulation system alignments, as well as improvements to the existing system should be prepared to promote installation sustainability. They should be designed to minimize impacts, relieve driver monotony, and provide a positive visual experience for the user without compromising safety (Figure 9.16). The following design techniques should be applied to circulation system design:

Figure 9.16 - Positive visual image conveyed

9.5.2 Blend circulation with the natural landform. The horizontal and vertical alignment of roads, walkways, and bikeways should minimize landform disturbance and blend with the natural setting (Figure 9.17).

Figure 9.17 – Build into natural landforms

9.5.2.1 Minimize cut and fill by avoiding steeping terrain and aligning roadway, walkway, or bicycle systems to cross slopes diagonally or parallel to the contours rather than perpendicular to the contours.

9.5.2.2 Mold cut-and-fill slopes to blend into the natural landform.

9.5.2.3 Blend road drainage ditches, swales, or channels into the natural landform.

9.5.2.4 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 anti-terrorism requirements when developing cluster-type facilities.

9.5.2.5 Minimize pedestrian, railroad, and bikeway crossings of highway, primary, and secondary roads.

9.5.2.6 Use natural topographic conditions to create grade-separated pedestrian, railroad, and bikeway road crossings wherever possible, especially at intersections with 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 (Figure 9.18).

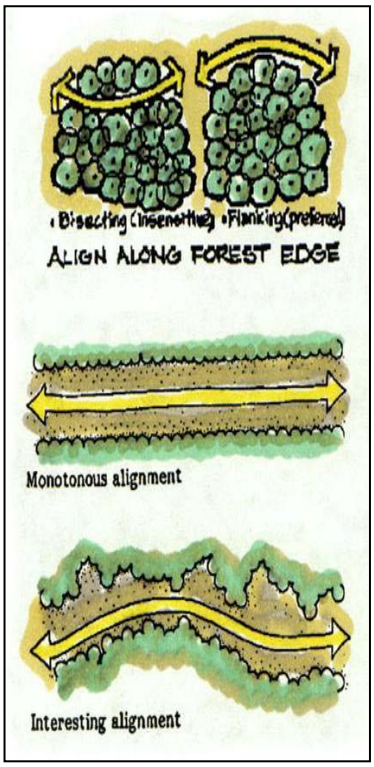


Figure 9.18 – Roadway alignment

9.5.3.1 Align roads through open areas rather than forested areas.

9.5.3.2 Minimize cut-and-fill to reduce the limits of clearing.

9.5.3.3 Clear only for sight distances rather that uniform right-of-way clearing.

9.5.3.4 Utilize tree wells or retaining walls to preserve specimen trees or significant vegetation areas.

9.5.3.5 Provide optimum conditions for re-vegetation by following proper planting and maintenance techniques.

9.5.3.6 Restore vegetation to disturbed areas using naturalistic plantings of native plant material.

9.5.4 Minimize adverse impacts on adjacent land uses.

9.5.4.1 Air Pollution

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

9.5.4.1.1 Locate roads adjacent to land uses that are minimally affected by traffic-emitted air pollutants.

9.5.4.1.2 Reduce the impact of traffic-emitted pollutants on more sensitive land use areas by locating the roadways downwind and/or providing planted buffers (Figure 9.19). Tactical vehicle trails should be hard surfaced to reduce dust pollution.

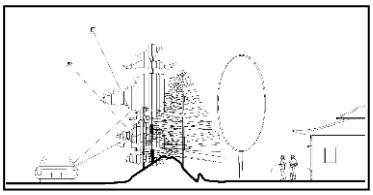


Figure 9.19 – Landscape and berms buffer air and noise pollution

9.5.4.2 Noise Pollution

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

9.5.4.2.1 Roads should be adequately set back from sensitive land uses, including residential, medical, educational, recreational, administrative, religious, library, community, or child care facilities.

9.5.4.2.2 Utilize noise abatement techniques such as berms, sound barrier walls, and plant material (Figure 9.19)

9.5.4.2.3 Route truck and tank traffic to roadways adjacent to less noise sensitive land uses. Tracked vehicle traffic should, ideally, be routed to a system of tank trails that are separate from corridors used by wheeled traffic vehicles.

9.6 Intersections

9.6.1 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 pedestrian, bicycle, and vehicular traffic. The following design techniques should be used to plan or improve intersections (Figure 9.20):

9.6.1.1 All roadways should be designed to intersect at right angles (90 degrees), although 85-95 degrees is acceptable.

9.6.1.2 Avoid dangerous, complex intersections of more than two streets intersecting at one point or offset intersections.

9.6.1.3 Eliminate intersections that are in close proximity to one another. They should be no closer than a minimum distance of 30 meters (100 feet).

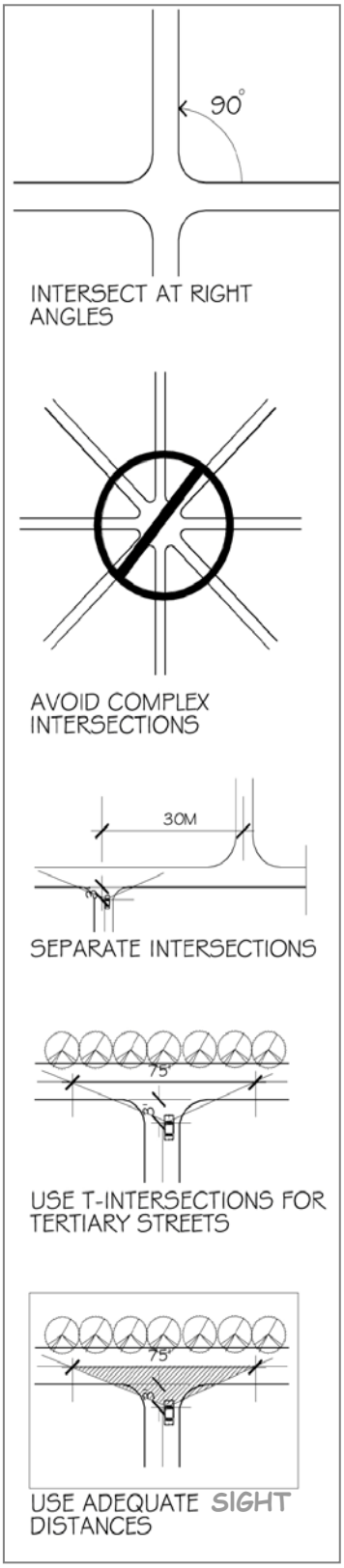


Figure 9.20 – Intersection design

9.6.1.4 Use T-intersections for tertiary road intersections with secondary or primary roads to reduce conflict and promote safety.

9.6.1.5 Provide turning lanes at intersections along primary roads to eliminate interference with through traffic flow.

9.6.1.6 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 streets with other nearby intersections.

9.6.1.7 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.

9.6.1.8 Minimize pedestrian and bicycle intersections with primary streets.

9.6.1.9 Provide crosswalks at all intersections of pedestrian paths with primary or secondary streets, marked with paint or vinyl strips or identified with a different paving surface.

9.6.1.10 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 (Figure 9.21).

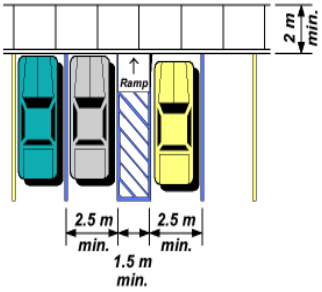


Figure 9.21 - Accessible parking

9.6.1.11 Create local service drives or access roads to parallel highways and primary roads to provide access to properties fronting the primary road. Access roads help avoid the need for direct curb cuts on the primary road at each individual property.

9.6.1.12 Intersections between railroad track and high-speed roads must be signaled, well marked, and have a smooth transition. All other road crossings of railroad tracks must be well marked and have clear line of sight down the tracks.

9.7 Entrance Gates

9.7.1 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.

Total spaces in parking area	Required minimum number of accessible spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1000	2% of total
1001 and up	20 plus 1 for each 100 over 1000

Figure 9.22 - Required minimum accessible parking spaces

9.8 Parking Requirements

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

9.8.1.1 All parking lots will be accessible to persons with disabilities in accordance with the requirements of the UFAS, paragraph 4.1.1(5)(a) (Figure 9.21). 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 9.22.

9.8.1.2 For initial planning and programming, allocate 400 square feet of parking lot area per car. The total provides adequate space for the parking spaces, access drives, and planting islands that make up a parking lot. This allocation does not account for tactical military vehicles.

9.8.1.3 Minimize parking space requirements of a facility by selecting a site that will allow the sharing of parking with related activities.

9.8.1.4 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 better conformance to natural topography.

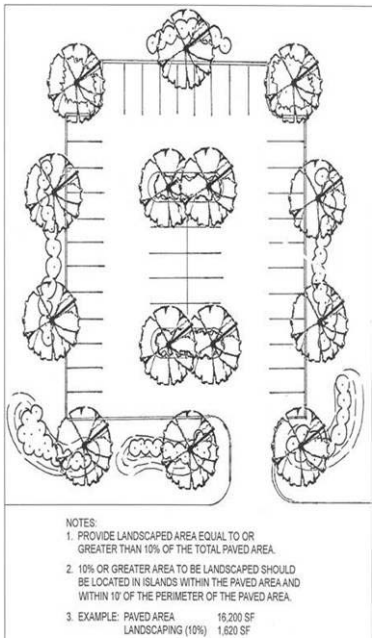


Figure 9.23 - Provide islands with trees to soften visual expanse

9.8.1.5 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 (Figure 9.23).

9.8.1.6 Minimize parking areas by promoting alternative means of access other than vehicular. Encourage pedestrian and bicycle access through the provision of walkways and bikeways.

9.9 Parking Lot Location and Design

9.9.1 Parking areas can be designed to provide a more pleasing visual 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.

9.9.1.1 Locate parking lots between and behind buildings to reduce their visual impact from the circulation system.

9.9.1.2 Locate parking lots on relatively level areas to avoid excessive cut and fill.

9.9.1.3 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.

9.9.1.4 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 and provide shade and/or wind breaks (Figure 9.24).

9.9.1.5 Use natural topography and existing trees to visually screen parking areas from adjacent facilities and other parking lots (Figure 9.25).

9.9.1.6 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.

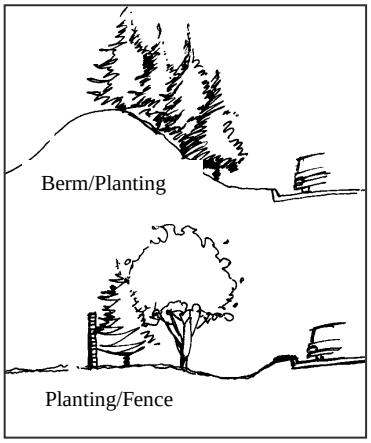


Figure 9.24 – Trees, berms, and walls screen parking lot

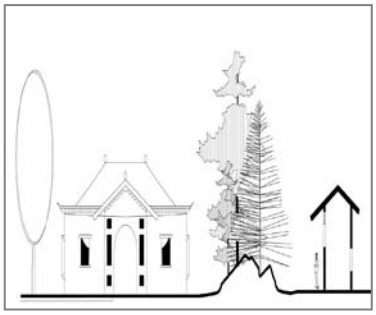


Figure 9.25 – Trees/berm screen

9.9.1.7 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.

9.9.1.8 Parking lots should be paved with concrete, asphalt, or other paving material. Infrequently used parking areas such as overflow areas can use pervious surfaces.

9.9.1.9 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 (Figure 9.26). If parking structures are built, they shall be designed to meet anti-terrorism requirements.

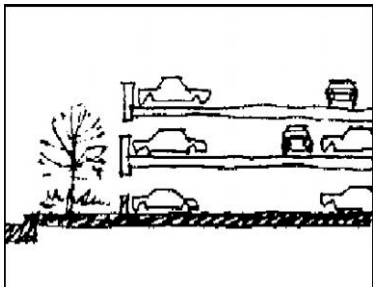


Figure 9.26 - Parking structures are desirable but expensive – consider anti-terrorism standards in planning

9.9.2 Parking Area Design Guide

A comprehensive parking area design guide that 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 Anti-terrorism 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.

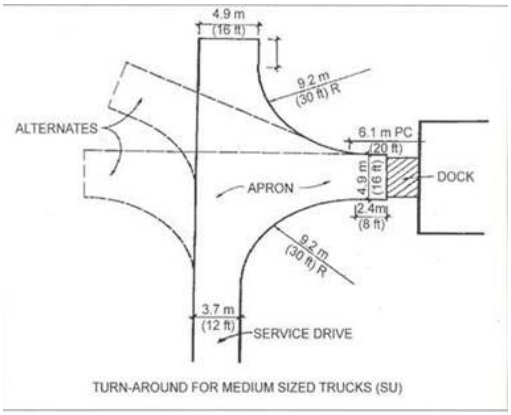


Figure 9.27 - Typical loading area

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 (Figure 9.27). They should be screened from public view to reduce negative visual impacts. Service areas shall meet all anti-terrorism requirements.

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 in this category are buildings such as headquarters, child development centers, schools, dining facilities, and clubs. Anti-terrorism standards state that access drives must be clearly defined and marked and that their intended use must be clear to prevent parking of vehicles in those areas, and that drop-off lanes should not be located under any inhabited portion of a building (UFC 4-010-01, Paragraph B-1.4). It is recommended that physical barriers be used to define the edge of these areas. 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 control 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 (Figure 9.28).

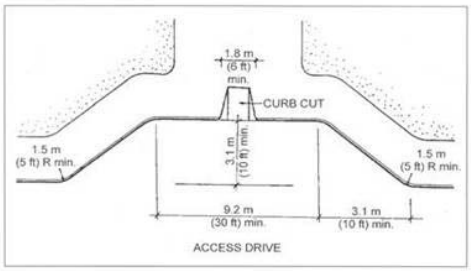


Figure 9.28 - Typical drop-off area

Figure 9.29 – Promote means of access other than vehicular, such as walkways and bikeways

9.12 Walkways and Pedestrian Circulation

9.12.1 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 (Figure 9.29).

9.12.2 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 sustainability by conserving energy, reducing air pollution, and decreasing the land requirement for parking. These walkways also provide a means to increase physical fitness.

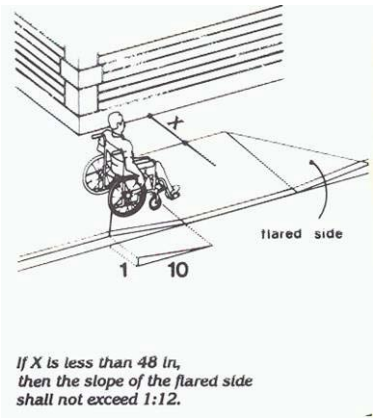


Figure 9.30 - Ramps must be provided per UFAS standards

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

- Provide walkways that are designed at a pedestrian scale to be comfortable, pleasant, and well-drained.
- Provide safe and secure pedestrian facilities that are separate from vehicular and railroad traffic.
- Provide amenities such as shade or seating 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 (Figure 9.30). 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 design consistency throughout the walkway length.

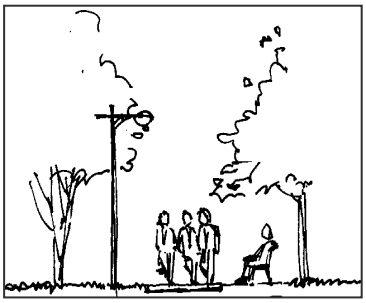


Figure 9.31– Primary walkways

9.12.4 Walkway Network Hierarchy

Sidewalks are classified to conform to the hierarchy roadway system - primary walkways, secondary walkways, and tertiary walkways. Non-roadway oriented sidewalks should be sized and placed where people will use them to avoid creating worn "shortcut" paths. Railroad track crossing should be avoided, but where necessary, they should be well marked and provide a good line of sight. Walkways through railroad track ballast should be maintained with small, well-drained rock.

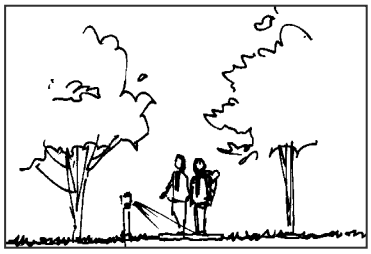


Figure 9.32 – Secondary walkways

9.12.4.1 Primary Walkways

Primary walkways (Figure 9.31) 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.

9.12.4.1.2 Primary walkways should be sized to accommodate anticipated pedestrian use. They should have a minimum width of 1.8 meters (6 feet), and maximum width should be 3-3.5 meters (10-12 feet) in high use areas (Figure 9.34).

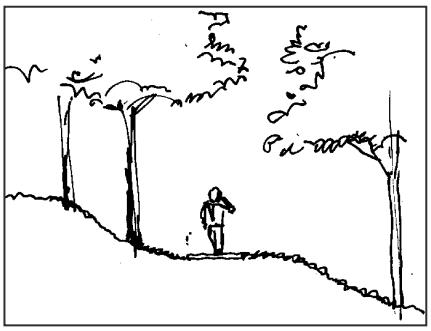


Figure 9.33 – Tertiary walkways

9.12.4.2 Secondary Walkways

Secondary walkways (Figure 9.32) 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.

9.12.4.2.2 These walkways should be sized to accommodate anticipated pedestrian use, but not less than 1.2 meters (4 feet) wide, and not wider than the maximum of 3-3.5 meters (10 - 12 feet) in high use areas (Figure 9.34).

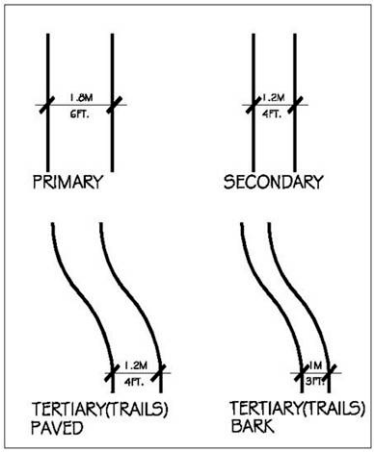


Figure 9.34 – Minimum walkway widths

9.12.4.3 Tertiary Walkways

Tertiary walkways (Figure 9.33) 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 conform to the natural landform.

9.12.4.3.2 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) (Figure 9.34). Where paths are designated for use by bicyclists and pedestrians, these widths should be increased an additional three feet for each bike lane.

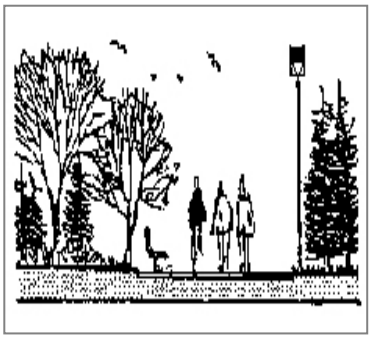


Figure 9.35 – Place landscape and site furnishings along walkways

9.12.5 Troop Running Trails

Troop running trails should be provided for Soldiers both in and out of formation. The width should be 4.5-5 meters (approximately 15 feet) to provide the width necessary for four Soldiers abreast with a cadence caller. Primary, secondary, and tertiary walkways can be designed to accommodate this function.

9.12.6 Troop Movement Paths

In locations where troops need to move four (4) abreast – between classrooms, barracks/dining hall facilities, etc. – a hard surface walkway of adequate width should be provided.

9.12.7 Site Amenities at Walkways

9.12.7.1 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, pedestrian-scale lighting, and signage in relationship to travel distance and traffic volume.

9.12.7.2 Site furnishings should be placed at regular intervals along walkways, parallel to the walk and facing the flow of pedestrian traffic (Figure 9.35).

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 (Figure 9.35), and discourage the creation of “shortcuts”. Utilize evergreen buffer plantings to screen harsh winds and undesirable views. Discourage the use of flowering/fruit bearing trees and shrubs along walkways because of threat of insects or maintenance issues.

9.13 Bikeways

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

9.13.2 A bikeway system should provide direct routes between primary destinations 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 physical separation from both roadways and walkways.

9.13.3 Bikeways are designed according to the following classifications:

9.13.3.1 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 9.36). 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, trains, or automobiles 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.

9.13.3.2 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 9.37). 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.
- Discouraging pedestrian and automobile crossings is more difficult than 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.

9.13.3.3 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 9.38). Class III Bikeway considerations include:

- Because no separation is provided, there is greater potential for 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 cyclists 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.

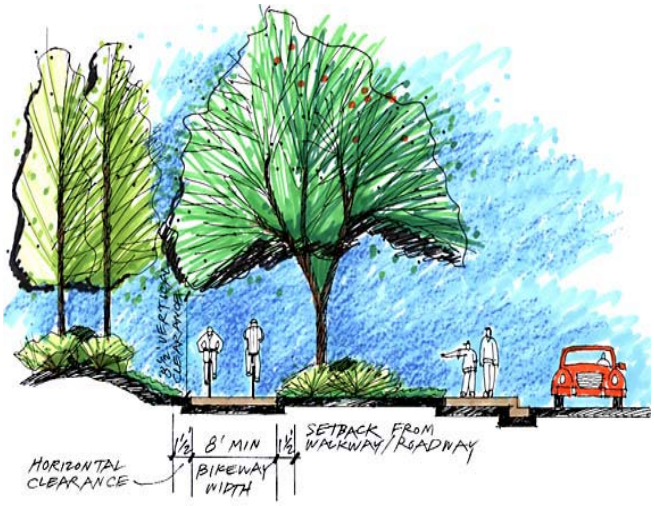


Figure 9.36 - Class I Bikeway

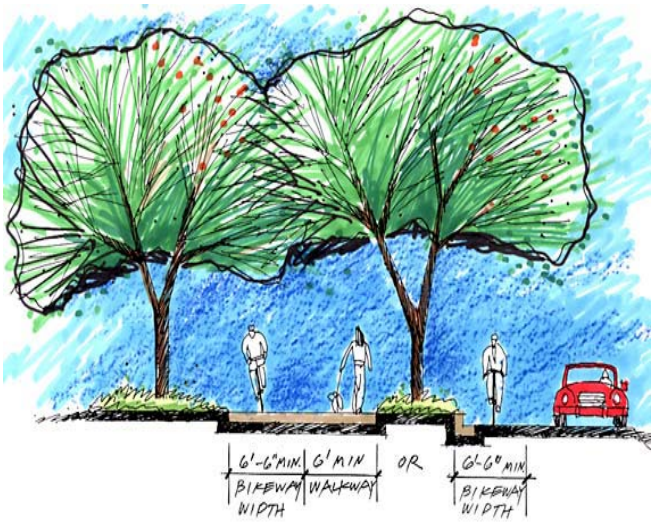


Figure 9.37 - Class II Bikeway

Figure 9.38 - Class III Bikeway

9.13.4 General Guidelines

9.13.4.1 Wherever possible, provide a designated right-of-way for bike traffic, separate from vehicular and pedestrian routes.

9.13.4.2 Locate bikeway crossings away from vehicular intersections with crossings marked on the street pavement.

9.13.4.3 When separate bicycle right-of-ways are not feasible, designate bikeway lanes with paint on the right-hand side of roadways.

9.13.4.4 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, lighting, 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 are close in proximity to building entrances, high activity areas, major workplaces, and recreational facilities, while avoiding conflicts with pedestrian circulation (Figure 9.39). Bicycle storage areas should be covered, especially at barracks, and easily accessible to building entrances (Figure 9.40).

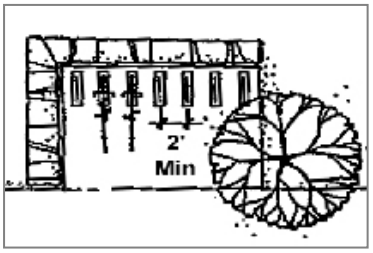


Figure 9.39 – Provide convenient bicycle storage

Figure 9.40 - Bicycle storage should be covered

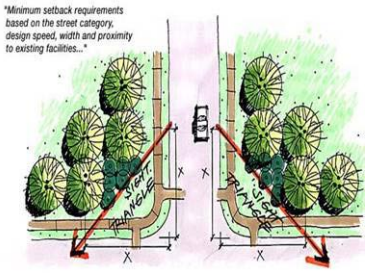


Figure 9.41 - Adequate sight lines give pedestrians an unobstructed view of crosswalks

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 into a raising crosswalk across the road in heavily used areas. Raised crosswalks eliminate the need for curb ramps in sidewalks.
- Provide a clear line of sight for motorists and pedestrians. Do not plant in sight lines. Walkways should meet the road at 90 degree angles (Figure 9.41).
- Adequate light should be provided.
- Provide barrier-free access at all intersections and 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. UFC 3-550-03FA (formerly Paragraph 10.4 of Technical Manual (TM) 5-811-1, Electric Power Supply and Distribution) directs the following walkway and bikeway lighting standards.

9.13.9.1 Intensities

Values are dependent upon whether walkways and bikeways are adjacent to roadways or are isolated from vehicular traffic.

9.13.9.1.1 Adjacent to Roadways

Walkways and bikeways will be illuminated to not less than one-half the maintained illumination required for adjacent roadways. Areas with grade changes, such as stairs and ramps, require additional illumination. Crosswalks in the middle of the block will be illuminated to 1.5 to 2 times the normal roadway lighting level.

9.13.9.1.2 Remote from Roadways

Walkways and bikeways remote form roadways will have a minimum of 5 lux (0.5 foot-candle) average illumination measured in lo-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.

9.13.9.2 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 designed 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 standard 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

9.14.1 The following 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*
- Unified Facilities Criteria (UFC) 3-550-03FA, *Electrical 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

9.15.1 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).

Links

Go to Section 10

Go to Table of Contents

Section 10 – Landscape Design Standards

10.1 Introduction

10.1.1 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.

10.1.3 The visual image conveyed by a military installation is defined not just by architectural character and site organization, but also by landscape design. The presence of plant material on the installation greatly enhances the visual character and environmental quality of the installation. The Integrated Natural Resources Management Plan (INRMP) and the Land Management Branch, which is developing an urban tree management plan, provide guidance for landscape management on the installation.

10.1.2 Plantings add an element of human scale to open spaces and can be used functionally to screen undesirable views, provide shade, buffer winds, reinforce the hierarchy of the circulation system, or provide a visual transition between dissimilar land uses.

10.2 Landscape Objectives

10.2.1 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 realized through the following objectives:

Figure 10.1 – The use of native plants improves visual quality

10.2.1.1 Preserve and enhance urban trees, forest lands, and detailed planting features such as shrubs and groundcovers.

10.2.1.2 Improve the overall visual quality of the installation by using native plant material to (Figure 10.1):

10.2.1.2.1 Blend the built environment with the natural environment.

10.2.1.2.2 Provide human scale and comfort to pedestrian environments (Figure 10.2).

Figure 10.2 - Provide comfort to the pedestrian environment

10.2.1.2.3 Reinforce the hierarchy of the circulation system (Figure 10.3).

10.2.1.2.4 Screen unsightly views or elements.

10.2.1.2.5 Buffer incompatible land uses.

10.2.1.2.6 Minimize maintenance through the use of native plant materials that require less upkeep to thrive.

10.2.1.2.7 Enhance anti-terrorism capabilities.

Figure 10.3 - Landscaping reinforces circulation hierarchy

10.3 Principles of Landscape Development

10.3.1 Landscape design is based on the following principles, illustrated in Figure 10.4.

10.3.1.1 Unity

Incompatible architectural elements can be blended, screened, and softened by the selection and placement of appropriate plant material. As a unifying element, plant material can be placed in front of a building or view to frame and enhance the visual impact.

10.3.1.2 Balance

Plant material can be selected and placed to provide visual balance through the use of either a symmetrical or asymmetrical planting scheme. Symmetrical plantings are generally more formal while asymmetrical plantings are informal.

10.3.1.3 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.

10.3.1.4 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.

10.3.1.5 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.

10.3.1.6 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.

10.3.1.7 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 concerns.

10.3.1.8 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.

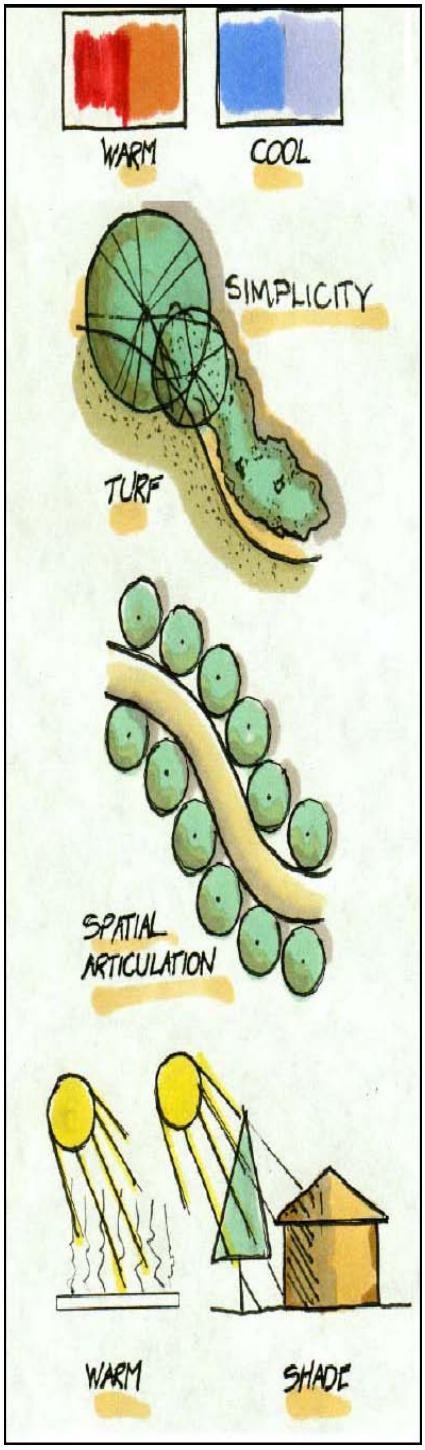


Figure 10.4 - Principles of design illustrated

10.4 Sustainable Landscape Development

10.4.1 The use of plant material on the installation promotes sustainability. Trees, shrubs, groundcover, and vines provide aesthetic appeal as well as preservation of natural fauna and flora, energy conservation, climate modification, erosion control, air purification, and noise abatement (Figure 10.5).

10.5 Landscape Design Guidelines

10.5.1 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. The following paragraphs present landscaping guidelines for the various locations of plant material use.

10.5.1.1 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 (Figure 10.6). When developing foundation planting plans, consideration should be given to anti-terrorism measures (See Paragraph 10.11).

10.5.1.1.1 Examine the architecture of the building to evaluate the selection of plants and planting design.

10.5.1.1.2 Focal and seasonal plantings should be located at building entries for pedestrian interest.

10.5.1.1.3 Plant materials should not block windows and views from interior spaces.

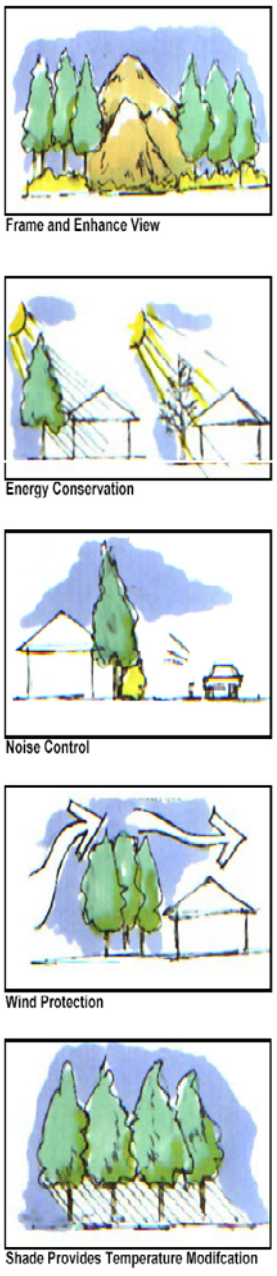


Figure 10.5 Plant material promotes sustainability

10.5.1.1.4 Trees should be set back from the building walls to provide space for mature growth and to prevent root systems from damaging the foundation.

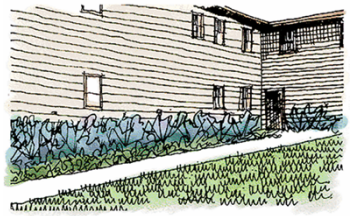


Figure 10.6 - Foundation plantings adding scale and creating entryway

10.5.1.1.5 A symmetrical foundation planting design should be used for a symmetrical building.

10.5.1.1.6 Due to the possibility of insect problems (bee stings, etc.), do not plant flowering plants near building entrances.

10.5.1.2 Screening

10.5.1.2.1 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.

10.5.1.2.2 Screening of Dumpsters

Landscape planting should be used to supplement wood fence and masonry wall dumpster enclosures (Figure 10.7).

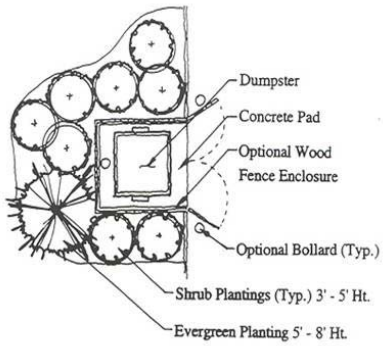


Figure 10.7 – Plantings used to screen dumpsters

10.5.1.3 Buffer and Edge Planting

Use a mixture of evergreen and deciduous trees and shrubs to visually separate land uses and to help separate visual zones.

10.5.1.4 Open Space Planting

Enhance open space areas with plantings. Use a mix of evergreen, deciduous, and flowering trees. Plant the same kind of trees in massive groupings to impact the vast open areas (Figure 10.8).

Figure 10.8 - Open space enhanced by plantings

10.5.1.5 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 (Figure 10.9). Also, in the design of street tree plantings, separate plant species may be used to identify distinct areas

of the installation such as a particular land use relationship, historical district, community area, or other similar entity.

10.5.1.5.1 Use formal street trees in single rows to visually reinforce primary and secondary roads. Use regularly spaced and uniformly shaped deciduous trees to provide an orderly appearance.

10.5.1.5.2 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 (Figure 10.9). Spacing should be uniform, except where curb cuts interrupt regular spacing.

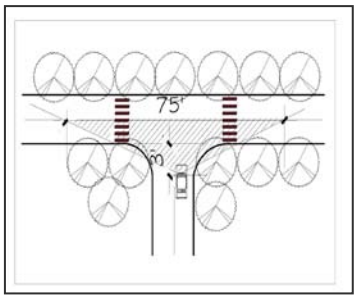


Figure 10.9 – Street trees reinforcing roadway hierarchy

10.5.1.5.3 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 to allow pedestrian and vehicle traffic to pass unimpeded by lower branches.

10.5.1.5.4 The street tree layout should be coordinated with the layout of proposed street lighting.

10.5.1.5.5 Appropriate plant heights should be used within sight triangles to ensure safe views from intersections.

10.5.1.5.6 Weeping trees should not be used in locations where they may hang over the roadway or block views.

10.5.1.6 Parking Lot Planting

Parking lots are often the least attractive elements on a military installation. The use of landscape plant material and earthen berms can greatly improve the appearance of these areas as well as help define circulation within the parking area and reduce heat gain during summer months (Figure 10.10).

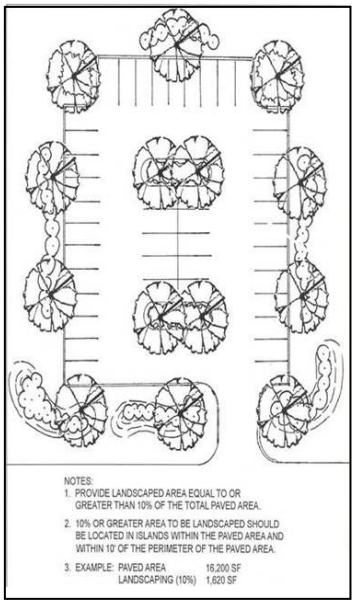


Figure 10.10 - Provide parking lot planting to reduce heat gain

10.5.1.6.1 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.

10.5.1.6.2 Choose trees and shrubs that require minimum maintenance and will not litter the parking area with leaves, fruit, or nuts.

10.5.1.6.3 Consider sight distances near entrances and exits when selecting and placing plant material.

10.5.1.6.4 Select trees, shrubs, and ground covers that can withstand harsher conditions, such as sun, glare, heat, and reduced water supply.

10.5.1.6.5 Use a mix of evergreen and deciduous plant material to screen parking areas from adjacent uses.

10.5.1.7 Environmental Control Planting

When properly placed, plants can provide environmental benefits as well as address visual concerns.

10.5.1.7.1 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.

10.5.1.7.2 Locate deciduous plantings on the southeast and southwest corners of buildings or courtyards to mitigate solar radiation due to heat build-up and glare due to and lower sun angles in the mid-morning and late afternoon hours.

10.5.1.7.3 Use mixed massings of deciduous shrubs and evergreen trees and shrubs to provide sound control along primary and secondary roads.

10.5.1.7.4 Use low impact development (LID) strategies to reduce stormwater runoff, reduce heat island gain, and increase water quality. See UFC 3-210-10 Low Impact Development and Public Works Technical Bulletin 200-1-62 dated 1 October 2008 for more information.

10.5.1.8 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 gates/entrances, along primary circulation systems, and areas with 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.

10.5.1.9 Entrances to the Installation

The entrances and streetscapes leading into the installation are areas to place landscaping that will develop a strong visual image and provide visual interest during all four seasons. Entrances create the first visual impression of the installation for the visitor.

10.5.1.9.1 The landscape materials and planting areas should be proportional in scale to the hierarchical position of the street (primary, secondary, tertiary, etc.) on which they are located.

10.5.1.9.2 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 entrance 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 (Figure 10.11).

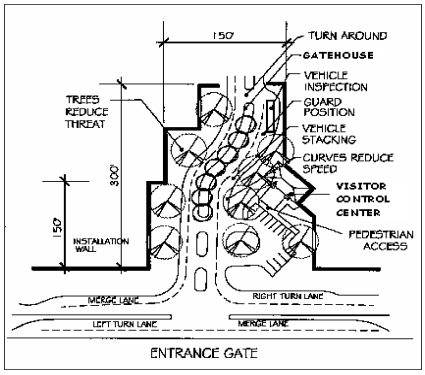


Figure 10.11 - Landscaping at entrance gates will meet AT/FP requirements

10.5.1.10 Zeroscaping

To conserve water and decrease maintenance, consider zeroscaping where appropriate.

10.5.1.11 Xeriscaping

Xeriscaping is the conservation of water and energy through creative and adaptive landscape design. Xeriscaped 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 Trees, shrubs, ground cover, and turf are the major elements of a planting composition. Basic plant selection criteria should foster a unified composition utilizing native materials for low maintenance and sustainability. Plant selection should avoid incompatible colors, textures and forms, and match the appropriate plant to the land use, situation, and environmental condition.

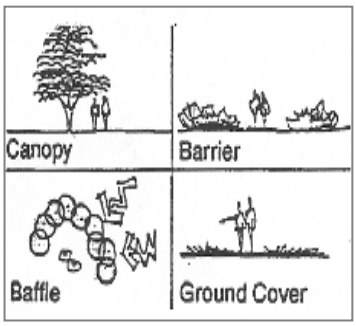


Figure 10.12 – Basic design categories

10.6.2 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 Selecting appropriate plants for a given condition is only one aspect of planting design. Another is composing arrangements that provide texture variety and accent site and building features. 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 10.12):

- Canopy
- Barrier
- Screen (or Baffle)
- Groundcover

10.7 Plant Palette and Plant Categories

10.7.1 The plant palette and categories are designed to help the designer choose the best plant selections for each particular set of design requirements. The plants that appear on the palette and in the categories have been selected for their hardiness and 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

10.7.2.1 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

10.7.2.2 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 Appendix O.

10.7.3 The Plant Categories

10.7.3.1 Plants from the plant palette with similar characteristics have been cataloged in Figure 10.13. 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); Ornamental Characteristics (flower color, autumn color, fruit color, and/or summer leaf color); and Functional Characteristics (erosion control capacity, relative hedge size, and optimal location).

10.7.3.2 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.

Plant Categories

Cultural Characteristics
- Growth Rate-Rapid
- Growth Rate-Medium
- Growth Rate-Slow
- Disease/Pest Resistance

Environmental Characteristics
- Acidic Soil Tolerant
- Alkaline Soil Tolerant
- Dry Soil Tolerant
- Moist Soil Tolerant
- Poor/Rocky Soil Tolerant
- Salt Tolerant
- Shade Tolerant
- Summer Wind Tolerant
- Urban Condition Tolerant

Ornamental Characteristics
- Blue Flowers
- Ornamental Bark
- Ornamental Fruit
- Red/Crimson/Purple Fall Color
- Pink/Purple Flowers
- Red/Crimson Flowers
- White/Cream Flowers
- Yellow/Orange Flowers
- Yellow/Orange/Red Fall Color

Functional Characteristics
- Erosion Control/Bank Stabilizer
- Foundation Plants
- Large Hedges (+25')
- Medium Hedges (10-20')
- Low Hedges (4-10')
- Naturalizing/Conservation
- Park Trees
- Large Street Trees (+35')
- Small Trees (15-35')
- Thorny Plants

Figure 10.13 – Plant categories

10.8 Plant Material Installation

10.8.1 A key step in assuring successful planting is selecting plants of the highest quality. Plant material should be of a size, genus, species, and variety complying with the recommendations and requirements of the "American Standard for Nursery Stock" ANSI Z60.1.

10.8.2 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 The planting and establishment of trees, shrubs, ground covers, and vines is detailed in TM 5-803-13, *Landscape Design and Planting Criteria*, Chapter 3.

10.8.4 General Guidelines for Plant Installation

10.8.4.1 At planting time, thin plants by removing one-third of the vegetative material.

10.8.4.2 Spray all evergreens with an anti-desiccant within 24 hours of planting.

10.8.4.3 Water all plants thoroughly during the first 24-hour period after planting.

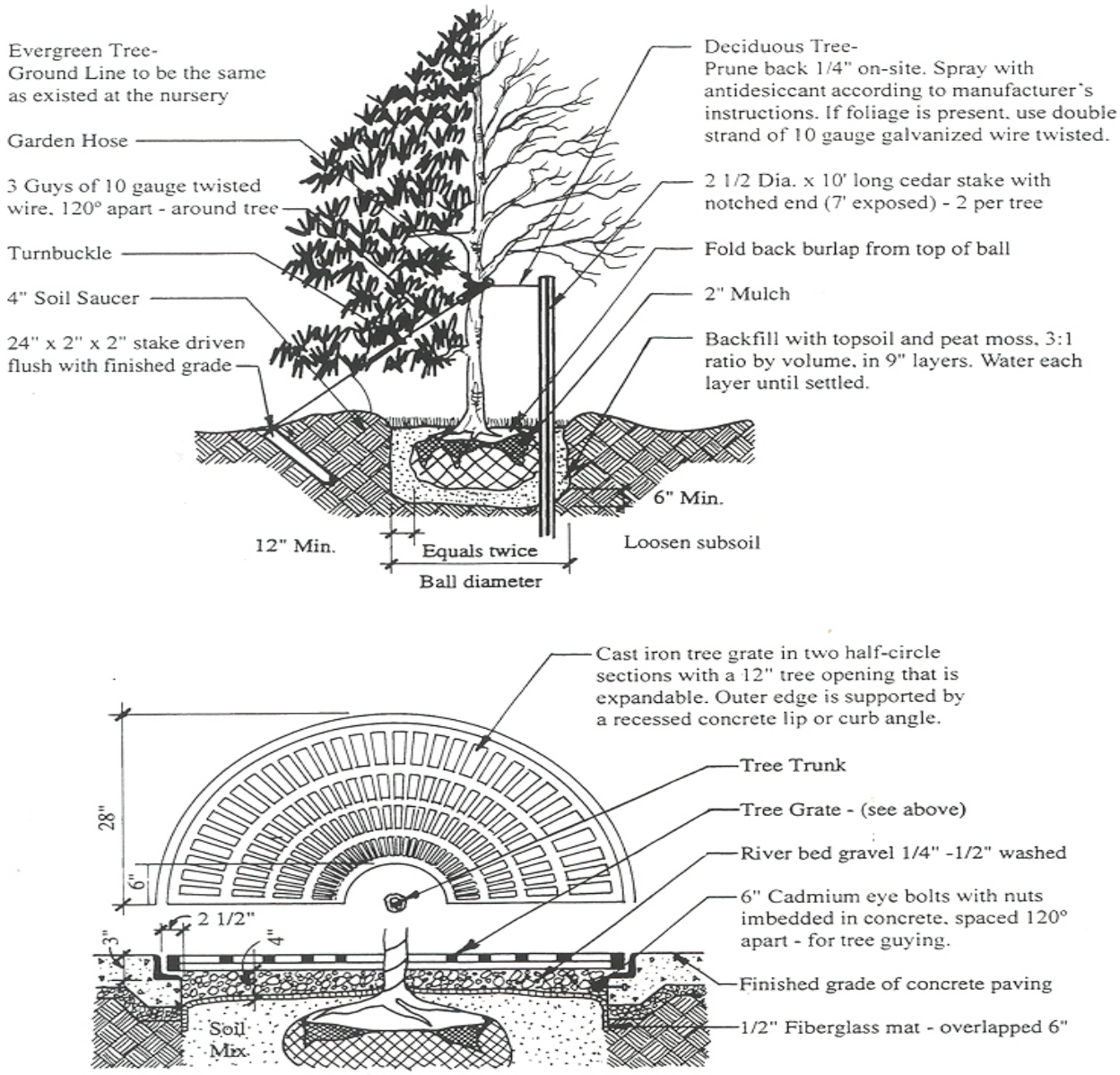


Figure 10.14 - Install plant material according to industrial standards

10.8.4.4 Site all plants and stakes plumb.

10.8.4.5 Install Plant Material According to Industrial Standards (Figure 10.14).

10.8.4.6 Space plants according to their mature size (Figure 10.15).

10.8.4.7 Install plant materials in groups for greater impact (Figure 10.16).

10.8.4.8 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.

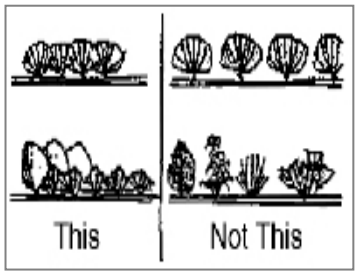


Figure 10.15 – Space plants according to their mature size

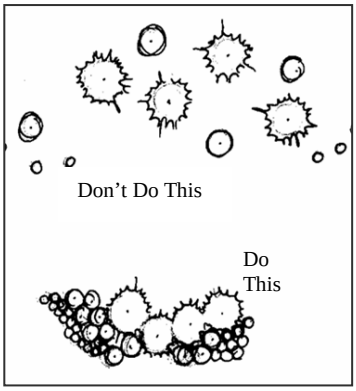


Figure 10.16 – Grouped plants have greater impact

10.9 Maintenance of Plant Material

10.9.1 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 healthy 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.

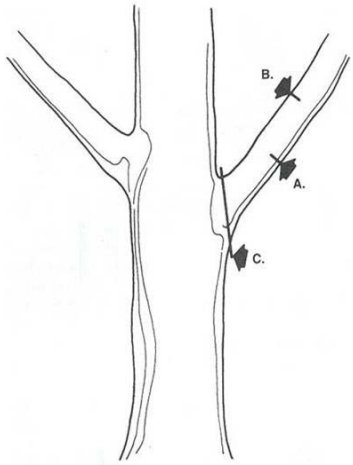


Figure 10.17 - Proper tree pruning procedures

10.9.2.1 Pruning Shrubs

- Do not prune shrubs flat across the top.
- For thick-branched shrubs, prune branches yearly 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.

10.9.2.2 Pruning Trees

- Remove large limbs 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 10.17).
- Make the second cut on the top of the branch within 1" of the undercut (Cut B, Figure 10.17).
- Make the final cut just beyond the outer portion of the branch collar (Cut C, Figure 10.17). The first two cuts are necessary to remove the weight of the branch, allowing 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 retention and to inhibit the growth of weeds and grasses (Figure 10.18). Mulch should be maintained at a depth of two (2) to four (4) inches.
- The best time to mulch for water conservation is in the late spring. Apply mulch immediately to new fall plantings.

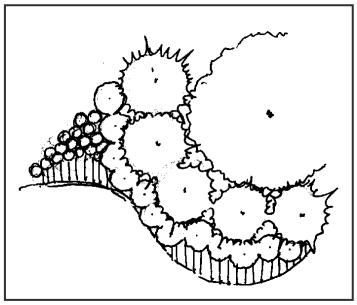


Figure 10.18 – Group plants in mulched beds to reduce maintenance

10.9.4 Ground Cover Maintenance

Although ground covers do not require pruning, they may periodically be dug up in the spring or fall for propagation and to prevent overcrowding in their beds.

10.9.5 Landscape Maintenance Schedule

The general objective of a landscape maintenance schedule is to ensure 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. Landscape maintenance scheduling information can be found in the Integrated Natural Resource Management Plan and the Land Management Branch's database of installation trees and maintenance needs.

10.10 Tree Protection and Preservation

10.10.1 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. The Integrated Natural Resource Management Plan (INRMP) and the Land Management Branch should be consulted for preservation and clearance strategies.

10.10.2 During the clearing and construction process, trees should be protected from damage. Construction barricades should be erected to protect and preserve the existing trees. 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 on- or off-site location.

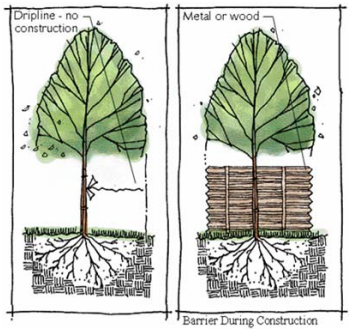


Figure 10.19 - Construct a barrier at drip line during construction to maintain grade

10.10.3 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 at least the area under the tree's canopy (the drip line) (Figure 10.19).

10.11 Anti-Terrorism/Force Protection Considerations

10.11.1 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 which reduce the threat of terrorism.

10.11.2 Proper selection and placement of trees and shrubs can 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 anti-terrorism measures (Figure 10.20).

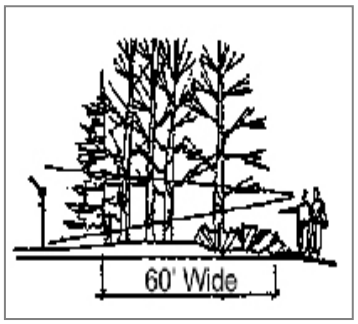


Figure 10.20 – Establish a visual barrier in perimeter setback

10.11.3 The plant material must allow building occupants to see out, but must not allow outside forces to monitor interior activity. The landscape architect should incorporate the following aspects into the design:

- Avoid conditions within 10 meters (33 feet) of inhabited structures that permit concealment of aggressors or obscure the view of objects 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 would obscure 150 mm (6 inch) packages.
- Group vegetation in order to reduce blast effect.
- Plant material selection and placement should minimize potential hiding places for bombs and aggressors.
- Provide vegetation screens for play and outdoor recreation areas to obscure them from off-installation view.
- Use trees to obscure sight lines of on-installation buildings from off-installation buildings (Figure 10.21).

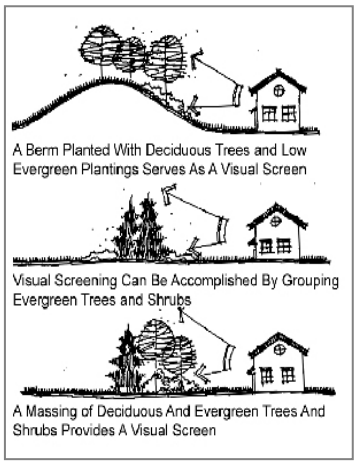


Figure 10.21 – Use trees to obscure sight lines

10.12 Army Standards

10.12.1 The following 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

10.13.1 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.
- Integrated Natural Resource Management Plan
- Land Management Branch

Links

Go to Section 11

Go to Table of Contents

SECTION 11 – Site Elements Design Standards

11.1 Introduction

11.1.1 Site elements include all outdoor utilitarian elements of the installation other than structures (Figure 11.1). These elements include the following four categories of utilitarian amenities:

- Site Furnishings
- Signs
- Lighting
- Utilities

11.1.2 The four sub-components provide major 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 section.

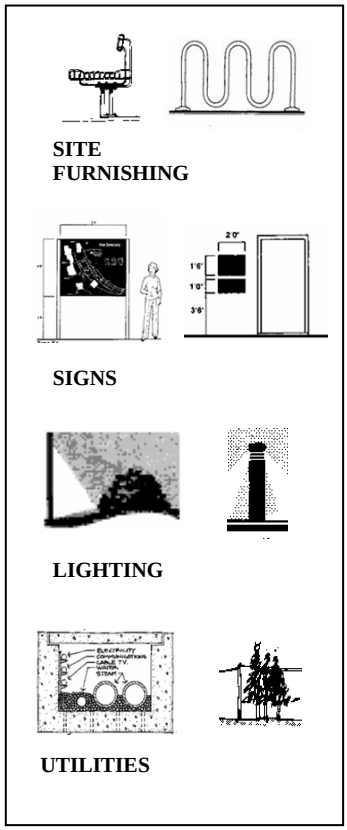


Figure 11.1 – Site elements

11.2 Site Element Objectives

11.2.1 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:

11.2.1.1 Provide site elements that are appropriate for their intended function.

11.2.1.2 Establish a coordinated system of site elements that provide consistency and continuity throughout the installation to convey a sense of organization.

11.2.1.3 The design and location of the various site elements should express an image, character, and scale appropriate to the installation.

11.2.1.4 Design and locate all site elements to meet AT/FP requirements.

11.2.1.5 Use recycled/salvaged materials wherever possible.

11.2.1.6 Minimize maintenance and repair through the use of efficient products that are vandal-proof.

11.2.1.7 Minimize negative visual impacts of all utility systems (Figures 11.2 and 11.3).

11.2.1.8 Minimize environmental impacts of all utility systems.

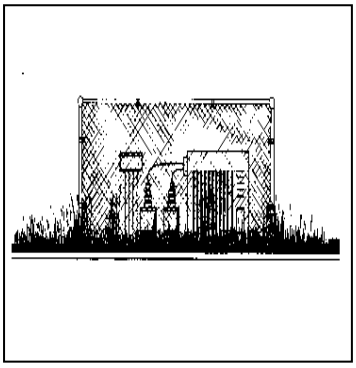


Figure 11.2 – Exposed utilities create negative visual impact

11.3 Site Furnishings

11.3.1 Site furnishings include all of the utilitarian outdoor amenities found on an installation. These outdoor furnishings should be located in coordinated clusters to 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), with the more stringent standards applying in the event of conflicts.

Figure 11.3 - Planted screen minimizes negative visual impact

11.3.2 Site furnishings include the following:

- Seating
- Tables
- Telephone Booths
- Shelters/Gazebos
- 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

11.3.3 Seating

Seating includes benches and walls, as well as tables and movable chairs.

11.3.3.1 Benches

11.3.3.1.1 Bench Location

Benches should be located in areas of high pedestrian use and arranged to encourage socialization in a pleasant outdoor setting. These areas include pedestrian nodes along primary walkways, major building entryways, courtyards, and bus stops.

11.3.3.1.2 Bench Siting

Benches should be sited on 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.

11.3.3.1.3 Bench Design

11.3.3.1.3.1 Aluminum Benches

Benches with backs are appropriate for high traffic areas, as well as the informal gathering, resting, eating and waiting uses characteristic of the installation. Bench dimensions should meet specifications presented in the Technical Manual (TM) 5-803-5, *Installation Design Manual*. Wall mounted benches should be similar in style and color to free standing benches. Aluminum benches of a clean, ergonomic design are preferred for comfort, sustainability and maintenance.

Figure 11.4 - Recommended Landscapeforms Plainwell Aluminum Bench

- Landscapeforms Plainwell Bench (Figure 11.4), or equal
- Aluminum; may be specified with a powdercoat in Storm Cloud
- Available in two lengths, the 72" and 96"; 72" should be the standard unless otherwise noted

- Surface mount support is standard

11.3.3.2 Seating Walls

11.3.3.2.1 Seating Walls Location

Wherever possible, seating should be incorporated into planter boxes or retaining walls, particularly at building entrance areas (Figure 11.5). Seating walls should be integrated into the overall area design and the pedestrian circulation system.

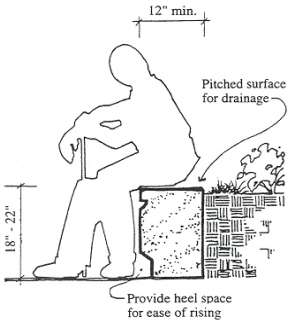


Figure 11.5 - Retaining wall/seating

11.3.3.2.2 Seating Wall Design

Seating walls should generally be from 18” to 22” high and 12” to 18” deep and constructed of textured concrete or brick in a manner that complements or matches the materials of the adjacent buildings (Figure 11.5).

11.3.3.3 Tables

Locate tables together with seating that is oriented to user needs of socializing, relaxing, or eating in less formal spaces with a pleasant setting and attractive view.

11.3.3.3.1 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 (Figure 11.6).

11.3.3.3.2 Table Materials

For flexible arrangement, provide movable tables and chairs. Both should be light, durable, and able to withstand changes in weather.

- Landscapeforms Steelhead Perforated Table (Figure 11.7)

Figure 11.6 – Trellis and vines providing shelter

11.3.3.4 Chairs

11.3.3.4.1 Chair Type(s)

For flexible arrangement, provide movable chairs. Chairs should be light, durable, and able to withstand changes in weather (Figure 11.8).

- Landscapeforms Traverse chair, or equal
- Steel; may be specified with a powdercoat in Storm Cloud
- Perforated seat to match table
- Available with or without armrests; armrests should be used everywhere unless otherwise noted

Figure 11.7 – Landscapeforms Steelhead Perforated Table

11.3.4 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.

11.3.5 Shelters/Gazebos

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. The design of a shelter should respect the historic theme of the visual zone.

Figure 11.8 –Travers perforated Chair

11.3.5.1 Bus Shelters

11.3.5.1.1 Bus Shelter Location

Bus shelters should be located at major facilities along the bus route such as commissary/post exchange areas, barracks areas, the hospital, and the 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.

11.3.5.1.2 Bus Shelter Design

Bus shelters should provide protection from wind, rain, and sun with an overhead roof enclosed on three sides. Side enclosures should be a transparent, unbreakable type of material to allow for adequate visibility (Figure 11.9). 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 integral bench, a trash receptacle, and an ashtray.

Figure 11.9 – Example of a bus shelter allowing adequate shelter and visibility

11.3.5.2 Picnic Shelters

11.3.5.2.1 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 shelters should be placed close to park and recreational areas' designated parking areas.

11.3.5.2.2 Picnic Shelter Design

Picnic shelters should be open on at least 3 sides for good ventilation and visibility (Figure 11.10). The minimum size should be 20 feet square with a minimum 8' vertical clearance. The materials selected should reflect the character of the surrounding area. Flooring should be concrete pavement within shelter for ease of maintenance.

Figure 11.10 – Picnic shelter design

11.3.5.2.3 Picnic Tables

Picnic tables should be durable, but simple in their design, and be handicapped accessible (Figure 11.11). Picnic tables should be located in a variety of outdoor settings including picnic shelters, larger parks, and recreational areas, as well as natural areas, and in areas designated as picnic areas. Freestanding and moveable picnic tables are preferred to anchored tables.

- Landscapeforms Gretchen picnic Table, or equal
- Freestanding is recommended

Figure 11.11 – Recommended Landscapeforms Gretchen picnic table

11.3.6 Kiosks

11.3.6.1 Kiosk Location

Kiosks can be used as information centers at pedestrian nodes and as trailhead indicators. In public places, kiosks provide information and rules and regulations for use. Provide kiosks only where they are needed on a concrete base adjacent to walkways. Allow a minimum of 3' clearance on all sides.

11.3.6.2 Kiosk 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. Kiosks may contain multi-media presentation space, space for flexible/removable information, or directional information (Figure 11.12).

Figure 11.12 – Kiosk example

11.3.7 Walls and Fences

11.3.7.1 Location and Use

Walls and fencing should be used to define pedestrian plaza areas, to provide visual screening, wind screening, pedestrian and vehicular control, security, and to retain soil. The design of walls and fences should fulfill their functions in harmony with the character and appearance of their settings.

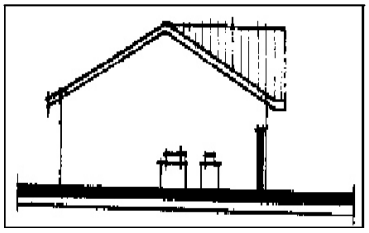


Figure 11.13 - Screen wall hides mechanical equipment

11.3.7.2 Walls

Low walls should be used to define pedestrian court areas and provide informal seating (see Paragraph 11.3.3.2). Screening walls can be used where appropriate to screen building storage and service areas and loading docks (Figures 11.13 and 11.14). 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 caps, or concrete with a textured finish and stone or concrete

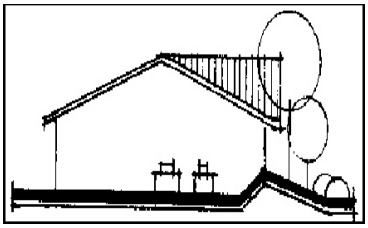


Figure 11.14 - Berms and shrubs hide mechanical equipment

caps. 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. Timbers are not acceptable. Walls used to screen service areas or trash enclosures should incorporate landscape plantings to help reduce the negative visual impact of these areas.

11.3.7.3 Fences

Fences should be utilized for screening of service areas and site utilities, particularly dumpsters. In areas visible to the public, all fencing should be buffered with landscaping to ensure an attractive visual image. Buffering should be accomplished with a mixture of evergreen trees, shrubs, ornamental or deciduous canopy trees that are either native or hardy to the region. Screen fencing should consist of square aluminum posts, rails and pickets. All fence posts should be securely anchored with concrete footings. All metal posts and framework should be painted or powdercoated in a dark grey or black (Figure 11.15). Chain link fences should be screened with trees and shrubs. The use of chain link fence should be held to a minimum within the installation. All fencing related to Force Protection should adhere to those specifications.

Figure 11.15 – Example of aluminum fencing

11.3.8 Trash Receptacles

11.3.8.1 Trash Receptacle Location

Trash containers should be highly visible and accessible for effective litter control. Containers should be located conveniently along walkways, near major pedestrian intersections, building entrances, and seating and eating areas. Anti-terrorism/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).

Figure 11.16 – Landscapeforms Plainwell Aluminum Litter Receptacle

11.3.8.2 Trash Receptacle Design

Trash receptacles should be of a design that is compatible with other site furnishings. Figure 11.16 illustrates a standard trash receptacle design.

- Landscapeforms Plainwell Litter Receptacles, or equal

- 35-gallon capacity, and includes a black polyethylene liner
- Side panels are available in aluminum with a powdercoat available in Storm Cloud
- Rotomolded black polyethylene top is attached by cable to the receptacle
- Surface mount support is standard.

11.3.8.4 Dumpsters

11.3.8.4.1 Dumpster Location

The location of dumpsters can have a significant visual impact and should be incorporated in site planning and addressed as part of an overall building design. To the greatest extent possible, incorporate dumpster placement into areas screened with walls, fencing, or plant material (Figure 11.17). Avoid locating dumpsters along major circulation routes or visible from high-use areas. Dumpsters should be directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles. Anti-terrorism/force protection (AT/FP) 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).

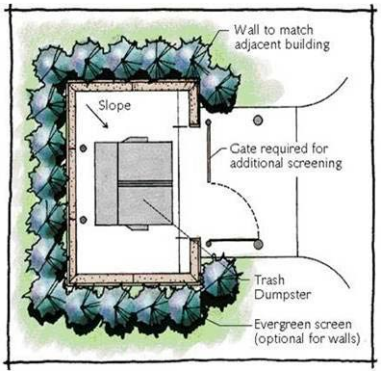


Figure 11.17 – Enclose dumpsters with walls, fences, or plantings and place on concrete pad

11.3.8.4.2 Dumpster Site Design

Locate plantings to buffer the visual impact of screen walls. Walls or fencing should be a maximum of 6' in height. 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.

11.3.9 Flagpoles

The standard flagpole for Fort Benning and Camp Merrill will be tapered mill finish aluminum, fitted with a gold anodized finish "ball" finial (Figure 11.18). 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,

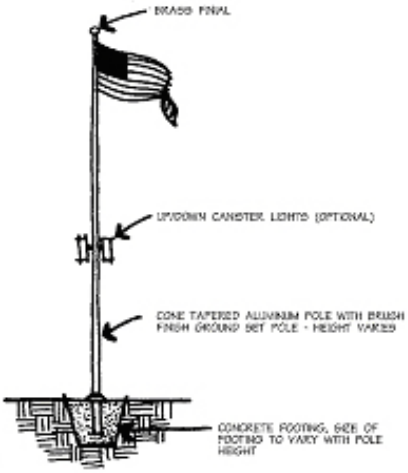


Figure 11.18 – Standard flagpole

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.

11.3.10 Planters

11.3.10.1 Movable pre-cast concrete planters may be used outside building entrances to provide seasonal color and interest and to serve as security threat barriers (Figure 11.19). Planters should be located so that they block uninterrupted vehicular access to a building, but not so that they excessively impede pedestrian movement.

Figure 11.19 – Movable planters

11.3.10.2 Planters Sizes and Design

Planters should be made of pre-cast stone or concrete. They should be freestanding so that they can be moved, but heavy enough so that they serve as effective barriers. Their construction should match the surrounding design emphasis of adjacent buildings and site furniture. Planters can be used in a single size or grouped in various sizes to produce an aesthetically pleasing display.

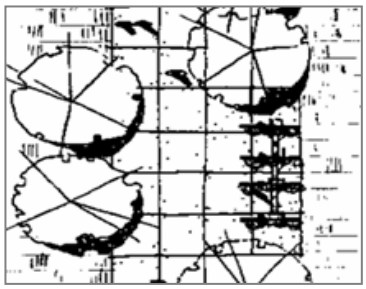


Figure 11.20 – Bicycle rack placement

11.3.11 Bicycle Racks

Bicycle racks should be provided at key destination locations. They should be located on concrete surfaces where they will not impede pedestrian and vehicular movement or block building entrances (Figure 11.20). Bicycle racks should be located to provide safety, security and convenience for all bicycle riders. Separate bicycle racks from motor vehicle traffic and parking lots by either a minimum of 1-meter (3 foot) separation distance, or a curb or other physical barrier. Bicycle parking should be provided for 5 percent or more of the building occupants. Bicycle storage areas near barracks should be covered, and the shelter should be consistent with those standards set in **Section 11.3.5**. If the bicycle rack is to be used at night it should be sufficiently illuminated.

Figure 11.21 – Ribbon bicycle rack

11.3.11.1 Bicycle Rack Size and Design

A ribbon type tubular aluminum bike rack with a dark finish should be standard (Figure 11.21).

11.3.12 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'.

11.3.13 Bollards

Bollards are utilized to separate vehicular and pedestrian traffic, to direct access, or as decorative elements in pedestrian areas. Simple bollards without illumination should be brown in color, especially in historic visual zones. When illumination is required, Figure 11.22 or equal should be standard.

11.3.13.1 Bollard Size and Design

- HessAmerica Cento 360 (Figure 11.22), or equal
- 360° illumination with translucent acrylic lens creates soft diffused light
- Heavy wall extruded aluminum shaft
- Standard color; matte silver grey metallic; special colors are available
- Surface mount support is standard.

Figure 11.22 - HessAmerica Cento 360 bollard

11.3.14 Playgrounds/Tot Lots

Playgrounds and tot lots should use equipment that is consistent throughout the installation and that meets specific criteria for materials, color, and design (Figure 11.23).

11.3.14.1 Playground Planning and Design

Guidance for planning and designing unsupervised outdoor play areas that meet child safety and child development requirements is found in Unified Facilities Criteria (UFC) 3-210-04, *Design: Children's Outdoor Play Areas*. The specifications detailed in this publication meet the needs of children with and without disabilities.

Figure 11.23 - Playgrounds and tot lots meet specific criteria for materials, color, and design throughout the installation

11.3.14.2 Playground Inspection and Maintenance

A play area inspection and maintenance program for Child Development Centers can be found in Technical Manual (TM) 5-663, *Child Development Center, Play Area Inspection and Maintenance Program*.

11.3.14.3 Recalled and Banned Playground Equipment

For updates on banned or recalled playground equipment consult the Consumer Product Safety Commission Press Releases and Recalls web site.

11.3.15 Mailboxes

All mailboxes should be located in close proximity to the facility they serve. However, when locating mailboxes, consider the site element's potential to be used as a container for the concealment of explosives, etc. Consider AT/FP 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. If group mailboxes are required, provide central locations for them adjacent to hard-surface walkways, but do not impede pedestrian movement.

11.3.16 Monuments, Memorials, and Military Equipment 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 a few major locations to create central focal points or exhibition facilities within the installation. Memorials will conform to the specifications set forth in Army Regulation (AR) 1-33, *Memorial Programs*.

11.3.17 Drinking Fountains

Outdoor drinking fountains should only be provided 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 the requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and Uniform Federal Accessibility Standards (UFAS) should be met. Figure 11.24 illustrates an acceptable outdoor drinking fountain.

Figure 11.24 – Sample water fountain

11.4 Signs

11.4.1 Signs are used to communicate information visually. Signs are highly visible features that should be attractive and compatible with their surroundings. Careful consideration must be given to sign copy, its visual appearance and organization, its location, structural support system, and relationship to other signs within the installation. Standardized signage systems facilitate navigation, provide a sense of orientation, reinforce standards of excellence, and memorialize deceased personnel with records of

outstanding achievement. Signage should be a unifying element that visually ties the installation themes together and builds reference continuity. Signage type and sizing standards are found in Unified Facilities Criteria (UFC) 3-120-01, *Air Force Sign Standard.*

11.4.2 Sign System Characteristics

There are several basic design characteristics that, by conveying necessary information clearly and attractively, are an integral part of any successful signage system.

11.4.2.1 Simplicity

Effective signage provides only needed information, avoids redundancy, and eliminates over-signing and the resultant clutter and visual confusion. Sign messages must be clear, simple, and easy for motorists to process quickly.

11.4.2.2 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 to the details of color continuity and matching typestyles.

11.4.2.3 Visibility

Sign location is very important to the success of the system. Signs must be located at significant decision points and oriented to provide clear sight lines for the intended user. To ensure long-term maximum visibility, it is important to coordinate locations with respect to landscaping, utilities, adjacent signage, and various other street design elements.

11.4.2.4 Legibility

Sign typestyle, line spacing, color, and size all combine to create the crucial design characteristics of legibility. This aspect of sign design must accommodate motorists, pedestrians, and bicyclists and consider the speeds at which each type of user will be traveling when viewing the signs.

11.4.3 Vocabulary-Communications

11.4.3.1 A common language has been created for establishing a signage system.

11.4.3.2 The creation of a "signing language" helps generate a unified bond within sign types that make up a signing family (Figure 11.25).

- Reference
- Information/Message
- Presentation
- Architectural Influence
- Graphic Architecture

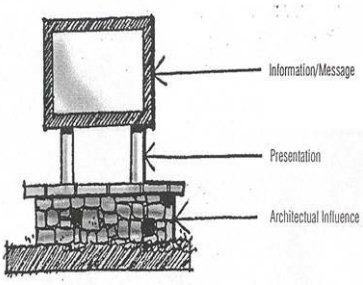


Figure 11.25 – Signing language helps establish a signing system

11.4.4 Visual Hierarchy

11.4.4.1 The entire signage system must communicate, through a range of sign and typestyle sizes, the relative importance of the individual activity identified by the sign (Figure 11.26). The system should follow a logical progression from a point of origin to the desired destination.

11.4.4.2 Establishing a ranking method clarifies 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.

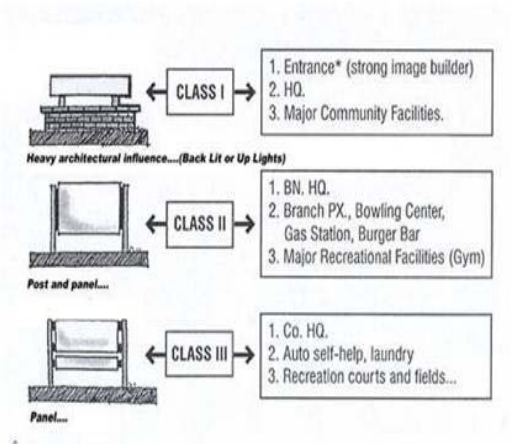


Figure 11.26 – Signs can be organized into classes within the visual hierarchy

11.4.4.3 Within each class, the size and the level of architectural ornamentation 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 communicated by its size and level of detail.

11.4.4.4 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

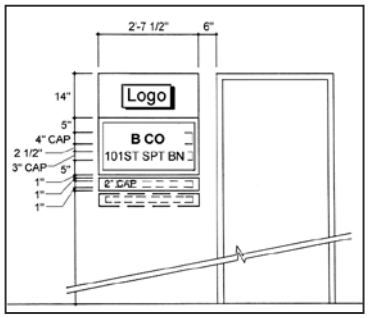


Figure 11.27 – Building-mounted information sign

11.4.5.1 Information/Identification Signs

These signs identify entrances to the installation, areas within the installation, major tenants, buildings, and organizational or functional components and can also serve to memorialize deceased Army personnel with records of outstanding service. These signs identify locations, greet visitors, and provide information important to the history and culture of the US Army and Fort Benning. Signs should be compatible in scale and character with nearby architecture and also blend with the natural surroundings (Figure 11.27).

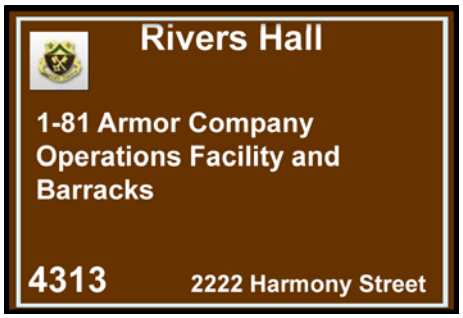


Figure 11.28 – Building/ Facility outdoor sign

Fort Benning follows a signage policy, adopted by the MCOE CG on December, 2 2009 that provides guidance regarding appropriate design attributes for each sign type. The sign types and attributes identified are as follows:

Figure 11.29 – Building/ Facility small sign

Buildings and Facilities:

Outside Sign (Figure 11.28)

- Unit crest (in appropriate color)
- Memorial name of facility (if applicable)
- Occupant/Descriptive name
- Building number
- Street address

Smaller brown metal sign just outside entrance to facility (Figure 11.29)

- "Commander" (OIC), Commander's name
- "Sergeant Major" (1SG) (NCOIC), SGM's name
- Battalion level and above
- Training companies – company level and above
- Removable/replaceable names plates

Figure 11.30 – Signs for Ranges, Training Areas, and Fields

Ranges, Training Areas, and Fields (Figure 11.30):

- Facility (Hero) name and medal
- Descriptive name
- Hero's full name and rank
- Branch, War/Conflict
- Date of award
- Highest award received

Informational Signs, No Memorial (Figure 11.31):

- Unit crest
- Occupant name
- Removable Cdr/SGM plate, where applicable

Figure 11.31 – Informational Signs

Inside Building, Engraved Bronze Memorial Plaque (Figure 11.32):

- Highest awarded medal (in appropriate colors)
- Memorial name
- "Named in Honor of"
- Hero's rank and name
- Branch
- War or conflict
- Year actions occurred that resulted in medal award
- Name of highest medal awarded

Figure 11.32 – Engraved bronze memorial plaque

Informational/identification signs are designed to include the following:

11.4.5.1.1 Typeface

Lettering is made of self-adhesive backing material.

- Building Title: Helvetica Medium, upper and lower case
- Building Numbers: Helvetica regular
- Building Addresses: Helvetica Medium, upper and lower case

11.4.5.1.2 Color

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

11.4.5.1.3 Materials

- Panel: Double-face 1/8" thick aluminum
- Post: Steel Pipe
- Foundation: Concrete pier or direct burial

11.4.5.1.4 Building Identification

11.4.5.1.4.1 Street Addresses

The addressing procedures prescribed in DoD 4525.8-M, DoD Official Mail Manual are mandatory for use by all DoD services. DoD 4525.8-M, Chapter 3 prescribes the following:

- All DoD addresses 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 addresses 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 addresses (such as 4102 Cindy Avenue, Figure 11.33) 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).

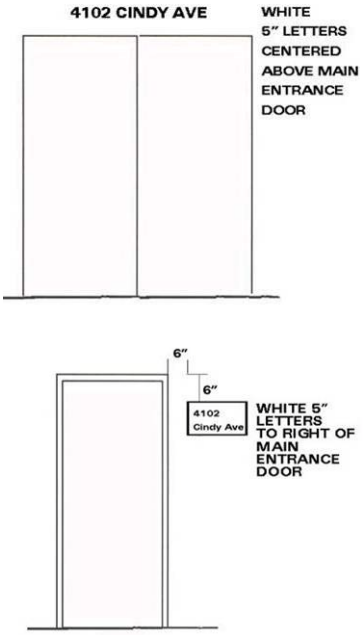


Figure 11.33 – Street address location at entrance doors

11.4.5.1.4.2 Address Placement

- Addresses should be placed by the front entrance of the building for visibility (C3.3.2.3.1).
- Both the street name and address number should be placed on the building if both the building number and street address are visible from the street.
- Building identification signs should use street addresses (Figure 11.34).
- Buildings without identification signs shall have the address number and street name centered above the main entrance or located to the right side (Figure 11.33).

Figure 11.34 – Use of street addresses on all building identification signs

11.4.5.1.5 Historic Districts

11.4.5.1.5.1 Signs should be complimentary to the architectural setting and visual character of historic districts.

11.4.5.1.5.2 Design and placement of any sign to be installed in an historic district should be approved by the master planner, historic architect, and cultural resources manager for conformance with the IDG and Fort Benning Branding Study prior to installation.

11.4.5.1.6 Housing Area

11.4.5.1.6.1 Signs should be complimentary to the architectural setting of the housing area and approved by the master planner, as well as the historic architect if the housing area is an historic district.

11.4.5.1.6.2 Housing numbers should be placed on the curb in front of the respective house and on the house, where lighting will effectively illuminate the numbering. In historic housing areas, housing numbers and lighting should be approved by master planner and historic architect.

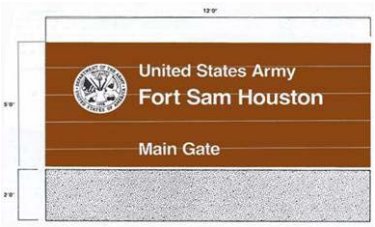


Figure 11.35 - Installation entrance signs

11.4.5.1.7 Installation Identification Signs

11.4.5.1.7.1 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, Paragraphs 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 11.35. The placement of the Senior Commander logo, Distinctive Unit Insignia, 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, installation identification 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.

11.4.5.1.7.2 Installation identification signs consist of three types:

- Sign type A1, main entrance sign, identifies the principal visitor entrance.

- 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.

11.4.5.1.7.3 See Unified Facilities Criteria (UFC) 3-120-01, *Air Force Sign Standard*, Paragraph 3-3, for sign specifications and Paragraph 3-11 for sign placement guidelines.

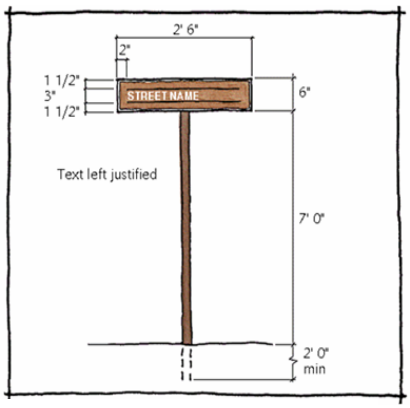


Figure 11.36 - Typical street signs

11.4.5.1.8 Street Signs

Street name identification signs should be designed with the same lettering, color, and materials as other information signs (Figure 11.36).

11.4.5.1.9 Portable Electrical Signs

Portable electrical signs should have an attractive presentation. Temporary landscape elements should be used whenever possible. The siting of this type of sign must 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.

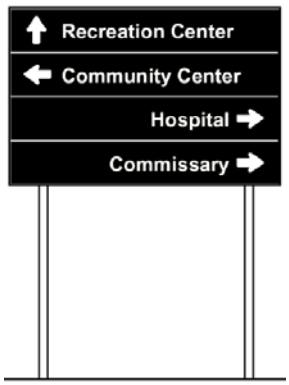


Figure 11.37 – Directional sign

11.4.5.2 Directional Signs

Place directional signs in central locations and at major decision points along circulation routes. These signs guide the motorist or pedestrian into, around, and out of the installation (Figure 11.37). The legibility and placement of these signs, as well as the ordering of information, is critical to their effectiveness. Messages will be grouped in the following order according to their arrow direction: forward, left, and right. In addition, placement of the copy on the sign panel is determined by the arrow direction. Destinations forward and left are listed first and have flush left messages. Destinations right are listed next and have flush right messages. The arrow (Figure 11.38) is centered in the space between the message and the edge of the sign. Prioritize destinations to be listed by giving the highest priority to the destinations that are most often sought by people new to the installation or that serve as highly visible landmarks on the installation. Those who live or work on the installations or who visit frequently do

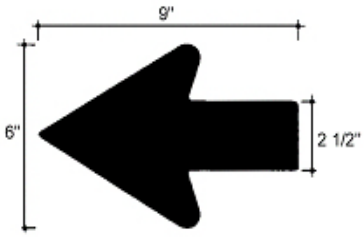


Figure 11.38 - Typical arrow for use on all destination signs

not need the degree of help required by a first time or infrequent visitor. These signs are designed to include the following:

11.4.5.2.1 Typeface:

Lettering is made of self-adhesive backing material.

- Helvetica Medium upper and lower case

11.4.5.2.2 Arrow:

- Place at end indicating direction
- Stoke width: Helvetica Medium cap

11.4.5.2.3 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

11.4.5.2.4 Materials:

- Panel: Double-face 1/8” thick aluminum
- Post: Steel Pipe
- Foundation: Concrete pier or direct burial

11.4.5.3 Regulatory Signs

These signs provide the rules for travel and parking on the installation. Regulatory signs include speed signs, turning and lane use signs, warning signs, parking control signs, etc. (Figure 11.39). Related to these signs are pavement markings and traffic signals. These signs are designed to include the following:

11.4.5.3.1 Typeface:

Lettering is made of self-adhesive backing material.

- Helvetica Medium upper and lower case

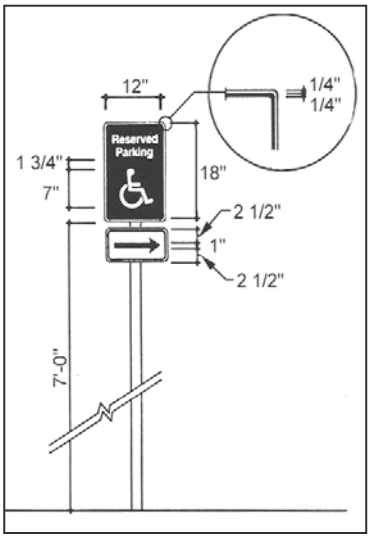


Figure 11.39 – Regulatory sign

11.4.5.3.2 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

11.4.5.3.3 Materials:

- Panel: Double-face 1/8" thick aluminum
- Post: Steel Pipe
- Foundation: Concrete pier or direct burial

11.4.5.3.4 Traffic Control Signs

11.4.5.3.4.1 CONUS Installations

National highway standards will be used for signs to regulate vehicular traffic on CONUS installations (AR 420-72, Transportation Infrastructure and Dams, Paragraphs 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 clear guidelines to installation officials for conforming to the MUTCD. These standards shall be used installation-wide to include Access Control Points.

11.4.5.2.4.2 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, Paragraphs 2-15e).

11.4.5.3.5 Prohibitory (Warning) Signs

This category of signage is intended to maintain security and safety on the installation perimeter and at other secure areas. These signs notify visitors of restrictions and other security procedures. The guidelines for design, fabrication, and placement of warning signs are found in Unified Facilities Criteria (UFC) *3-120-01, Air Force Sign Standard*, Paragraphs 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.

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 signs are the exception to this rule (Figure 11.40).
- 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 of the driver's line of vision (Figure 11.41). Provide proper placement to avoid posing hazards to children.

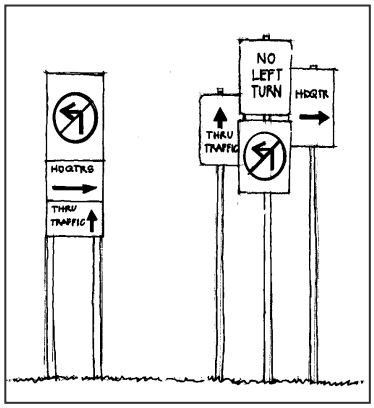


Figure 11.40 – Signs should be simple, legible, and combined

11.4.8 Sign System Typography

11.4.8.1 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 the 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.

11.4.8.2 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.

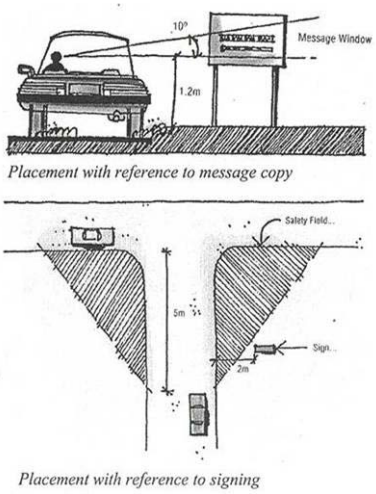


Figure 11.41 - Placement is critical to ensure easy readability

11.4.8.3 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.

11.4.8.4 Unit Signs

Painting or drawing on areas that belong to a unit promote unit spirit. Unit signs may be painted on concrete surfaces outside of buildings:

- Areas within 50 feet of the unit belong to the unit
- Unit funds should be used to purchase materials for painting and maintaining unit logos or graphics, rather than requesting DPW or SRM funds

11.4.9 Reduce Visual Clutter

11.4.9.1 Over-signing detracts from a uniform sign system and, if left uncontrolled, will eventually destroy the integrity of the system.

11.4.9.2 Clutter creates confusion and ineffectiveness. Often, motorists and pedestrians are confused when bombarded with messages having no relationship to each other, or when a sign's level of communication is so minimal that it serves no purpose (Figure 11.42).

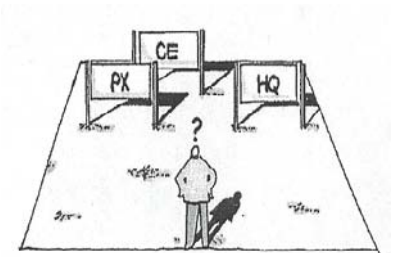


Figure 11.42 - Visual clutter causes confusion

11.4.10 Location Maps

11.4.10.1 Location maps are integral element of installation entrances. The location map display provides information and a sense of orientation to the viewer (Figure 11.43). The design and construction should be of compatible architectural materials found throughout the installation.

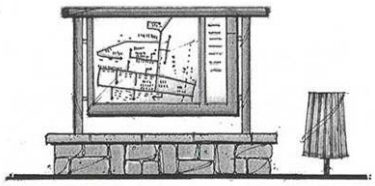


Figure 11.43 - Location maps provide a sense of place

11.4.10.2 The location map design should include the following characteristics:

- Plexiglas-covered map for protection
- Architecturally compatible materials used for the base
- Paved walk-up area
- Litter receptacle
- Adjacent parking
- Current takeaway maps

11.5 Lighting

11.5.1 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 The primary exterior lighting problem on most military installations has been the lack of overall lighting system coordination.

11.5.3 A lighting system provides the proper type of lighting for different requirements and locations. A system is composed of six primary components – fixtures, light height, pole type, light spacing, lamp type, and lamp intensity level.

11.5.4 The proper type of lighting for various locations is shown in Table 11-1 – Lighting Design Matrix.

11.5.5 All lighting should be located or designed to prevent undesirable spillover of light into other areas. Spotlights in particular should be aimed or screened so as not to blind motorists or pedestrians or to illuminate sleeping areas.

11.5.6 Selection of lighting equipment and lighting system design should carefully seek to balance aesthetics and performance. Consideration should be given for energy efficient systems, which can provide cost savings and help achieve broader sustainability goals.

Table 11-1 Lighting Design Matrix

LIGHTING 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		☐							☐	☐	☐	☐				☐			☐
FIXTURE	Cutoff		☐	☐	☐													☐	☐	
	Utility	☐														☐				☐
	Bollard																			
	Spot													☐			☐			
	Wall Mount																			
POLE	Metal		☐	☐	☐													☐	☐	
	Wood															☐				
SPACED	120' Max		☐	☐	☐											☐		☐		
	90' Max																		☐	
	Varies													☐			☐			☐

11.5.7 Light Fixtures

11.5.7.1 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.

11.5.7.2 Lighting fixtures are grouped into five general categories as defined below. Figure 11.44 includes examples of four of the categories.

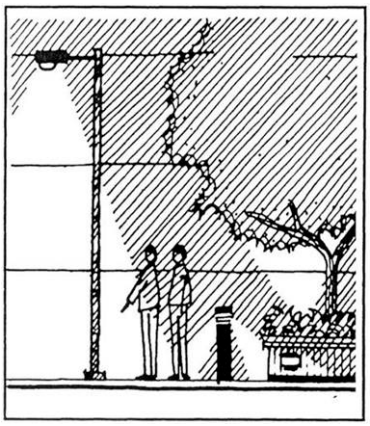


Figure 11.44 – Example of cutoff, bollard, wall and spot lighting

11.5.7.2.1 Cutoff Lighting

This refers to the large, shoebox-shaped fixtures placed on tall poles and used to illuminate streets and parking lots. The fixtures 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.

11.5.7.2.2 Utility Lighting

This refers to simple, inexpensive fixtures that are used in industrial areas of low visibility.

11.5.7.2.3 Bollard Lighting

This refers to fixtures that are mounted on or in a short post to illuminate pedestrian areas. Bollards can also be used as physical barriers between pedestrian and vehicular traffic.

11.5.7.2.4 Spotlighting

This 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.

11.5.7.2.5 Wall-Mounted Lighting

This refers to fixtures attached to the wall of a building or a wall bordering a walkway or stairway.

11.5.8 Light Poles

11.5.8.1 The light fixture size should be proportional to the intended pole height.

11.5.9 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 described below (Figure 11.45).

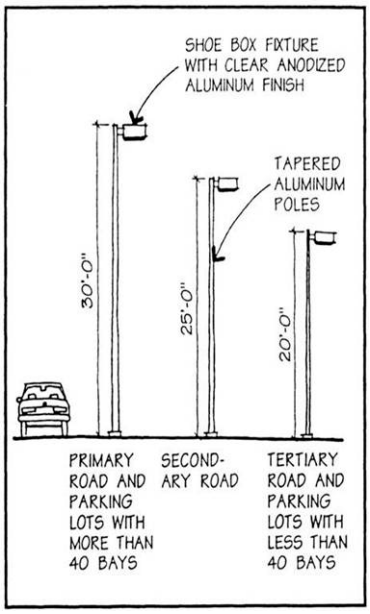


Figure 11.45 – Pole height and function

11.5.10 Lamp Characteristics

Selection of a lamp involves evaluating its optical control, efficiency, lamp color rendition, lamp life, cost, and maintenance (Figure 11.46). The following is a summary of the characteristics of typical lamp types.

11.5.10.1 Incandescent

- Superior color rendition
- Inexpensive
- Good optical control
- Short life span
- Lowest efficiency

11.5.10.2 High Pressure Sodium

- Poor color rendition
- Broad application
- Low maintenance
- Superior optical control
- Superior life span
- Excellent efficiency
- Expensive

11.5.10.3 Low Pressure Sodium

- Poor color rendition
- Good efficiency
- Superior life span
- Expensive

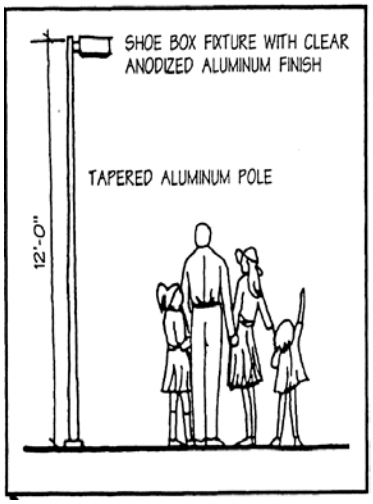


Figure 11.46 – Lamp characteristics

11.5.10.4 Fluorescent

- Good color rendition
- Poor optical control
- Good life span
- Good efficiency in mild climates
- Produces glare

11.5.10.5 Metal Halide

- Superior color rendition
- Superior optical control
- Efficiency better than mercury vapor but poorer than pressure sodium.
- Expensive

11.5.10.6 Mercury Vapor

- Good color rendition
- Good foliage lighting
- Good life span
- Good efficiency
- Inexpensive

11.6 Utilities

11.6.1 Utility systems provide the basic infrastructure of power, communication, water, and sewer services necessary for the operation of the installation. Utilities can have a significant impact on the visual quality of an installation. Their primary impact on the visual quality is the result of poor siting or screening, cluttered overhead utility lines and poorly designed storm drainage systems.

11.6.2 The visual and environmental impact of utilities should be minimized on the installation (Figure 11.47). 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.

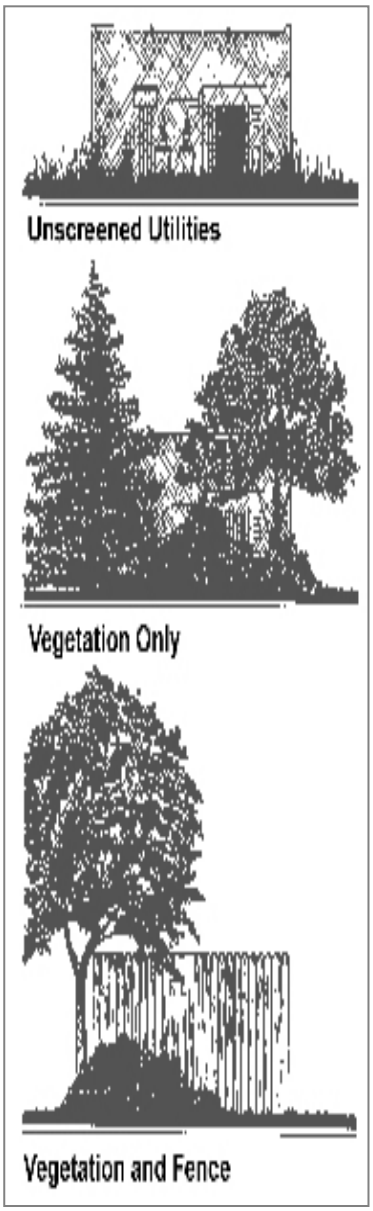


Figure 11.47 - Screen existing utilities to decrease visual impact

11.6.3 Overhead Transmission Lines

11.6.3.1 Unsightly 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:

11.6.3.2 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. The lines 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.

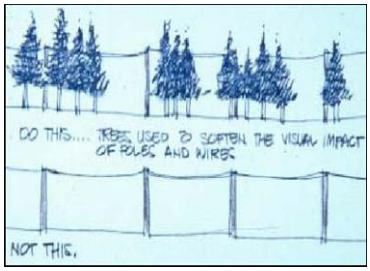


Figure 11.48 - Soften impact of overhead lines

11.6.3.2 View Screening

Minimize long views or silhouette views of overhead transmission lines from along roads and other public viewing areas. Avoid the “tunnel effect” created by long, straight, uninterrupted views along the alignment by only clearing vegetation 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.

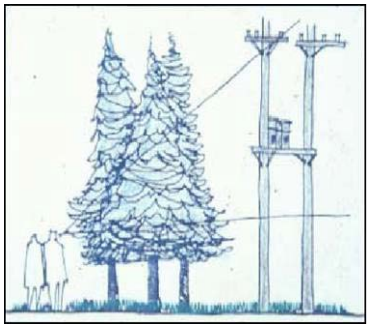


Figure 11.49 - Screen utilities to reduce negative impact

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 (Figures 11.48 and 11.49). Avoid alignment 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. Cell phone towers should be monopole towers, rather than lattice towers, to reduce visual impact and clutter.

11.6.5 Substations and Transformers

Substations and transformers should be designed and located to minimize their visual impact and to be compatible with the character of their setting. Substations are best located in industrial use areas rather than in major public circulation areas. Substations should be screened from public view by using plant material, berms, and walls.

11.6.6 Sewer and Water

11.6.6.1 All sewer and water lines should be underground.

11.6.6.2 Sewage treatment facilities should be located 1,250 ft. (0.38 Km) away from and in a downwind direction from all inhabited facilities.

11.6.6.2 Treatment facilities should be screened from view of major roads and other installation facilities by plant material, berms, walls, and fences.

11.6.6.3 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. However, painting logos and distracting colors onto water storage tanks can negatively impact the visual environment. Therefore, logos and paint colors for water storage tanks should be reviewed and approved by the Master Planner prior to application.

Figure 11.50 - Fire hydrants should be nutmeg brown and caps shall indicate tested water pressure

11.6.6.4 Fire hydrants should be highly visible and free of any screening. Fire hydrants shall be nutmeg brown in color with luminous paint. Caps shall indicate tested water pressure (Figure 11.49).

11.6.7 Storm Drainage

11.6.7.1 Installation storm drainage systems should be appropriate to the character of development they serve. Storm drainage systems in densely developed areas require curbs, 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 natural amenities that are part of the natural contours of the land, rather than

square or rectangular holes 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.

11.6.7.2 Large, hard-surfaced parking lots should have covered drainage at the entry to prevent water draining into adjacent streets.

11.7 Army Standards

11.7.1 The following 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*
- Army Regulation (AR) 1-33, *The Army Memorial Program*
- Americans with Disabilities Act Accessibility Guidelines (ADAAG)
- Uniform Federal Accessibility Standards (UFAS)
- Unified Facilities Criteria (UFC) 3-120-01, *Air Force Sign Standard*
- 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

11.8.1 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*

Links

Go to Section 12

Go to Table of Contents

SECTION 12 – Force Protection Design Standards

12.1 Introduction

12.1.1 Accommodating the need for security and anti-terrorism features is a significant concern for all military facilities design. The security and anti-terrorism 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. Figure 12.1 shows how bollards are used as protective features at Ft. Benning's Historic Main Post. These design elements should be utilized to provide visual harmony with the main facility, producing design compatibility through consistent use and application of materials, forms, and colors.

Figure 12.1 – Bollards as force protection for Building 35

12.1.2 Final design decisions to meet security and anti-terrorism 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, the installation's 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.

12.2 Building Siting and Design Standards

12.2.1 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.*

12.2.1.1 UFC 4-010-01 establishes the minimum building anti-terrorism standards for all DoD components.

- Mandatory DoD minimum anti-terrorism standards for new and existing inhabited buildings are contained in Appendix B.
- Mandatory DoD minimum anti-terrorism 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 must be reviewed before any site planning or design is initiated.

12.2.1.2 Minimum Standoff Distances and Separation for Buildings (see Figure 12.2)

- 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.

Figure B-1 Standoff Distances and Building Separation – Controlled Perimeter

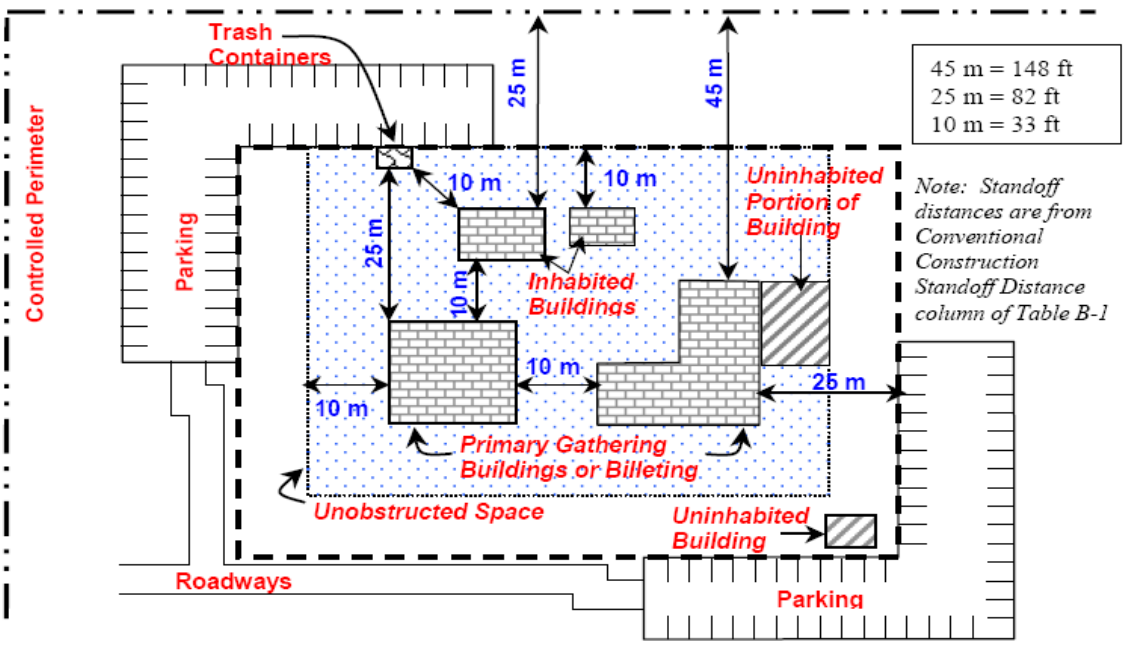


Figure 12.2 – Diagram from UFC 4-010-01, DoD Minimum Anti-terrorism Standards for Buildings

12.2.1.3 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 standard for specific Combatant Commanders or based on Risk and/or Threat Analysis.

12.2.1.4 When the minimum standoff distances cannot be achieved because land is unavailable, the standards allow for building hardening to mitigate blast effects. Costs and requirements for building hardening are addressed in the DoD Security Engineering Manual. (See Paragraph 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* is found in UFC 4-010-02.

12.2.2.1 Website Access for Military and Government Users

The Security Engineering Working Group website 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.

12.2.2.2 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 procedure, 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 should be considered when determining the orientation of a building:

12.2.3.1 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.

12.2.3.2 Protect against attack by selecting perimeter barriers, such as obstruction screens, trees, or shrubs, to block sightlines. Non-critical structures or other natural or man-made features can be used to block sightlines.

12.2.3.3 Create "defensible space" by positioning facilities to permit building occupants and police to clearly monitor adjacent areas.

12.2.3.4 If roads are nearby, orient the building such that no sides are parallel to vehicle approach routes.

12.2.3.5 Design vehicular flow to minimize vehicle bomb threats by prohibiting high-speed approach into any critical or vulnerable area.

12.2.3.6 Avoid siting the facility adjacent to high surrounding terrain, which provides easy viewing of the facility from nearby non-military facilities.

12.3 Fencing

12.3.1 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 12.3). A fence will assist in controlling and screening authorized access to a secured area. Design guidelines for fences can be found in Section 11 of the IDG. Fences also serve the purposes listed below.

12.3.1.1 As a platform for the Intrusion Detection System

12.3.1.2 As a screen against explosive projectiles

12.3.1.3 To stop moving vehicles if they are reinforced to do so

12.3.2 Plants with tall growth habits and/or large mature growth will be located well away from security fences.

Figure 12.3 – Fencing as a protective measure at Harmony Church

12.4 Landscape Considerations

12.4.1 Landscaping guidelines for buildings should not be disregarded because of standoff distance requirements. The landscape design should enhance the overall attractiveness of the facility while still providing or enhancing the objective level of security.

12.4.2 Establish clear zones along both sides of security fencing. Vegetation in the clear zone shall 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).

12.4.3 Strategically locate trees and planters to prevent penetration of an attack vehicle into the secure area perimeter.

12.4.4 Vegetative groupings and earth sheltering berms provide inherent blast effect reduction from external blast forces.

12.4.5 Plant material that can provide concealment should not be used adjacent to high security structures or fence lines.

12.4.6 Use dense, thorn-bearing plant material to create natural barriers to deter aggressors.

12.4.7 Screen play and outdoor recreation areas from public (off-installation) view.

12.4.8 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 _".

12.4.9 Place trash containers as far away from the facility as possible. Anti-terrorism/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).

12.4.10 Unobstructed Space

Ensure that vegetation and site features within 10 meters (33 feet) of inhabited buildings cannot conceal objects of 150mm (6 inches) in height. (UFC 4-010-01, Appendix B, Paragraph B-1.3). This does not preclude 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 determine lighting system requirements. Often two or more types of lighting systems are used within a single area (Figure 12.4). Guidance on the use of security lighting may be obtained from TM 5-811-1, Electrical Power Supply and Distribution.

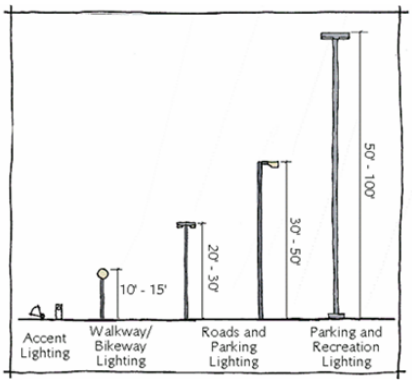


Figure 12.4 – Types of lighting systems for installation environments

12.6 Berms

12.6.1 Use of berms for force protection can fulfill one of more of the following functions (Figure 12.5):

- Define boundaries of property or boundary limits
- Provide a barrier to moving vehicles
- Hinder pedestrian movement
- Intercept projectiles
- Obstruct lines of sight

12.6.2 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-

Figure 12.5 – Berms can serve many force protection functions

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])

12.7.1 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 among the most important installation features in creating a sense of arrival for both installation personnel and visitors. It is important that these areas present a positive public image (Figure 12.6).

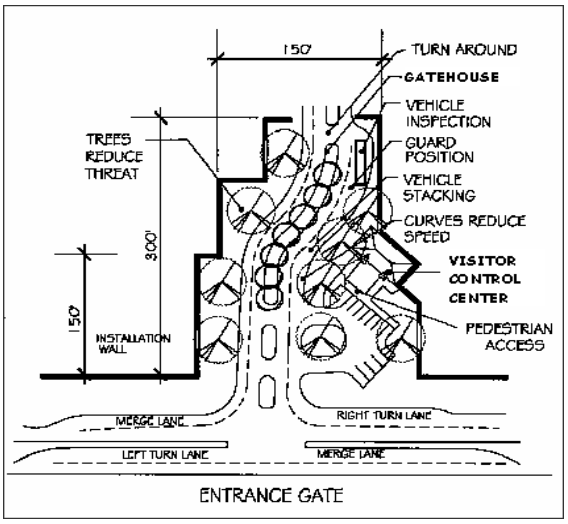


Figure 12.6 – Conceptual entrance gate to meet AT/FP requirements

12.7.2 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). The Army Access Control Points Standard Design/Criteria was approved by HQUSACE in April 2009.

12.7.2.1 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.

12.7.2.2 USACE Centers of Standardization (COS) for Access Control Points

12.7.3 Physical Security Equipment

12.7.3.1 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.

12.7.3.2 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 Army Standards

12.8.1 The following 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 inquiries regarding this document).
- Uniform Federal Accessibility Standards (UFAS)
- Americans with Disabilities Act Accessibility Guideline (ADAAG)
- DoD Instruction 2000.16, DoD Antiterrorism Standards
- The Army Access Control Points Standard Design/Criteria

12.9 References

12.9.1 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/dir.html.
- Army Regulation (AR) 525-13, The Army Force Protection Program (Available only through the Army Knowledge Online web portal)
- UFC 4-010-02, *DoD Minimum AntiTerrorism Standards for Buildings*.

- 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.

Links

Go to Appendix A

Go to Table of Contents

Appendices

Appendix A - Design Team IDG Checklist
Appendix B - Project Requirements IDG Checklist
Appendix C - Interior Design Review Checklist
Appendix D - Sustainable Design
Appendix E - LEED Project Checklists
Appendix F - Landscape Maintenance Schedule
Appendix G - Prioritized Improvements Project List
Appendix H - Self-Help Project Checklist
Appendix I - Interior Finishes Standards
Appendix J - Interior Furnishings Standards
Appendix K - Reserved
Appendix L - Exterior Color Checklist
Appendix M - Historic Preservation Guidelines
Appendix N - Housekeeping Rules
Appendix O - Plant Palette
Appendix P - Army Facilities Standardization Program Centers of Standardization
Appendix Q - Standards and References
Appendix R - DOIM Requirements
Appendix S - Sample Specifications

Appendix A - Design Team IDG Checklist

A.1 Intended Use

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 or additions or renovations to existing facilities, or performing 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 with in the design process, and by the Master Planner in project review.

A.2 Responsible Parties

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 part of the project record files.

A.3 Denial and Revision

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 suggested in the explanation of denial.

A.4 Army Installation Design Guide (IDG) Compliance Checklist

1. Project Title and Description

Title:

Description:

2. Project Justification:

3. Sustainable Design:

a. Has LEED worksheet been attached? (If not, obtain completed worksheet)

b. Does LEED criteria meet or exceed Silver level?

Yes _____ Review project as submitted

No _____ Return submittal to design team for revisions to meet LEED

4. Site Planning

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?

Yes _____ No _____ If not, provide justification:

f. Does site planning meet approved installation master plan siting compliance?

Yes _____ No _____ If not, provide justification:

g. Has NEPA been initiated for the construction effort in accordance with AR 200-2?

Yes _____ No _____

h. Has airspace criteria been consider relative to airfield accident potential zones?

Yes _____ No _____

5. Buildings

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 agency's requirements for any deviations?

Yes _____ No _____

e. Does the building exterior design meet AT/FP requirements (if applicable)?

Yes _____ No _____

f. Designer comments on exterior building design:

g. Does building design comply with the IDG?

Yes _____ No _____ If not, provide justification:

6. Circulation

a. If the project includes roadway construction, does the proposed plan meet Federal Highway and/or local guidelines defined in the IDG?

   i. Yes _____ No _____

b. If the project includes roadway construction, does the proposed plan meet AT/FP roadway setback requirements defined in the IDG?

   i. Yes _____ No _____

c. If the project includes roadway construction, does the proposed plan include applicable roadway alignment and intersection characteristics defined in the IDG?

   i. Yes _____ No _____

d. If the project is an entrance gate, does the proposed plan include entrance gate characteristics and standards defined in the IDG?

   i. Yes _____ No _____

e. If the project includes parking, does the proposed plan meet the parking lot location/design guidelines defined in the IDG?

   i. Yes _____ No _____

f. If the project includes pedestrian circulation, does the proposed plan meet the walkways and pedestrian circulation guidelines in the IDG?

   i. Yes _____ No _____

g. If the project includes bicycle circulation, does the proposed plan meet the bikeway guidelines in the IDG?

   i. Yes _____ No _____

h. Designer comments on circulation design:

i. Does circulation design comply with the IDG?

   Yes _____ No _____ If not, provide justification:

7. Plant Material

a. All projects for new construction should include the planting of trees, shrubs and/or groundcover. Does the proposed project plan include a planting 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:

e. Does landscape design comply with the IDG?

Yes _____ No _____ If not, provide justification:

8. Site Elements

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 IDG?

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 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 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:

i. Does site elements design comply with IDG?

Yes _____ No _____ If not, provide justification:

9. Anti-terrorism (Security)

a. Have installation boundary setbacks been included?

Yes _____ No _____

b. Have building setbacks from roads, parking structures, and 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:

e. Does AT/FP design comply with the IDG?

Yes _____ No _____ If not, provide justification:

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**

Links

Go to Appendix B

Go to Table of Contents

Appendix B - Project Requirements IDG Checklist

B.1 The following checklist is optional and is designed for use on major projects.

PROJECT REQUIREMENTS CHECKLIST

For Completion by Installation Personnel for Use in Preparation of the Request for Proposals (RFP)

PROJECT _____ **LOCATION** _____
DPW/DIS POC _____ **PHONE #** _____
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.

1.0 GENERAL INFORMATION

A. Maps and plans available: (Provide copies with completed checklist)

1. Basic Information Maps (BIMs): (List Drawing Numbers)

NOTE: 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

a) Site Map

2. Aerial Photograph (Preferred to Topographic)
3. USGS Map
4. Project Siting Plan (Proposed)
5. Environmental

a) Jurisdictional wetlands designation

b) Other historical concerns:

B. 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

C. 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

1.1 TEMPORARY FACILITIES AVAILABLE TO THE CONTRACTOR

A. 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:

NOTE: Disposition of scrap and salvageable materials resulting from construction is the responsibility of the contractor unless otherwise noted and agreed.

B. 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.

1.2 DEMOLITION REQUIREMENTS

A. 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.

1.3 PAVING REQUIRMENTS

A. Parking area(s) required: _____ Yes, _____No**.**

1. Location and brief description:
2. Number of parking spaces for passenger vehicles: _____ (including _____ spaces for the handicapped).
3. Type of pavement: _____
4. Perimeter of parking area (s) to have concrete curb:_____Yes, _____No.
5. Striping of parking spaces required: _____Yes, _____No.
   a) Width of stripes: _____
   b) Type of paint to be used: _____
6. Special signage required: _____
7. Concrete wheel stops required: _____Yes, _____No.
8. Handicapped ramps/depressed curbs required: _____Yes, _____No.

B. Service road(s) required: ____Yes, ____No.

1. Location: _____
2. Type pavement: _____
3. Concrete curbing required on both sides of road: _____Yes, _____No.
4. Minimum roadway width: _____Feet _____.

   List any other special paving considerations or needs:

C. Sidewalks required: ____Yes, ____No.

1. Type of paving material: _____
2. Location: _____
3. Minimum width: _____
4. Minimum thickness shall be 4” with welded wire fabric.

D. Concrete dumpster pads required: ____Yes, ____No.

1. Number of pad (s): _____each. See note below.
2. Size of each pad: _____ feet by _____ feet.
3. Provide bumper stops at rear of pads: _____Yes, _____No.
4. 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).

1.4 UTILITIES SERVICE REQUIREMENTS

A. Electrical Service: Meter required: ____Yes, ____No.

Type:

1. Type system to be installed: _____underground, _____aerial.
2. Type transformer(s) to be installed: _____Pole mtd., _____Pad mtd.,

NOTE: Screen in accordance with Army Installation Design Guide (IDG).

3. Available Voltage: _____
4. Location of tie-in point: _____

B. Water Service: Meter required: ____Yes, ____No

1. Size and location of tie-in point: _____
2. Additional fire hydrant(s) required: _____

C. Sanitary Sewer Service: Size and location of tie-in point: _____

D. Storm Drainage:

1. Design for _____year occurrence.
2. Type System: _____Surface, _____Underground
3. Location of tie-in point for existing underground storm drainage system if incorporated in contractor design: See Site Plan.

E. Gas Service: ____Natural, ____Propane

Meter required: _____Yes, _____No.

1. For Heating: _____Yes, _____No.
2. For domestic hot water: _____Yes,_____No.
3. For laundry dryers: _____Yes,_____No.
4. For kitchen equipment: _____Yes,_____No.
5. 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).

F. Coordination and Notification Required for Utilities Tie-in:

1. Point of contact for coordination:

   _____

   Tel. _____ Email _____

2. Road Closing:

   a) Can both lanes be closed to traffic: _____Yes, _____No.

   b) Maximum time road can be closed:

   c) Can road be closed over a holiday or weekend: _____Yes, _____No.

3. 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.

NOTE: At overseas installations, utility work must meet Host Nation codes. Notably, in Europe utilities connections shall comply with the supplier's local codes. Contractors in Europe shall meet local utilities provider's conditions.

G. Coordination and Notification Required for Railroad Track Work:

1. Point of contact for coordination:

   _____

   Tel. _____ Email_____

2. Road Closing:
   a) Can both lanes of traffic be closed: _____ Yes, _____ No.
   b) Maximum time road can be closed:
   c) Can road be closed over a holiday or weekend: _____ Yes, _____ No.
3. Railroad Track Closing:
   a) Can track be closed to traffic: _____ Yes, _____ No.
   b) Maximum time track can be closed: _____
   c) Can track be closed over holiday of weekend: _____ Yes, _____ No.
4. Minimum notification time required for railroad track and road closing:
   a) Railroad track: working days.
   b) Road: working days.
5. Are used track components to be sorted and properly stored: _____ Yes, _____ No.
6. Are samples, ultra-sonic inspections, temperature recordings, and certificates to be submitted for ties, rail track components, or ballast: _____ Yes, _____ No.
7. Are RAILER markings and reporting required: _____ Yes, _____ No.
8. 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.

1.5 ARCHITECTURAL AND STRUCTURAL BUILDING DESIGN REQUIRMENTS

A. Seismic Design Zone: _____. Structural design shall be in accordance with codes specified in the RFP.

B. Basic wind speed: _____ mph.

C. Ground Snow Load: _____ PSF (Plus code live load).

D. Maximum Frost Penetration: _____inches.

E. Heat Transmission: "U" Factors:

1. Walls: _____.
2. Floor (slab-on-grade) at perimeter foundation wall: _____.
3. Floor over ventilated crawl spaces: _____.
4. Ceiling and/or roofs: _____.

F. Roof:

1. Minimum pitch: _____
2. Type: _____
3. Scuppers and drains are required: _____ Yes, (If a parapet type roof is proposed); _____ No.
4. Gutters and downspouts: _____ Yes, _____ No, Type: _____
5. Drainage carry off: _____ Splash Blocks; or _____ Underground drainage system (internal roof drains not permitted.)
6. 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.

G. Site Conditions:

1. Environmental Assessment required: _____ Yes, _____ No.

   Completion Date: _____.

   EIS Required: _____ Yes, _____ No.

   Completion Date: _____.

   (Provide copies of actions to date.)
2. Cultural Resources Compliance Completed: _____ Yes, _____ No.
3. Site Conditions:

Topographical feature description:

Confirm or identify subterranean hazards:

Fill area

Old foundations

Unexploded ordnance

Existing/abandoned utility line

Tunnels/mines

Other

4. Soil investigation data available: _____ Yes, _____ No.

   At project location: _____ Yes, _____ No.

   Other:

5. 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.

H. 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.

I. 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).

J. Kickplates required on interior wood doors: _____Yes, _____No.

K. Approximate total maximum occupancy:

1. Female: Adults _____ Children _____
2. Male: Adults _____ Children _____
3. TOTAL: _____

   Comments:

L. Landscape Requirements:

1. 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.

M. Establishment of Turf:

N. 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.

O. Paint Color:

List standard paint colors:

P. Finishes:

List standard finishes:

1.6 ELECTRICAL DESIGN REQUIREMENTS

A. Exterior lighting:

1. Parking area (s) lighting required: _____Yes, _____No.

   a) Type of lighting: _____ High Pressure Sodium

   _____ Low Pressure Sodium

   _____ Mercury

   _____ Halogen

   _____ Other

   b) Average Intensity: _____ foot candles per sq. yd. with a uniformity ratio of 4:1_____, Other _____. (Avg. to min.)

   c) Type pole: _____.

   d) Special mounting requirements:

   e) Switching:

   (1) Type: _____ Manual

   _____ Clock _____7 day _____7 day

   _____ Astronomical

   _____ Photo Electric

   _____ Combination of above as indicated.

   _____ Other

2. Exterior building lighting required: _____Yes, _____No.

   a) Type of lighting: _____ High Pressure Sodium

   _____ Low Pressure Sodium

   _____ Mercury

   _____ Halogen

   _____ Other

   b) Average Intensity: _____foot candles per sq. yd.

   c) To be mounted on the building structure: _____Yes, _____No.

   d) Switching:

(1) Type: _____ Manual

_____ Clock _____7 day _____7 day

_____ Astronomical

_____ Photo Electric

_____ Combination of above as indicated.

_____ Other

(2) Location: _____.

e) Lighting for plumbing and electrical chases required:

_____Yes, _____No.

NOTE: All electrical wiring (exterior and interior) shall be copper.

B. 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.

C. Electromagnetic Shielding:

List any electromagnetic shielding requirements.

D. Standby/Backup Power Requirements:

List and standby/backup power requirements.

1.7 MECHANICAL/PLUMBING DESIGN REQUIREMENTS

NOTE: The selection of mechanical and plumbing equipment has implications for energy efficiency and performance. The use of stand- alone heating or electric heat for new building construction is recommended for energy efficiency and avoidance of increased potential emissions of criteria pollutants and PSD permitting.

A. Heating design data:

1. Below is the outside dry bulb temperature that is equaled or exceeded 97 ½ 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 ½ percent of the time.
   a) Dry bulb temperature: _____.
   b) Wind velocity: _____.
   c) Degree days: _____.
2. Interior design temperatures: 68 degrees.

B. Air conditioning design data:

1. Outside dry bulb and wet bulb temperatures that are equaled or exceeded 2-½ 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 2-½ percent dry bulb, wet bulb temperature.
   a) Dry bulb temperature: _____.
   b) Wet bulb temperature: _____.
2. Interior design temperatures:
   a) Dry bulb temperature: _____.
   b) Wet bulb temperature: _____.

C. Heating and air conditioning system: shall be designed to provide a relative humidity of 50% + 10% or -10%.

D. 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 ½% 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 35° F shall be provided when it can be clearly shown that use of the economy cycle is cost effective.

E. Install humidity control override: _____Yes, _____No.

F. Automatic timer controls required for:

1. Heating System: _____Yes, _____No.
2. Air Conditioning System: _____Yes, _____No.

G. Heating and Air Conditioning Source:

1. Self contained plant: _____Heat, _____AC.
2. Supply lines from central plant: _____Heat, _____AC.
3. Purchased heat: _____

H. Low profile roof mounted HVAC units are permissible:_____Yes, _____No.

I. Automatic timer controls required for:

1. Heating System: _____Yes, _____No.
2. Air Conditioning System: _____Yes, _____No.

J. Heating fuel to be used:

Fuel: _____Natural gas, _____#2 Fuel oil, _____Propane.

K. Dual fuel heating plant required: _____Yes, _____No.

Primary Fuel _____ Secondary Fuel_____.

L. Outside air supply intake: to close when building is unoccupied:

_____Yes, _____No.

M. Outside air supply intake: to close when building is unoccupied:

_____Yes, _____No.

N. Type heating and air conditioning filters required:

( ) Permanent ( ) Throw away

O. Covers and locks: required on interior utilities controls: _____Yes, _____No.

P. Plumbing Design Data:

1. Exterior hose bibs: Minimum of _____ each with ¾" hose connection on building exterior.
   a) Frost protection required: _____Yes, _____No.
   b) Removable cutoff handles required: _____Yes, _____No.
2. Interior hose bibs: See Functional Requirements
3. Grease trap(s) required: _____Yes, _____No.

   Location(s):

4. Commodes shall be floor mounted flush valve type.
5. Lift station required: _____Yes, _____No.
6. 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.

7. Provide a minimum of _____ floor drain (s) in the laundry and mechanical room.
8. 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.

9. 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.
10. Provide grease interceptor: _____Yes, _____No.

    Location:
11. Provide a water filtration system: _____Yes, _____No.

    Location:

    Type:
12. Other plumbing considerations or requirements:

2.0 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.

A. General: MALE and FEMALE

ITEM	QUANTITY	SPECIAL REQUIREMENTS
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.
Trash receptacle	_____	recessed, each restroom.

B. Specific: WOMEN'S

Sanitary napkin disposal	_____	each commode stall.
Sanitary napkin disposal	_____	each restroom, coin operated.

C. Specific: MEN'S

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).

3.0 FIRE PROTECTION REQUIREMENTS

A. Sprinkler system required: ____ Yes, ____ No.

1. Type system to be installed: _____ Wet, _____ Dry.
2. Complete coverage throughout the structure: _____Yes, _____No.

   If no, describe proposed system, layout, etc.:

3. Exterior siamese connections are required.

B. Detection System:

1. Smoke detectors required: _____Yes, _____No.

   NOTE: Radium type shall not be used.

2. 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 135° 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.

C. 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.

D. Special fire suppression system (s) required: ____ Yes, ____ No.

Describe type, location, and justification:

E. Fire extinguishers (manually operated) are required.

1. Government furnished: _____Yes, _____No.
2. Quantity and locations shall be based upon building design, NFPA, requirements, and coordinated with Installation's fire department.
3. 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 1½"tall, 7" deep and 8 ½" wide w/glass doors.

F. All interior finish materials shall be per NFPA standards and UFC 3-600-01, *Design: Fire Protection Engineering for Facilities*, 17 April 2003**.**

G. Water supply lines: for the sprinkler system shall be black steel pipe.

H. The installation's standard fire alarm panels shall be specified for ease of maintenance and sustainability.

I. Emergency Lighting Requirements:

4.0 SECURITY REQUIREMENTS

A. Building physical security:

1. Intrusion detection system required: _____Yes, _____No.
   a) Type system to be installed.
   b) Desired location of detectors:
   c) Exterior door alarm requirements:
   d) Exterior window alarm requirements:
2. Duress alarm system(s) required: _____Yes, _____No.
   a) Type system to be installed.
   b) Location(s):

B. Safe (s) required: _ Yes, __ No.

1. Type and Number:
2. Size:
3. Location (s):
4. Secure to building: _____ Yes, _____ No, if yes, how:
5. Connect to main intrusion alarm system: _____ Yes, _____ No.

C. 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.

D. Keying requirements:

1. Rooms requiring card readers:
2. Rooms requiring cipher locks:
3. Rooms requiring individual keys:
4. Rooms requiring master keys:

5. Exterior keying requirements:
6. 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.
7. The Offeror shall provide fifty (50) key blanks in addition to the above keying requirements.

E. All exterior doors shall have unremovable hinge pins.

F. Panic hardware shall be in accordance with NFPA requirements.

G. Hardened secure area(s) required: ____ Yes, ____ No

1. Location(s):

H. Fencing Requirements:

1. Location:
2. Type and height:
3. Gate requirements:

I. Antiterrorism Requirements:

1. Blast resistant windows:
2. Setbacks:
3. Barriers:
4. Others:

J. Risk/Threat Analysis Requirements:

1. ***Installation:*** Fill in unclassified pieces of risk/threat analysis.
2.
3.

5.0 COMMUNICATIONS REQUIREMENTS

A. Intercom system required: ____ Yes, ____ No.

Give a brief description of the requirements for the system:

B. Music/Paging system required: ____ Yes, ____ No.

Give a brief description of the requirements for the system:

C. 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 the 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:

1. Direct in dialing, with restrictions on receiving collect calls.
2. Direct out dialing to local exchange number only.
3. Restrictions on placing chargeable calls outside the local exchange, except for calls charged to credit card or calls made with the charges reversed.

D. Television system required: _____ Yes, __ No.

1. The technical and installation requirements of the television system shall be coordinated with _____ the local cable television provider.
2. Locations/number of internal outlets:
3. Wiring and grounding shall be in accordance with the National Electric Code.

E. 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:

6.0 SIGNAGE REQUIREMENTS

(Excluding those required by NFPA and OSHA)

A. Interior signage:

B. Exterior Signage:

All exterior signage shall conform with the Army Installation Design Guide and Post Wide Paint/Exterior Finish Standards and color charts.

7.0 OTHER COMMENTS

Links

Go to Appendix C

Go to Table of Contents

Appendix C – Interior Design Review Checklist

Interior Design

1. Does the building interior design meet the Interior Design objectives defined in the IDG?

   Yes_____ No_____

   If no, provide justification below.

2. Does the interior design comply with the Design Guide (DG) 1110-3-122, *Design Guide for Interiors*?

   Yes_____ No_____

   If no, provide justification below.

3. Does the interior design comply with Engineering Regulation (ER) 1110-345-122, *Engineering and Design, Interior Design*?

   Yes_____ No_____

   If no, provide justification below.

4. Does the interior design space planning comply with Army Regulation (AR) 405-70, *Utilization of Real Property*?

   Yes_____ No_____

   If no, provide justification below.

5. Does the interior design meet the Electrical and Communications objectives defined in the IDG?

   Yes_____ No_____

   If no, provide justification below.

6. Does the interior design comply with color objectives and Design Guide, (DG) 1110-3-122, *Design Guide for Interiors*?

   Yes_____ No_____

   If no, provide justification below.

7. Does the interior design meet the acoustic objectives of the IDG?

   Yes_____ No_____

   If no, provide justification below.

8. Does the interior design meet the lighting objectives of the IDG?

   Yes_____ No_____

   If no, provide justification below.

9. Does the interior design meet the finishes standards of the IDG?

   Yes_____ No_____

   If no, provide justification below.

10. Does the interior design meet the furnishings standards of the IDG?

    Yes_____ No_____

    If no, provide justification below.

11. Has the interior designer consulted Division 12 – Furnishings of the *Construction Criteria Base* for furnishings guidelines?

    Yes_____ No_____

    If no, provide justification below.

12. Does the interior design comply with the interior operations policies and housekeeping rules?

    Yes_____ No_____

    If no, provide justification below.

13. If the project is a renovation, addition, or modification to an historic building, does the change maintain the design integrity and character defining features of the building and meet the Historic Approval Agencies (historic architect or state historic preservation office) requirements?

    Yes_____ No_____

    If no, provide justification below.

14. Does the building comply with the IDG?

    Yes_____ No_____

    If no, provide justification below.

Links
Go to Appendix D
Go to Table of Contents

APPENDIX D - Sustainable Design

D.1 What is Sustainable Design?

D.1.1 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 D.1). It is a systematic process and engineering practice including guidance, checklists, tools, and scoring systems. Sustainable design integrates decision-making across the installation, balancing immediate demands and long-term consequences and recognizing the interrelationship of installation actions with the natural environment. The Army installations Sustainable Design guidance provides `for the design, construction, operation, and reuse/removal of the built environment in an environmentally and energy-efficient manner (Figure D.2). The basic objectives of sustainability are to:

Figure D.1 – Sustainable site design diagram

D.1.1.1 Reduce the consumption of energy, land, materials, water, and other non-renewable resources.

D.1.1.2 Minimize the waste of energy, land, materials, water, and other limited resources.

D.1.1.3 Protect the natural environment.

D.1.1.4 Create livable, healthy, and fiscally productive manmade environments for existing and future generations.

Figure D.2 – Sustainable design process

D.1.2 Designing for sustainability ultimately increases quality of life through better resource protection and use. The design process must incorporate a cognitive change that embraces less consumptive lifestyles. Consideration must be given to global interdependence, environmental stewardship, social responsibility, and economic viability. The new design mindset must 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

D.2.1 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 D.3), healthy (Figure D.4), high-performance (Figure D.5), and safe buildings.

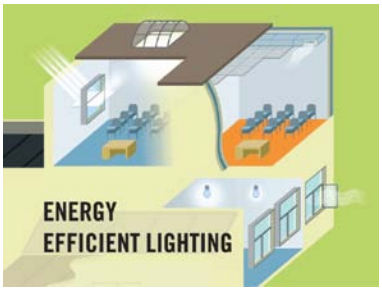


Figure D.3 – Energy efficient lighting contributes to sustainability

D.2.2 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 affect 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).

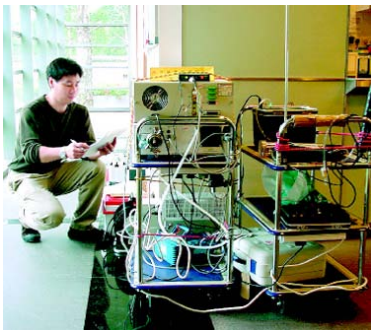


Figure D.4 - Indoor air quality measurement

D.2.3 Appendix D, Sustainable Design, discusses the sustainable design concept and its application to Army projects. New construction, additions and major renovations at Fort Benning and Camp Merrill shall follow the requirements and guidance of the U.S. Green Building Council. Fort Benning and Camp Merrill must meet the LEED Silver Standard level.

Figure D.5 – Efficient water usage contributes to a high performance facility

D.2.3.1 The LEED Checklist documents (Appendix E) are from the U.S. Green Building Council LEED 2.0 (Leadership in Energy and Environmental Design) Green Building Rating System.

D.2.3.2 Army Rating Standard

D.2.3.2.1 In a 5 January 2006 memorandum, the Assistant Secretary of the Army for Installations and Environment announced that the Army will transition from Sustainable Project Rating Tool (SPiRiT) to the LEED Green Building Rating System® effective with the FY08 MILCON Program. Projects prior to the FY08 MILCON

program can use the LEED rating system if the LEED Silver level can be achieved within the program amount. The Sustainable Project Rating Tool (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-FY07 MILCON projects, the minimum SPiRiT rating requirement is "Gold".

D.2.4 Further information on sustainable design can be obtained at the following websites:

D.2.4.1 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.

D.2.4.2 U.S. Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory (CERL), Engineering Knowledge Online Website.

D.2.4.3 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

D.3.1 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 D.6):

Figure D.6 – Sustainable design principles

D.3.1.1 Site - Optimize site potential.

D.3.1.2 Energy – Minimize nonrenewable energy consumption.

D.3.1.3 Materials – Use environmentally preferable products.

D.3.1.4 Water – Protect and conserve water.

D.3.1.5 Indoor Environmental Quality – Enhance indoor environmental quality.

D.3.1.6 Facility Delivery – Holistic delivery of facility.

D.3.1.7 O&M – Optimize operational and maintenance practices.

D.3.1.8 Future Missions – Functional life of facility and support systems.

D.4 LEED

D.4.1 LEED

D.4.1.1 In 1993 the U.S Green Building Council (USGBC) began an effort for the establishment of national guidelines to measure and define "green building" design. This effort produced the LEED rating system. The system awards certification at multiple levels for outstanding efforts in green design.

Figure D.7 – LEED Certification levels

D.4.1.2 Certification is quantified through multiple rating systems including New Construction, Existing Buildings, Commercial Interiors, Core and Shell, and most recently a new program for the certification of Neighborhood Developments. A design team or client may submit their building for certification for any of these categories. Each system is graded based upon a point system that is outlined in the manual provided for each designation.

D.4.1.3 A project becomes eligible for the certification process once it has achieved a predetermined level of points and criteria established by the USGBC. Points are awarded by providing specific technologies and practices in design and construction. The current levels of certification are certified, silver, gold and platinum (Figure D.7).

D.4.2 LEED Neighborhood Developments (ND)

D.4.2.1 Unlike its predecessors that focus primarily upon systems within the context of the building envelope, the LEED ND system addresses the need for green building practices at the site and community levels. It "places emphasis upon the design and construction elements that bring buildings together into a neighborhood, and relate the neighborhood to its larger region and landscape" (USGBC).

D.4.2.2 In 2008, the LEED Neighborhood Development program was unveiled. The system was developed in cooperation with the USGBC, Congress for New Urbanism and the Natural Resources Defense Program to establish standards that assess and reward "environmentally superior development practices". According to the USGBC, the goal of these practices is to "encourage developers to reduce land consumption, reduce automobile dependence, promote pedestrian activity, improve air quality, decrease polluted storm water runoff, and build more livable, sustainable, communities for people of all income levels" (Figure D.8).

Figure D.8 - Walkable streets are vital to a sustainable community

D.5 Army Standards

D.5.1 The cited Army Standards shall be met.

In a 5 January 2006 memorandum, the Assistant Secretary of the Army for Installations and Environment announced that the Army will transition from Sustainable Project Rating Tool (SPiRiT) to the LEED Green Building Rating System® effective with the FY08 MILCON Program. Projects prior to the FY08 MILCON program can use the LEED rating system if the LEED Silver level can be achieved within the program amount. The Sustainable Project Rating Tool (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-FY07 MILCON projects, the minimum SPiRiT rating requirement is "Gold".

D.6 SPiRiT

D.6.1 For historical reference, the U.S. Army Corps of Engineers (USACE) previously developed a checklist for sustainability to be used by design professionals in all new construction, additions, or renovation of Army facilities. This checklist was the "Sustainable Project Rating Tool (SPiRiT)". The SPiRiT document was derived from the U.S. Green Building Council LEED 2.0 Green Building Rating System.

D.6.2 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 form the very beginning of the project. By using a "whole building" perspective, the SPiRiT rating tool helps in preserving the environment and improving facility life-cycle management. SPiRiT is based on accepted energy and environmental principles.

D.6.3 The SPiRiT document includes eight (8) categories of design concerns (Figure D.9). 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

Sustainable Sites……...20 pts. max.	
Water Efficiency…….5 pts. max.	
Energy/Atmosphere…..29 pts. max.	
Materials/ Resources….13 pts. max.	
Indoor Enrichment…....17 pts. max.	
Facility Del Process..…..7 pts. max.	
O & M…….6 pts. max.	
Future Mission……4 pts. max	
TOTAL……..100 pts. max.	

Figure D.9 – SPiRiT checklist points summary

D.7 References

D.7.1 The following references are provided for guidance.

- 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), Engineering Knowledge Online Website.
- Air Force Sustainable Facilities Guide
- Office of the Assistant Secretary to the Army, Sustainable Design and Development Policy Update – SpiRiT to LEED Transition.
- Whole Building Design Guide
- USGBC New Construction and Major Renovation Reference Guide
- USGBC LEED for Neighborhood Development Rating System

Links
Go to Appendix E
Go to Table of Contents

Appendix E – LEED Project Checklists

LEED for New Construction - Registered Project Checklist

The LEED project checklist for new construction can be found on the US Green Building Council website: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220.

LEED for New Neighborhood Development – Registered Project Checklist

The LEED project checklist for new neighborhood development can be found on the US Green Building Council website: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148.

Links

Go to Appendix F

Go to Table of Contents

Appendix F – Landscape Maintenance Schedule

Links

Go to Appendix G

Go to Table of Contents

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
GENERAL	Final leaf removal			Spring start-up of irrigation system (if present)				Soil samples taken where needed		Fall leaf removal	Turn off irrigation system and winterize (if present)	Total clean up (debris removal; blow off pavement)
LAWN	Spray any Fescue in Bermuda turf; Turf scalping (Bermuda and Zoysia ONLY); Turf pre-emergence herbicides (1st treatment); Turf post-emergence herbicides and weed control (as needed)	Remove all Fescue in Bermuda turf		Turf mowing, trimming, and edging (as needed); Inspect and treat any turf insect or disease incidence (as needed); Turf pre-emergence herbicides (2nd treatment); Turf post-emergence herbicides and weed control (as needed); Turf fertilization (high Nitrogen; slow release)	Fertilize any turf exhibiting poor green-up (use iron for greener color)	Turf fertilization (slow release)		Turf post-emergence herbicides and weed control (spot treatments as needed); Turf fertilization (light; slow release)	Lime turf as necessary; Fall fertilization of all turf with high Potassium fertilizer		Turf edging and spot mowing (as needed); Fall turf post-emergence weed control (as needed)	
TREES AND SHRUBS	Liriope cut back; Tree raising of lower limbs; Pine straw mulch applications (as necessary); Winter pruning of shrubs; Crape Myrtle pruning; Post-emergence weed control for beds (as needed)	Tree raising and sucker removal	Finish all Liriope and Pampass Grass cut back; Remove die back from lower limbs in small trees; Rose bush pruning; Bed pre-emergence herbicides application	Spring annual flower installation; Shrub pruning of new growth (as needed)	Remove tree suckers and any vines from shrubs; Bed edging, trimming, and weeding; Shrub pruning (as needed); Apply mitocides/iron to Junipers	Prune Azaleas after bloom senescence; Fertilize Azaleas; Apply mitocides/ iron to non-green Junipers		Bed post-emergence pesticides (spot treatments); Fertilize, weed, and deadhead flowers (as needed); Inspect and treat any trees and shrubs for insects and disease incidence (as needed)	Fertilize all trees and shrubs (well-balanced fertilizer)	Fall annual flower installation; Fall shrub pruning and shaping	Shrub pruning (as needed) and begin Winter pruning; Shrub post-emergence weed control (as needed)	Tree raising sucker removal; Start Winter pine straw mulching after leaf removal; Post-emergence weed control (as needed)

Appendix G - Prioritized Improvements Project List

Prioritized Improvements Projects List	
INSTALLATION:	• PRESS "ENTER" TO INSERT A NEW LINE. • PRESS "TAB" AT END OF LAST ITEM TO INSERT NEXT ITEM #.

DPW or EQUIVALENT - MASTER PLANNER		
NAME:	**PHONE:** **EMAIL:**	**ADDRESS:**

PRIORITY NO.	PROJECT TITLE	RECOMMENDED FUNDING SOURCE	ALTERNATIVE FUNDING SOURCE	COST ESTIMATE	IDG PARA NO.	POINT OF CONTACT

Links

Go to Appendix H

Go to Table of Contents

Appendix H – Self Help Project Checklist

Installation: develop a self-help projects checklist in accord with the degree of latitude given to self-help projects at your installation.

Links

Go to Appendix I

Go to Table of Contents

Appendix I – Interior Finishes Standards

I.1 Introduction

Fort Benning is essentially a working neighborhood and city. They are mixed-use installations that include live, work, and play environments that are historic and new. Because the installation is mixed-use serving a variety of functions and a diverse population of all ages, abilities, and ethnicities, the interior needs and conditions at the installation vary greatly. Therefore, there is not one way to address every interior situation. This section of the IDG provides general guidelines when addressing interior finishes and lighting. Currently, each department furnishes its own space, and there is a manager for each building or department. Occupants tend to "do whatever they want" with their spaces regardless of installation standards and guidelines, building and life safety codes, and preservation standards for treatment. Fort Benning DPW is not in the business of interior design or approval of office furnishings and furniture. The U.S. Army Corps of Engineers, however, pays for interior design consultants for these services on all but small projects. The intent of the IDG Interior Finishes Standards is to implement more consistent interior standards between departments and consistent procedures for addressing interiors.

It should be noted that if the project includes an addition and/or change to the building's occupancy, a structural investigation should be conducted. Building and life safety codes should be complied with accordingly.

There are procedural guidelines that should be followed for all projects. All proposed interior projects should be reviewed by the DPW. Projects should be reviewed by Cultural Resources and the historic architect if they involve or impact historic buildings. Additionally, all interior projects should:

- consult the Directorate of Public Works,
- be in accordance with the IDG,
- protect the life, safety, health, and welfare of the occupant,
- be energy efficient, and
- respect the existing historic character of the installations.

I.2 Color

Our personal and cultural associations affect our perception of color. Our reactions to color are led by a combination of biological, physiological, psychological, social, and cultural factors. Sensitivity to color differs among individuals, so each person's perception of color is unique in some way. Humans react to color on different levels and color preferences are also very personal. However, there are some general physiological effects of color on the body. Colors are generally considered warm or cool. Warm colors are in the red family and cool colors are in the blue family. Red has been shown to stimulate the senses and raise blood pressure, while blue has been shown to calm the mind. Warm colors - red, yellow, magenta, and orange - are generally considered high-arousal colors. They speed up our perception of time and produce feelings that are warm, cozy, and inviting. Warm colors are associated with excitement, happiness, and comfort. Cool colors include blue, green, and violets. Cool colors are generally considered low-arousal colors. Emotions associated with these colors range from calm and peace to sadness, withdrawal, and depression. Of course, the brilliance, darkness, and lightness of colors can alter the physical and psychological effects of color.

Every surface effects the perception of color. Color interacts with light and all the other elements in a setting to create an atmosphere. The color atmosphere of a room results not only from whatever hue is on the

walls, but from how the walls, ceiling, and floor interact with the light (natural or artificial) and with views of other rooms. When choosing colors, one should consider not only a single room at a time, but a series of rooms. Think of color choices in terms of sequences and how rooms related to each other. The relationship of the colors between rooms is as important as the relationship of colors in a room. Generally, the greater the contrast, the more the eye is attracted.

Most of the interiors at Fort Benning are painted white or some version of white (off-white). In addition to white for interior spaces, the color shell with pantone number 11-0604TPX (see color chart on next page) should be considered for use. Building occupants should have some liberty in painting their spaces with colors of a recommended palate. It is further recommended that trendy and bright paint colors be avoided since the reaction to and preference for these colors can vary greatly. Classical colors in earth tones tend to be more neutral and universally acceptable to most people. Other acceptable colors are listed according to their pantone number and include 11-0907 TPX (almond), 12-0910 TPX (custard), 13-1009 TPX (tan), 15-1309 TPX, and 15-5704 TPX Gray. Keep in mind that the amount and type of lighting and surrounding area affect color perception.

COLOR BOARD for the Army Installation Design Standards

The color squares shown here are approximations of the Pantone numbers indicated. They have been simulated using RGB values and are intended to be reproduced electronically. Color quality may vary with printer. Pantone 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 Color swatch of the color indicated. A hard copy supplemental sheet with accurate color representations is available.

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

I.2.1 Historic Paint Colors

After the Civil War, paint manufacturers went from providing raw materials for painters (who purchased the materials and mixed the paint colors on site) to providing factory mixed paints in an expanding array of colors. The expansion of the railroad network, print media methods, architectural pattern books, and advertising brought factory mixed paint to virtually any American anywhere.

Ideally, paint colors in historic buildings should be based on careful paint analysis in individual buildings by a professional conservator. But this method is not always available or affordable. An alternative is to use paint colors that are appropriate to the period of construction (to select colors that are historically proper for the age of the structure and to place those colors to emphasize correctly the rich character and detailing intended by the original builders). Several paint books and guides from the turn of the century have been reprinted and are available such as *Authentic Color Schemes for Victorian Homes: Comstock's Modern House Painting, 1883* and *Victorian House Designs in Authentic Full Color: 75 Plates from the "Scientific American-Architects and Builders Edition," 1885-1894.* Additionally, several contemporary books have been published on historic paint colors including *Paint in America, the Colors of Historic Buildings.* According to Roger Moss, the widespread distribution of late nineteenth century colors strongly suggests the homogenization of American color use by the 1880s and 1890s, especially in more heavily populated areas. Moss further explains, "The palette of themed-nineteenth century – grays and other stone colors – doubtless continued to be used by most Americans throughout the century except for the more exotic styles of the 1880s, particularly Queen Anne, for which the rich, multicolored paint schemes seem so appropriate, and the more self-conscious Arts and Crafts styles.

Several common paint manufacturers offer paint lines based on historic colors. Keep in mind that these colors are only guidelines and not exact reproductions specific to the building and time. In historic buildings, it is best to use a paint scheme that has been determined by actual paint analysis. If paint analysis is not an option, using historic references and historic paint lines are other options. The historic architect and Cultural Resources should be consulted and approve the paint scheme prior to conducting paint projects.

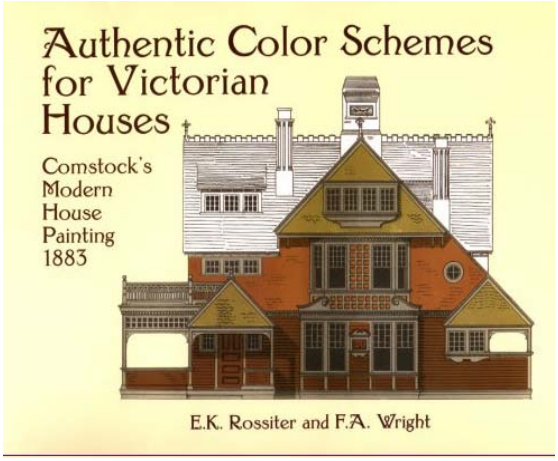


Figure I.1 ***Authentic Color Schemes for Victorian Homes: Comstock's Modern House Painting, 1883*** **is available through bookstores.**

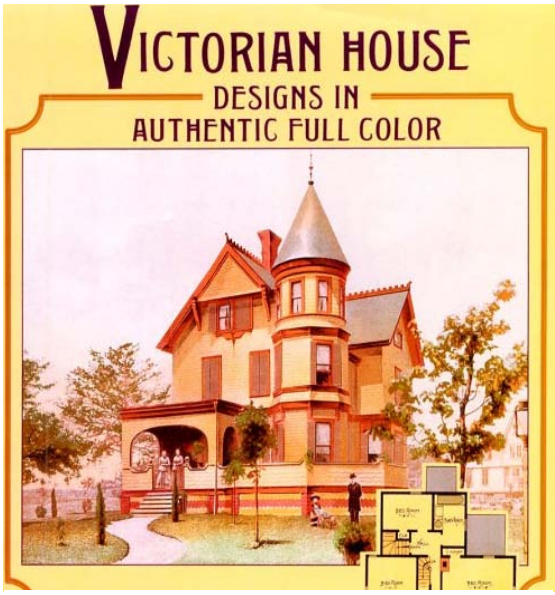


Figure I.2 ***Victorian House Designs in Authentic Full Color: 75 Plates from the "Scientific American-Architects and Builders Edition," 1885-1894*** **is available through bookstores.**

Figure I.3 The paint samples are from Sherwin Williams Heritage Colors collection. Beniamin Moore offers a historic color collection as well.

I.3 Lighting

Lighting can enhance or deter all office-related tasks. Studies have shown that effective lighting can decrease utility costs, save energy, and improve productivity by improving comfort, reducing errors, and reducing absenteeism. According to a study by L. Edwards and P. Torcellini in 2002, “With properly installed and maintained day-lighting systems, natural light has proved to be beneficial for the health, productivity, and safety of building occupants.”

Complete natural lighting is impossible and not necessarily ideal, and not all buildings allow all occupants access to natural light. Ideally building interiors will provide combination lighting: day-lighting or natural light from windows or skylights, general or ambient lighting, and task lighting.

For economic reasons, most facilities are using fluorescent lights to provide general illumination. The quality of fluorescent light has improved greatly in recent years. If fluorescent lights are used, full spectrum lights are recommended. They provide a higher quality and more pleasant light that more closely resembles natural light. Likewise, full-spectrum fluorescent illumination provides substantially all of the spectral energy distribution although light levels are much lower than daylight levels.

Ambient lighting should be designed to avoid screen reflection. The best way to do this is to a combination of indirect/direct lighting. Indirect lighting bounces light from the ceiling back down to the work area below, reducing the amount of energy needed to create the perception of a brightly lit office. Indirect lighting must be at the right height to avoid causing uniform glare or eliminating contrasts and shadows. If direct

fluorescent lighting is used in computer areas, position with computer screens perpendicular to the light to avoid glare. Also, an unshielded fluorescent strip should not be used because it will cause glare.

Developing the right combination of lighting types in an office depends on the type of work that is performed, the interior layout, workstation configurations, window size and location, and computer screen characteristics. There are general lighting aspects that should be considered for every project.

Overhead lighting should not provide the major source of light for offices where computers are used. General space illumination should be lower than task light and complement it. According to a study conducted by Herman Miller, 25-50 foot candles, supplemented by task lighting of an additional 25-75 foot candles is now considered to be the extent to which direct and indirect general lighting and task lighting should be used. (More light is a waste of energy and often a drain on health and productivity). The best task lighting gives the user control over position and intensity so that it can be located to minimize glare and match the workers changing needs.

I.4 Flooring

Wood, composite tile, carpet squares, roll carpet, sheet vinyl, and tile are permitted flooring products. Usually, carpet squares or tiles are more cost effective and less expensive to repair or replace over time than roll carpet. Carpet tile is available in hard back or cushion back. Cushion back maintains its overall appearance longer and is more comfortable to stand on and walk on than hard back. Also, accessible flooring systems should be considered. Accessible flooring systems are defined as a suspended floor plane above the structural slab with re-locatable modular components. Floor systems have the potential of using the plenum below for the horizontal distribution of conditioned air, power, data, telecommunication, low-voltage system cabling, and flexibility in positioning connections above the floor. Public corridors that carry heavy foot traffic and provide major circulation pathways should be extremely durable and low maintenance. Ideally, sustainable and low maintenance flooring products are preferred. If carpet and an accessible floor system are used, then carpet tiles should be installed for easy access and modifications.

I.5 Walls

Plaster and gypsum board are permitted wall materials. Most interior wall partitions will be composed of gypsum board on metal or wood studs. Permitted wall coverings include paint, wallpaper, paneling, and tile. Paint is the most inexpensive and flexible wall covering available. General office space should have uniform wall heights to provide flexibility for future floor plan changes. Walls should have a 5” wood baseboard. Marker boards, bulletin boards, and message boards can be installed on walls to facilitate communication and interaction and store information. Ideally, sustainable and low-maintenance wall materials and coverings are preferred. Walls should comply with NPFA codes and standards and be appropriately fire rated.

I.6 Windows and Doors

Ideally, sustainable and low-maintenance windows and doors are preferred. All windows and exterior doors shall be insulated. It is preferable for windows to be operable. Consideration for glare control plus heating and cooling loads should be considered when choosing type, style, and placement of windows.

Exterior doors should be of heavy-duty construction. Vestibules are preferable to control air infiltration. Interior doors should be the same finish on both sides and match those in the building. Utility and egress doors should be painted metal.

Interior doors in areas where data processing equipment is present shall be solid core and fire rated where required.

I.7 Ceilings

General office space should have uniform ceiling heights to provide flexibility for future floor plan changes. Suspended ceilings, plaster, gypsum board or exposed ceilings are permitted. In historic buildings, the original ceiling height should be maintained. In office space containing vaulted ceilings, oversized windows, or similar features, consideration should be given to thoughtfully designed, exposed ceiling solutions that maintain full ceiling clearance and allow ornamental surfaces to remain exposed to view. Ideally, sustainable and low maintenance materials will be used. Enclosed offices should have the same ceiling height as adjacent open office spaces to allow for future reconfiguration.

Links

Go to Appendix J

Go to Table of Contents

Appendix J – Furnishings Standards

J.1 Introduction

Building environments must accommodate a diversity of functions and activities that are constantly changing. This is especially true in the office environment. In a 1995 study, the office furniture company Knoll found that "while some 12 percent of companies never make substantial changes to their offices, 42 percent move their people, and 50 percent reconfigure their furniture, every six months or less."

Different types of space include: private offices, shared enclosed spaces, open-plan workstations, desks in open areas, conference rooms, break areas, reception areas, executive suites.

Workers draw conclusions about a company based on their surroundings. The physical environment forms one of the first impressions of a company, and communicates many powerful messages, including how successful the company is, whether or not management values workers, and whether they will get the tools and equipment they will need to be successful on the job.

In a study conducted by Knoll, 350 workers were questioned on workspace characteristics, productivity, and worker satisfaction. More than 70 percent indicated that increased productivity results from: state of the art technology, the ability to control climate, storage space for work related items, quiet space, and space that can be personalized to the occupant's work style. Between 50 percent and 60 percent cited increased productivity due to: an ergonomic chair, a visually appealing workspace, lighting control, privacy, and an exterior window. Less than 40 percent indicated having a large workspace, personal space for small meetings, and space for personal items as having an impact on productivity.

Worker space should provide the following:

- User adaptability, function, and comfort
- Adequate storage space
- Adequate seating
- Adequate desk and work space
- Adequate space for voice and data equipment
- Adaptability and adequate space for voice and date wiring
- Adequate meeting space

J.2 Closed Office vs. Open Office Plan

The open office is often utilized in large facilities. The open office is often more efficient and flexible and allows for an easier distribution of natural light and day-lighting techniques, and heating and cooling to the working areas. Open offices also encourage interaction between individuals.

J.3 Meeting Rooms

Meeting rooms are multi-functional spaces that can be used for training, conferences, and lunchrooms. Enough meeting rooms should be available and they should be adaptable for maximum use. Table space and seating should be able to accommodate a variety of functions.

J.4 Furnishings

The selection and design of fixed and moveable furniture should be carefully coordinated to achieve a consistent image, proper function, and required clearances. Furnishings should consider function, cost, availability, and aesthetic criteria.

J.5 Built-In Furnishings

In general, built-in furniture needs to be designed with integral cable raceways plus conduits sized for future expansion and change. Built-in furnishings should also include access panels to permit easy cable and wiring changes. Provisions for power, data, and telecommunication outlets, sound, and other systems shall be considered depending on need.

J.6 Furniture Systems

Systems furniture includes pieces that can be combined and integrated in a variety of ways depending on the needs of the occupant and office. Systems furniture usually includes a work surface and panels. The advantage of systems furniture is that it is adaptable and expandable. Panels are moveable and can define departments, individuals or teams. They can also conceal wiring. Panels come in a variety of colors and finishes and should be coordinated with their surroundings. Pre-wired furniture systems may be an appropriate solution for distribution of power and communications wiring in renovated buildings. All furnishings must comply with Directorate of Information Management requirements. Open plans have been used successfully in historic buildings. Furniture systems must be selected with great care to minimize any adverse impact on historic building features. Modular furniture system dimensional planning restrictions, best adapted to open spaces, may have limited feasibility in older structures with short or irregular structural spans.

J.7 Seating/Chairs

Today's professional office worker spends an average of 70 percent of their working time sitting. A chair should adjust to a given posture, body size, or task. An appropriate chair is one that:

- is appropriated sized to the person
- is adjustable for seat height and depth,
- allows for posture changes
- allows for backrest-angle adjustability
- has a chair recline or tilt
- allows for Seat pan-angle adjustability
- has adjustable armrests
- provides lumbar support
- downward curving or short armrests so the chair can pull close to work surfaces
- upholstery that's stain and fire resistant
- support for the legs that also allows for easy movement and improves comfort and blood circulation to the feet and lower legs
- a space-saving base that also provides stability to the chair

A single chair will not necessarily fit all people. A chair that "fits" is one that allows the user to comfortably rest his or her feet on the floor, with the thighs fully supported and approximately parallel to the floor. The user's back should be comfortably supported, and the angle formed by the thighs and the torso should be

between roughly 90 and 105 degrees. Tilting back should be easy, but not too easy. And the chair should permit frequent posture changes—an essential element of comfortable sitting.

Sit in a chair before you buy it, and make sure it does the following:

1. Provides support for the lower back
2. Has a seat that isn't too deep
3. Doesn't allow you to ever feel the hard inner shell of the chair while seated
4. Has arm rests, casters, cushions, and other easily maintained parts
5. Meets or exceeds that standards for seating dimensions and adjustability established by the American National Standards Institute/Human Factors Society
6. Is aesthetically pleasing and compatible with its surroundings

Although establishing dimensional criteria for chair adjustments must depend on the specific situation, recommended ranges are given in documents such as the "ANSI/HFS 100 Standard for VDT Workstations" (available from the Human Factors and Ergonomics Society, PO Box 1369, Santa Monica, CA, 90406).

The following directions for adjusting a chair and workstation are from Herman Miller and can be found at http://www.hermanmiller.com/hm/content/research_summaries/wp_Body_Support.pdf. If a workstation has many adjustments, the following steps should be considered basic. These instructions assume independently adjustable work surface and keyboard height and an adjustable chair. The steps are simplified for a typical case and should be modified based on job and personal factors.

1. Start with feet flat on the floor.

2. Adjust chair height to a comfortable position that keeps the feet on the floor and thighs approximately parallel to floor. Several studies have indicated that many people prefer to adjust their chairs up to two inches higher than parallel thigh height, even when work surfaces are not influencing height settings. Forward sitters also may prefer to sit high, but recliners may prefer to sit lower in order to get a good grip on the floor when they recline. People in knee-tilt chairs tend to prefer higher positions than people with column-tilt chairs that lift the feet when reclining.

3. Adjust chair tilt tension so the user can recline primarily through shifting weight rather than by pushing off with the feet. If the heels rise significantly off the floor when reclining, the user is pushing with the feet too much and the tension should be lightened. If the user prefers not to recline, the tension can be kept tight.

4. Adjust the angle of the backrest to allow as much recline as feels comfortable.

5. Adjust the keyboard height to elbow height or lower. Adjust the angle so the wrists are in a neutral (straight) position and the elbows are angled 90 degrees or more.

6. Place the mouse where it can be used without reaching.

7. Adjust the monitor height so the entire viewing area is somewhere below eye level.

8. Adjust the monitor angle to face users' eyes. Users should be able to see their eyes in a small mirror placed at the center of the screen.

9. Check for monitor glare and correct it by changing or shielding the light source or rearranging the workstation. Do not reduce glare by compromising the monitor height, angle, or location.

10. Adjust the work surface height so the arms and shoulders are not raised significantly when writing or reading. Work surface height is more important than keyboard height for people who spend little time keying.

11. Place the documents used during VDT work at about the same distance from the eyes as the monitor and perpendicular to the line of sight.

12. Adjust document and monitor positions to minimize eye and head movement between them. People who look equally at the monitor and document may prefer to place them either side of a center line rather than have one or the other in the center.

J.8 Bathroom Fixtures

Generally, bathroom fixtures and furnishings should be as sustainable as possible. Bathroom partitions should have a high recycled content. Hands free faucets and waterless urinals shall be utilized where possible. Toilet accessories should be constructed of stainless steel for low maintenance and long life. Hand driers should be considered over paper towel dispensers which generate more waste.

J.9 Hardware

Hardware and room number designations should be in accordance with DPW standards.

J.10 Interior Furnishings Checklist

1. Are the furnishings adaptable, functional, and comfortable?
2. Does the seating comply with the seating recommendations?
3. Is adequate desk and table space provided?
4. Is adequate storage provided?
5. Are conference/meeting furnishings adequate, flexible and adaptable?
6. Do the furnishings comply with IT standards providing enough space for voice and date equipment and wiring?

Links
Go to Appendix K
Go to Table of Contents

Appendix K – Reserved

Links

Go to Appendix L

Go to Table of Contents

Appendix L – Exterior Color Checklist

L.1 EXTERIOR COLOR CHECKLIST 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 of the Army Installation Design Standards, 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's approval process for selection of exterior building colors. 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 based upon their appropriateness to the building type, desired appearance, material to be painted, and prevailing architectural design and landscape character of the installation and visual zone in which the building is located. 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.
- For historic buildings, the historic color should always be maintained. If the building is being restored, a color analysis should be conducted to determine the appropriate colors for the building. Non-historic paint should be removed from brick buildings.

L.2 COLOR CHECKLIST

During the schematic design phase, the designer shall complete and submit a Color Checklist that includes the project identification, project location, existing context of the project site and the proposed colors of the exterior materials and finishes. The Color Checklist should have, at a minimum, three attachments. The first attachment should contain photographs that document the existing surrounding context of the project site. The second attachment should be a color board that contains color samples of the proposed exterior materials, finishes and coatings. The third attachment should be a colored rendering illustrating the exterior appearance of the building. The following is an example of the Color Checklist required for approval by the Army of the proposed exterior colors:

COLOR CHECKLIST FOR EXTERIOR COLOR APPROVAL.

PROJECT NAME:_____

PROJECT LOCATION:_____

PROJECT DESIGNER:_____

PROPOSED MATERIALS AND COLORS:

WALLS, BASE (PRIMARY) MATERIAL:_____

WALLS, SECONDARY MATERIAL:_____

ROOF, SLOPED AREAS:_____

ROOF, FLAT AREAS (Light color required):_____

DOORS, WOOD:_____

DOORS, METAL:_____

DOORS, STOREFRONT:_____

DOORS, STORM DOORS:_____

DOOR FRAMES:_____

WINDOW FRAMES:_____

TRIM, FASCIA:_____

TRIM, SOFFIT:_____

TRIM, GUTTERS & DOWNSPOUTS:_____

TRIM, AWNINGS & CANOPIES:_____

TRIM, RAILINGS AND HANDRAILS:_____

TRIM, FIRE EXCAPES:_____

TRIM, LOUVERS & GRILLES:_____

TRIM, COPING:_____

MISC., FENCES, RETAINING WALLS, ETC.:_____

COLOR CHECKLIST (CONTINUED)

PROJECT NAME:_____

PROJECT LOCATION:_____

Designer shall attach a minimum of four photographs (minimum 5” by 7” in size) documenting the existing surrounding context of the building site. The photographs shall be keyed or labeled to indicate the view location and direction.

Designer shall attach a color board of the proposed exterior colors for the project.

Designer shall attach a colored rendering of the proposed building illustrating the exterior materials and colors proposed.

ENERGY SAVINGS THROUGH THE USE OF WHITE PAINT

Recent studies indicate that light-colored coatings containing titanium dioxide (TiO_2) can help reduce energy. The studies suggest that these coatings reflect more light than coatings without titanium dioxide additives. Building exteriors coated with this paint experience less heat gain on their interiors because of the light energy reflection. Therefore, titanium dioxide paints should be considered as exterior coatings for new buildings.

Links

Go to Appendix M

Go to Table of Contents

Appendix M – Historic Preservation Guidelines

M.1 Introduction

M.1.1 Military Planning and Design

M.1.1.1 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.

Figure M.1 – Historic mixed use visual zone at Fort Benning containing historic administration buildings and housing

M.1.1.2 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. This is illustrated by the various districts and zones at Fort Benning and Camp Merrill (Figure M.1).

M.2 Historic Preservation Regulations

M.2.1 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)

M.2.2 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)

M.2.3 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)

M.2.4 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.

M.2.5 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 for cultural resources at the U.S. Army Environmental Command website and Department of the Department of Defense Instruction Number 4715.16. The Installation Design Guideline is intended to be used in conjunction with the above regulations as well as with the Fort Benning Integrated Cultural Resources Management Plan (ICRMP).

M.2.6 In April 2006, Fort Benning adopted Army Alternate Procedures (AAP) in lieu of 36 CFR 800 for Section 106 compiance of the National Historic Peservation Act (NHPA), which provides a new method for managing historic properties. This streamline approach to Section 106 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 the **Historic Mixed Use District** 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.

M.3.1.1 New work should not:

M.3.1.1.2 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.

M.3.1.2 New work should:

M.3.1.2.1 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.

M.3.1.2.2 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.

M.3.1.2.3 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, which 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

M.3.3.1 **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 (Figure M.2).

Figure M.2 – Make every effort to use historical structures as originally intended. Historic family housing, Fort Benning.

M.3.3.2 **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.

M.3.3.3 **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.

M.3.3.4 **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.

M.3.3.5 **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.

M.3.3.6 **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.

M.3.3.7 **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.

M.3.3.8 **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.

M.3.3.9 **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 or power washing, which could damage historic material or speed their deterioration, are discouraged.

M.3.3.10 **Archaeological resources.** All work, which potentially affects surface or sub-surface pre-historic or historic archaeological resources, should be coordinated with an archaeologist.

M.3.3.11 **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.3.4 Guidelines for Historic Preservation Projects

M.3.4.1 Roof Guidelines

- Preserve existing historic roofing. Repair and patch with matching materials (Figure M.3).
- 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 or replace with in-kind 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.

Figure M.3 - Replace or restore roofs with historical materials. Historic mixed use visual zone, Fort Benning.

M.3.4.2 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.

M. 3.4.3 Porch Guidelines

- Retain or maintain existing original porches (Figure M.4).
- Remove historically inappropriate porches.
- Where possible, restore original porches that have been removed or enclosed.

Figure M.4 - Retain existing historical porches.

M.3.4.4 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.

M.3.4.5 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 door opening.
- Restore all main entranceways by reinstalling appropriate frames.

M.3.4.6 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.

M.3.4.7 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.

M.3.4.8 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.

M.3.4.9 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.

M.3.4.10 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.

M3.4.11 **Force Protection.** 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.4 Army Standards

- U.S. Army Environmental Command Cultural Resources
- 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 DoDI 4715.16 Cultural Resources Management

M.5 References

- Advisory Council on Historic Preservation
- United States Army Environmental Center
- National Park Service

Links

Go to Appendix N

Go to Table of Contents

Appendix N – Housekeeping Rules

Residents of Fort Benning and Camp Merrell are provided the **Family Housing Handbook** to reference regarding the care and maintenance of their homes. The Installation Support Service Center Housing Manager and Family Housing Branch Staff request that residents consult the Handbook prior to the modification or maintenance of any residence on the Installation.

The resident and Installation Housing Representative are required to review and sign a "Conditions of Occupancy" document prior to housing occupancy. A liability statement to the resident is included in the document for any damage to equipment or furnishings during the time of occupancy. This document also specifies the general maintenance and redecorating requirements, and states that written consent is necessary from the Housing Authority before redecorating, altering, adding, or improving the property.

General repairs are addressed in the Self-Help Program (included in the handbook) which specifies repairs that are within the capability of the resident to complete. The program establishes a $100 annual allowance per family dwelling unit to make such repairs. Residents are requested to contact the Self-Help Center of the Family Housing Office regarding the maintenance or repair of items not included on the list.

Upon arrival to and departure from the Installation, the Housing Inspector and resident complete a Housing Inspection Checklist, which examines the general condition of the unit and specifies the removal of all personal items prior to the final inspection. Furnishings and other appliances are inventoried by the resident and property book officer when the residence is assigned and terminated.

Guidelines for historic residences are available through the Cultural Resources Manager. Generally, all interior work should be in accordance with the Secretary of Interior's Standards for the Treatment of Historic Properties. Highlighting some of the most important aspects of the standards:

- Modifications should be reversible
- Use the gentlest means possible
- Retain the historic, character-defining features of the building

Links

Go to Appendix O

Go to Table of Contents

Appendix O – Plant Palette

O.1 Fort Benning Plant Selection List

O.2 Camp Merrill Plant Selection List

Links

Go to Appendix P

Go to Table of Contents

FORT BENNING
PLANT SELECTION LIST
Plant Material Suitability Matrix

Botanical Name	Common Name	Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
		Characteristics													Culture								Use									
CANOPY TREES																																
Acer negundo	Boxelder	▲				▲			▲	▲			▲			▲	▲	▲		▲	▲	▲		▲					▲			▲
Acer rubrum	Red Maple	▲				▲			▲	▲			▲		▲	▲	▲	▲		▲	▲	▲	▲	▲		▲				▲		
Acer saccharum 'Floridanum'	Florida Sugar Maple	▲		▲					▲	▲			▲			▲	▲			▲	▲			▲						▲		
Betula nigra	River Birch	▲				▲			▲	▲		▲				▲	▲			▲						▲			▲	▲		
Carya illinoensis	Pecan	▲		▲	▲				▲	▲				▲		▲	▲	▲		▲	▲			▲							▲	▲
Cryptomeria japonica	Cryptomeria*		▲	▲	▲				▲	▲		▲	▲			▲	▲			▲	▲				▲	▲	▲					
Diospyros virginiana	Persimmon	▲		▲					▲	▲		▲		▲			▲		▲	▲	▲	▲							▲		▲	
Gingko biloba	Gingko (male only)*	▲		▲					▲	▲		▲	▲				▲	▲	▲		▲		▲							▲		
Ilex opaca	American Holly		▲	▲					▲	▲		▲	▲	▲		▲	▲			▲	▲				▲	▲				▲		
Juniperus virginiana	Red Cedar		▲	▲					▲	▲				▲		▲	▲	▲			▲	▲			▲		▲	▲				
Liquidambar styraciflua	Sweetgum	▲			▲	▲			▲	▲			▲	▲		▲	▲	▲		▲	▲			▲						▲	▲	
Liriodendron tulipifera	Tulip Tree	▲				▲			▲		▲		▲				▲			▲	▲			▲		▲				▲	▲	
Magnolia grandiflora	Magnolia		▲		▲	▲		▲			▲		▲	▲		▲	▲	▲		▲	▲				▲					▲	▲	
Metasequoia glyptostroboides	Dawn Redwood*	▲				▲				▲		▲	▲				▲			▲	▲		▲		▲	▲			▲	▲	▲	
Nyssa sylvatica	Blackgum	▲			▲				▲	▲		▲	▲	▲		▲	▲		▲	▲				▲		▲			▲	▲		
Oxydendrum arboretum	Sourwood	▲		▲				▲			▲		▲			▲	▲				▲	▲				▲				▲		
Pinus echinata	Shortleaf Pine		▲			▲			▲	▲		▲					▲	▲				▲				▲					▲	
Pinus elliottii	Slash Pine		▲			▲			▲	▲				▲			▲			▲	▲					▲					▲	
Pinus palustris	Longleaf Pine		▲			▲			▲	▲		▲	▲			▲	▲				▲					▲				▲		
Pinus taeda	Loblolly Pine		▲			▲			▲	▲			▲			▲	▲	▲			▲	▲			▲	▲	▲				▲	
Platanus occidentalis	Sycamore	▲				▲			▲	▲		▲				▲	▲			▲	▲			▲		▲				▲	▲	
Prunus serotina	Black Cherry	▲				▲			▲		▲		▲	▲		▲	▲			▲	▲	▲		▲						▲		▲
Quercus alba	White Oak	▲		▲					▲	▲			▲	▲		▲	▲	▲		▲	▲			▲						▲	▲	
Quercus coccinea	Scarlet Oak	▲				▲			▲	▲			▲	▲			▲				▲		▲	▲								▲
Quercus falcata	Southern Red Oak	▲			▲				▲	▲			▲	▲			▲	▲				▲		▲								
Quercus nigra	Water Oak	▲			▲	▲			▲	▲				▲		▲	▲			▲	▲			▲					▲		▲	▲
Quercus nutallii	Nuttall Oak	▲							▲	▲			▲	▲		▲	▲		▲	▲	▲		▲	▲		▲				▲		
Quercus palustris	Pin Oak	▲				▲			▲	▲			▲	▲		▲	▲							▲						▲	▲	
Quercus phellos	Willow Oak	▲			▲	▲			▲	▲			▲	▲			▲			▲			▲	▲						▲		
Quercus stellata	Post Oak	▲		▲					▲	▲		▲		▲		▲	▲	▲				▲										▲

FORT BENNING
PLANT SELECTION LIST
Plant Material Suitability Matrix

Botanical Name	Common Name	Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
		Characteristics													Culture								Use									
Quercus virginiana	Live Oak		▲	▲	▲					▲				▲		▲	▲			▲	▲			▲		▲				▲	▲	
Salix nigra	Black Willow	▲				▲			▲	▲			▲				▲			▲	▲	▲				▲			▲			
Taxodium distichum	Bald Cypress	▲			▲		▲	▲				▲	▲			▲	▲			▲	▲	▲	▲			▲			▲	▲		
Ulmus americana 'Princeton'	Princeton Elm	▲			▲	▲			▲	▲			▲	▲		▲	▲		▲	▲	▲		▲	▲								
Ulmus parvifolia	Lacebark Elm*	▲				▲	▲					▲	▲			▲	▲	▲		▲	▲		▲	▲		▲				▲		
Zelkova serrata	Japanese Zelkova*	▲			▲	▲			▲	▲		▲	▲			▲	▲		▲		▲		▲	▲						▲		
UNDERSTORY TREES																																
Amelanchier arborea	Serviceberry	▲			▲				▲		▲	▲	▲	▲		▲				▲	▲					▲			▲	▲		
Carpinus caroliniana	American Hornbeam	▲		▲				▲		▲		▲	▲	▲	▲	▲	▲			▲	▲		▲	▲				▲	▲			
Cercis canadensis	Redbud	▲			▲				▲		▲		▲			▲	▲	▲			▲					▲				▲		
Chionanthus retusus	Chinese Fringe Tree*	▲		▲	▲			▲	▲		▲	▲		▲		▲	▲	▲		▲	▲									▲		
Chionanthus virginicus	Fringe Tree	▲		▲	▲			▲	▲		▲	▲	▲	▲		▲	▲	▲		▲	▲					▲			▲	▲		
Cornus florida	Dogwood	▲		▲	▲				▲		▲	▲	▲	▲		▲					▲					▲				▲		
Crataegus marshallii	Hawthorn	▲			▲				▲		▲	▲	▲	▲		▲			▲	▲	▲						▲	▲				▲
Halesia diptera	Two-winged Silverbell	▲			▲	▲		▲	▲		▲		▲			▲	▲			▲						▲			▲	▲		
Lagerstroemia indica	Crape Myrtle*	▲			▲			▲			▲	▲	▲				▲			▲	▲					▲				▲		
Magnolia denudata	Yulan Magnolia*	▲		▲	▲				▲		▲			▲		▲	▲			▲	▲									▲		
Magnolia stellata	Star Magnolia*	▲		▲	▲				▲		▲	▲	▲			▲	▲				▲									▲		
Magnolia x soulangiana	Saucer Magnolia	▲			▲				▲		▲	▲				▲	▲			▲	▲									▲		
Malus floribunda	Crabapple	▲			▲				▲		▲			▲			▲			▲	▲					▲				▲		
Prunus caroliniana	Cherry Laurel		▲			▲			▲		▲		▲	▲		▲	▲				▲		▲		▲			▲				
Sassafras albidum	Sassafras	▲		▲					▲			▲	▲			▲	▲			▲	▲	▲				▲			▲	▲		
Styrax japonica	Japanese Snowbell*	▲			▲			▲			▲	▲	▲			▲				▲	▲									▲		
Vitex agnus-castus	Chaste Tree*	▲			▲	▲		▲			▲		▲				▲	▲		▲	▲									▲		
LARGE SHRUBS																																
Aesculus parviflora	Bottlebrush Buckeye	▲			▲			▲			▲		▲			▲				▲	▲					▲			▲			
Aesculus pavia	Red Buckeye	▲			▲				▲		▲		▲			▲	▲			▲	▲	▲				▲			▲			

FORT BENNING
PLANT SELECTION LIST
Plant Material Suitability Matrix

Botanical Name	Common Name	Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
		Characteristics													Culture								Use									
Camellia sasanqua	Sasanqua Camellia*		▲	▲	▲		▲				▲		▲		▲	▲					▲				▲			▲		▲		
Cleyera japonica	Cleyera*		▲	▲	▲			▲	▲	▲	▲		▲	▲	▲	▲	▲		▲	▲	▲				▲	▲		▲				
Ilex decidua	Possumhaw	▲			▲				▲	▲		▲		▲		▲	▲			▲	▲					▲		▲	▲	▲		
Ilex verticillata	Winterberry/Black Alder	▲		▲	▲				▲	▲		▲		▲		▲	▲			▲	▲					▲			▲	▲		
Illicium parviflorum	Anise Tree		▲		▲	▲		▲	▲	▲			▲		▲	▲	▲			▲	▲	▲			▲	▲		▲	▲			
Myrica cerifera	Wax Myrtle		▲		▲				▲	▲				▲		▲	▲		▲		▲	▲			▲	▲	▲	▲	▲	▲		
Osmanthus x fortunei	Fortune Tea Olive*		▲	▲	▲		▲				▲		▲			▲	▲				▲				▲	▲		▲		▲		
Osmanthus fragrans	Sweet Tea Olive*		▲	▲			▲		▲		▲					▲	▲	▲			▲				▲	▲				▲		
SHRUBS																																
Abelia x grandiflora	Glossy Abelia*		▲		▲	▲		▲			▲		▲			▲	▲		▲		▲				▲	▲		▲				
Berberis thunbergii	Japanese Barberry*	▲	▲		▲				▲	▲			▲			▲	▲	▲	▲		▲	▲			▲	▲		▲				
Buxus sempervirens	Boxwood*		▲	▲						▲			▲			▲	▲				▲				▲			▲				
Callicarpa americana	American Beautyberry	▲			▲	▲		▲		▲			▲	▲		▲	▲			▲	▲					▲			▲			
Calycanthus floridus	Sweet Shrub/Allspice	▲			▲				▲		▲		▲			▲	▲			▲	▲					▲			▲			
Chaenomeles speciosa	Flowering Quince*	▲			▲	▲			▲		▲			▲			▲				▲					▲		▲		▲		
Euonymus alatus 'Nana'	Burning Bush*	▲			▲			▲	▲	▲			▲			▲	▲				▲				▲	▲		▲		▲		
Forsythia x intermedia	Golden Bells*	▲				▲			▲		▲						▲		▲		▲	▲				▲			▲	▲		
Gardenia jasminoides	Gardenia*		▲	▲	▲		▲	▲			▲		▲			▲	▲				▲				▲	▲				▲		
Hydrangea quercifolia	Oakleaf Hydrangea	▲			▲	▲		▲	▲		▲	▲	▲		▲	▲				▲	▲					▲			▲	▲		
Hypericum patulum	St. John's Wort*		▲			▲		▲			▲						▲		▲			▲				▲						
Ilex cornuta 'Burfordii'	Burford Holly*		▲			▲			▲	▲			▲	▲		▲	▲	▲			▲				▲	▲		▲		▲		
Ilex cornuta 'Carissa'	Carissa Holly*		▲			▲				▲			▲	▲		▲	▲	▲			▲				▲	▲		▲				
Ilex cornuta 'Rotunda'	Chinese Holly*		▲			▲				▲			▲			▲	▲	▲	▲		▲				▲	▲		▲				
Ilex crenata 'Helleri'	Helleri Holly*		▲	▲						▲			▲			▲	▲				▲				▲	▲		▲				
Ilex glabra 'Shamrock'	Inkberry		▲	▲	▲				▲	▲			▲	▲		▲	▲			▲	▲				▲	▲			▲			
Ilex vomitoria 'Nana'	Yaupon Holly		▲	▲	▲					▲			▲		▲	▲	▲	▲	▲	▲	▲	▲				▲		▲				
Itea virginiana	Sweetspire	▲		▲	▲			▲	▲		▲		▲		▲	▲	▲			▲	▲					▲			▲			
Jasminum nudiflorum	Winter Jasmine*	▲				▲			▲		▲						▲			▲	▲	▲			▲	▲			▲			
Juniperus spp.	Juniper*		▲		▲	▲				▲			▲				▲	▲	▲		▲	▲			▲	▲			▲			
Loropetalum chinense	Loropetalum*		▲		▲				▲		▲		▲			▲	▲		▲		▲				▲	▲		▲		▲		

FORT BENNING
PLANT SELECTION LIST
Plant Material Suitability Matrix

Botanical Name	Common Name	Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
		Characteristics													Culture								Use									
Mahonia bealei	Leatherleaf Mahonia*		▲	▲					▲		▲		▲	▲	▲						▲					▲				▲		
Nandina domestica	Heavenly Bamboo*		▲		▲			▲	▲		▲		▲	▲		▲	▲		▲		▲				▲	▲		▲				
Prunus laurocerasus	English Laurel*		▲		▲				▲				▲		▲	▲	▲				▲				▲							
Pyracantha spp.	Pyracantha*		▲		▲	▲			▲		▲		▲	▲		▲	▲	▲			▲				▲	▲				▲	▲	
Rhododendron canescens	Native Azalea	▲		▲					▲		▲					▲	▲			▲	▲					▲			▲	▲		
Rhododendron indicum	Southern Azalea*		▲		▲				▲		▲				▲	▲	▲			▲	▲				▲	▲			▲	▲		
Rhus copallina	Flameleaf Sumac	▲			▲	▲		▲					▲	▲			▲					▲				▲			▲		▲	
Rosa x'Knockout'	Knockout Rose*	▲				▲	▲	▲	▲		▲						▲		▲		▲					▲		▲		▲		
Santolina chamaecyparissus	Gray Santolina*		▲	▲	▲			▲			▲		▲				▲		▲			▲				▲		▲				
Spiraea spp.	Spirea*	▲			▲	▲			▲		▲		▲				▲				▲				▲	▲						
Viburnum spp.	Viburnum*	▲	▲		▲	▲			▲		▲		▲			▲	▲		▲	▲	▲				▲	▲		▲				
Yucca filamentosa	Adam's Needle		▲		▲			▲			▲		▲			▲	▲					▲								▲		
ORNAMENTAL GRASSES																																
Andropogon spp.	Bluestem	▲			▲	▲	▲	▲			▲		▲			▲	▲	▲			▲	▲				▲			▲		▲	
Chasmanthium latifolium	Wild Oats	▲			▲		▲	▲			▲		▲		▲	▲				▲	▲	▲				▲			▲		▲	
Cortaderia selloana	Pampas Grass*	▲	▲		▲	▲	▲	▲			▲		▲			▲	▲	▲	▲		▲	▲			▲	▲			▲	▲		
Eragrostis spectabilis	Purple Lovegrass	▲			▲		▲				▲		▲				▲				▲	▲			▲	▲			▲	▲	▲	
Miscanthus sinensis 'Gracillimus'	Maiden Grass*	▲			▲	▲	▲	▲			▲		▲			▲	▲	▲			▲	▲			▲	▲			▲	▲	▲	
Muhlenbergia spp.	Muhly Grass	▲			▲	▲	▲	▲			▲		▲			▲	▲	▲			▲	▲			▲	▲			▲	▲	▲	
Pennisetum alopecuroides	Fountain Grass*	▲			▲	▲	▲				▲		▲			▲	▲	▲			▲	▲			▲	▲			▲	▲	▲	
Schizachyrinum scoparium	Little Bluestem	▲			▲	▲	▲				▲		▲			▲	▲				▲	▲				▲			▲		▲	
GROUNDCOVERS																																
Ajuga reptans	Carpet Bugle*		▲			▲			▲		▲		▲		▲	▲					▲											
Aspidistra elatior	Cast Iron Plant*		▲	▲						▲			▲		▲			▲			▲					▲						

FORT BENNING
PLANT SELECTION LIST
Plant Material Suitability Matrix

Botanical Name	Common Name	Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
		Characteristics													Culture								Use									
Cyrtomium falcatum	Holly Fern*		▲		▲					▲			▲		▲	▲				▲	▲					▲			▲			
Echinacea purpurea	Purple Coneflower		▲		▲			▲			▲			▲			▲	▲			▲	▲				▲						
Euonymous fortunei 'Radicans'	Wintercreeper*		▲		▲					▲			▲			▲	▲			▲	▲				▲	▲			▲			
Gelsemium sempervirens	Carolina Jessamine		▲		▲	▲			▲		▲		▲		▲	▲	▲		▲		▲					▲			▲		▲	
Hemerocallis spp.	Daylily*	▲				▲	▲	▲	▲		▲		▲			▲	▲		▲	▲	▲	▲				▲			▲			
Juniperus spp.	Juniper*		▲		▲					▲			▲				▲		▲		▲	▲				▲			▲			
Liriope spp.	Monkey Grass*		▲		▲	▲		▲			▲		▲		▲	▲		▲	▲		▲					▲			▲			
Ophiopogon japonicus	Mondo Grass*		▲			▲		▲		▲			▲		▲	▲		▲	▲		▲					▲						
Pachysandra terminalis	Japanese Spurge*		▲	▲	▲				▲	▲			▲		▲				▲		▲					▲						
Phlox subulata	Thrift		▲		▲				▲		▲		▲				▲	▲	▲			▲				▲			▲			
Rudbeckia fulgida	Yellow Coneflower		▲		▲			▲			▲			▲			▲	▲			▲	▲				▲						
Sedum spp.	Stonecrop*		▲			▲		▲	▲		▲		▲				▲	▲	▲		▲	▲				▲			▲	▲		
Thelypteris kunthii	Maiden Fern*	▲				▲				▲			▲			▲				▲	▲					▲			▲	▲		
Trachelospermum asiaticum	Asian Jasmine*		▲			▲				▲			▲		▲	▲	▲				▲					▲			▲			
Vinca minor	Periwinkle*		▲			▲			▲		▲		▲		▲	▲			▲		▲	▲				▲			▲			
VINES																																
Bignonia capreolata	Cross Vine	▲	▲			▲			▲		▲		▲	▲		▲	▲		▲	▲	▲	▲			▲	▲			▲			
Campis radicans	Trumpetcreeper	▲				▲	▲	▲			▲			▲		▲	▲	▲	▲	▲	▲	▲				▲			▲			
Clematis spp.	Clematis*	▲				▲	▲	▲	▲		▲			▲		▲	▲		▲	▲	▲	▲								▲		
Gelsemium sempervirens	Carolina Jessamine		▲		▲				▲		▲		▲		▲	▲	▲		▲		▲				▲	▲			▲			
Lonicera sempervirens	Coral Honeysuckle		▲		▲			▲	▲		▲			▲	▲	▲	▲		▲	▲	▲	▲			▲	▲			▲			
Parthenocissus quinquefolia	Virginia Creeper	▲			▲					▲			▲	▲		▲	▲		▲		▲					▲			▲		▲	▲
Rosa banksiae	Lady Banks' Rose*	▲	▲			▲			▲		▲					▲	▲	▲	▲	▲	▲	▲			▲	▲			▲	▲		
Rosa hybrida	Climbing Rose*	▲				▲	▲	▲	▲		▲						▲				▲				▲					▲		
Trachelospermum jasminoides	Confederate Jasmine*		▲			▲		▲	▲		▲		▲			▲	▲				▲				▲	▲			▲	▲		
Vitis app.	Grape Vine	▲				▲				▲		▲		▲		▲	▲	▲			▲				▲	▲			▲	▲		

FORT BENNING
PLANT SELECTION LIST
Plant Material Suitability Matrix

		Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
Botanical Name	**Common Name**	**Characteristics**													**Culture**								**Use**									
Wisteria floribunda	Japanese Wisteria*	▲				▲			▲		▲					▲	▲				▲									▲		
TURFGRASSES																																
Axonopus affinis	Carpet Grass	▲			▲	▲				▲			▲				▲	▲		▲	▲								▲		▲	
Cynodon dactylon	Bermuda Grass (or suitable hybrids, including Tifway 419)	▲				▲				▲			▲				▲				▲	▲							▲		▲	
Lolium multiflorum	Annual Ryegrass	▲	▲			▲				▲			▲			▲	▲				▲								▲		▲	
Wildflower Seed Mix	see note **	▲	▲			▲	▲	▲	▲		▲		▲	▲		▲	▲	▲			▲	▲				▲			▲		▲	
Zoysia spp.	Zoysia Grass	▲		▲						▲			▲		▲	▲	▲	▲			▲	▲							▲		▲	

*Species not native to the area.

**All wildflower seed mixtures to contain 40% annuals, 20% biennials, and 40% perennials with a mixture of spring, summer, and fall blooming species using a minimum of 12 species. Mixture can be adapted for erosion control, shade tolerance, and/or height restrictions.

CAMP MERRILL
PLANT SELECTION LIST
Plant Material Suitability Matrix

Botanical Name	Common Name	Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
		Characteristics													Culture								Use									
CANOPY TREES																																
Acer rubrum	Red Maple	▲				▲			▲	▲			▲		▲	▲	▲	▲		▲	▲	▲	▲	▲		▲				▲		
Acer saccharum	Sugar Maple	▲		▲					▲	▲			▲			▲	▲			▲	▲			▲						▲		
Ilex opaca	American Holly		▲	▲					▲	▲		▲	▲	▲		▲	▲			▲	▲				▲	▲				▲		
Juniperus virginiana	Red Cedar		▲	▲					▲	▲				▲		▲	▲	▲			▲	▲			▲		▲	▲				
Liquidambar styraciflua	Sweetgum	▲			▲	▲			▲	▲			▲	▲		▲	▲	▲		▲	▲			▲						▲	▲	
Liriodendron tulipifera	Tulip Tree	▲				▲			▲		▲		▲				▲			▲	▲			▲		▲				▲	▲	
Magnolia grandiflora	Magnolia		▲		▲	▲		▲			▲		▲	▲		▲	▲	▲		▲	▲				▲					▲	▲	
Nyssa sylvatica	Blackgum	▲			▲				▲	▲		▲	▲	▲		▲	▲		▲	▲				▲		▲			▲	▲		
Oxydendrum arboretum	Sourwood	▲		▲				▲			▲		▲			▲	▲				▲	▲				▲				▲		
Pinus echinata	Shortleaf Pine		▲			▲			▲	▲		▲					▲	▲				▲				▲					▲	
Pinus elliottii	Slash Pine		▲			▲			▲	▲				▲			▲			▲	▲					▲					▲	
Pinus taeda	Loblolly Pine		▲			▲			▲	▲			▲			▲	▲	▲			▲	▲			▲	▲	▲				▲	
Quercus alba	White Oak	▲		▲					▲	▲			▲	▲		▲	▲	▲		▲	▲			▲						▲	▲	
Quercus coccinea	Scarlet Oak	▲				▲			▲	▲			▲	▲			▲				▲		▲	▲								▲
Quercus falcata	Southern Red Oak	▲			▲				▲	▲			▲	▲			▲	▲				▲		▲								
Quercus nutallii	Nuttall Oak	▲							▲	▲			▲	▲		▲	▲		▲	▲	▲		▲	▲		▲				▲		
Quercus palustris	Pin Oak	▲				▲			▲	▲			▲	▲		▲	▲							▲						▲	▲	
Quercus phellos	Willow Oak	▲			▲	▲			▲	▲			▲	▲			▲			▲			▲	▲						▲		
Taxodium distichum	Bald Cypress	▲			▲		▲	▲				▲	▲			▲	▲			▲	▲	▲	▲			▲			▲	▲		
UNDERSTORY TREES																																
Amelanchier arborea	Serviceberry	▲			▲				▲		▲	▲	▲	▲		▲				▲	▲					▲			▲	▲		
Carpinus caroliniana	American Hornbeam	▲		▲				▲		▲		▲	▲	▲	▲	▲	▲			▲	▲		▲	▲				▲	▲			
Cercis canadensis	Redbud	▲			▲				▲		▲		▲			▲	▲	▲			▲					▲				▲		
Chionanthus virginicus	Fringe Tree	▲		▲	▲			▲	▲		▲	▲	▲	▲		▲	▲	▲		▲	▲					▲			▲	▲		
Cornus florida	Dogwood	▲		▲	▲				▲		▲	▲	▲	▲		▲					▲					▲				▲		
Crataegus marshallii	Hawthorn	▲			▲				▲		▲	▲	▲	▲		▲			▲	▲	▲						▲	▲				▲
Halesia diptera	Two-winged Silverbell	▲			▲	▲		▲	▲		▲		▲			▲	▲			▲						▲			▲	▲		
Prunus caroliniana	Cherry Laurel		▲			▲			▲		▲		▲	▲		▲	▲				▲		▲		▲			▲				
Sassafras albidum	Sassafras	▲		▲					▲			▲	▲			▲	▲			▲	▲	▲				▲			▲	▲		

CAMP MERRILL
PLANT SELECTION LIST
Plant Material Suitability Matrix

Botanical Name	Common Name	Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
		Characteristics													Culture								Use									
LARGE SHRUBS																																
Aesculus parviflora	Bottlebrush Buckeye	▲			▲			▲			▲		▲			▲				▲	▲					▲			▲			
Aesculus pavia	Red Buckeye	▲			▲				▲		▲		▲			▲	▲			▲	▲	▲				▲			▲			
Camellia sasanqua	Sasanqua Camellia*		▲	▲	▲		▲				▲		▲		▲	▲					▲				▲			▲		▲		
Ilex decidua	Possumhaw	▲			▲				▲	▲		▲		▲		▲	▲			▲	▲					▲		▲	▲	▲		
Ilex verticillata	Winterberry/Black Alder	▲		▲	▲				▲	▲		▲		▲		▲	▲			▲	▲					▲			▲	▲		
Illicium parviflorum	Anise Tree		▲		▲	▲		▲	▲	▲			▲		▲	▲	▲			▲	▲	▲			▲	▲		▲	▲			
Myrica cerifera	Wax Myrtle		▲		▲				▲	▲				▲		▲	▲		▲		▲	▲			▲	▲	▲	▲	▲	▲		
Osmanthus x fortunei	Fortune Tea Olive*		▲	▲	▲		▲				▲		▲			▲	▲				▲				▲	▲		▲		▲		
Osmanthus fragrans	Sweet Tea Olive*		▲	▲			▲		▲		▲					▲	▲	▲			▲				▲	▲				▲		
SHRUBS																																
Abelia x grandiflora	Glossy Abelia*		▲		▲	▲		▲			▲		▲			▲	▲		▲		▲				▲	▲		▲				
Berberis thunbergii	Japanese Barberry*	▲	▲		▲				▲	▲			▲			▲	▲	▲	▲		▲	▲			▲	▲		▲				
Callicarpa americana	American Beautyberry	▲			▲	▲		▲		▲			▲	▲		▲	▲			▲	▲					▲			▲			
Calycanthus floridus	Sweet Shrub/Allspice	▲			▲				▲		▲		▲			▲	▲			▲	▲					▲			▲			
Forsythia x intermedia	Golden Bells*	▲				▲			▲		▲						▲		▲		▲	▲				▲			▲	▲		
Gardenia jasminoides	Gardenia*		▲	▲	▲		▲	▲			▲		▲			▲	▲				▲				▲	▲				▲		
Hydrangea quercifolia	Oakleaf Hydrangea	▲			▲	▲		▲	▲		▲	▲	▲		▲	▲				▲	▲					▲			▲	▲		
Ilex cornuta 'Burfordii'	Burford Holly*		▲			▲			▲	▲			▲	▲		▲	▲	▲			▲				▲	▲		▲		▲		
Ilex cornuta 'Carissa'	Carissa Holly*		▲			▲				▲			▲	▲		▲	▲	▲			▲				▲	▲		▲				
Ilex cornuta 'Rotunda'	Chinese Holly*		▲			▲				▲			▲			▲	▲	▲	▲		▲				▲	▲		▲				
Ilex glabra 'Shamrock'	Inkberry		▲	▲	▲				▲	▲			▲	▲		▲	▲			▲	▲				▲	▲			▲			
Ilex vomitoria 'Nana'	Yaupon Holly		▲	▲	▲					▲			▲		▲	▲	▲	▲	▲	▲	▲	▲				▲		▲				
Itea virginiana	Sweetspire	▲		▲	▲			▲	▲		▲		▲		▲	▲	▲			▲	▲					▲			▲			
Juniperus spp.	Juniper*		▲		▲	▲				▲			▲				▲	▲	▲		▲	▲			▲	▲			▲			
Loropetalum chinense	Loropetalum*		▲		▲				▲		▲		▲			▲	▲		▲		▲				▲	▲		▲		▲		
Nandina domestica	Heavenly Bamboo*		▲		▲			▲	▲		▲		▲	▲		▲	▲		▲		▲				▲	▲		▲				

CAMP MERRILL
PLANT SELECTION LIST
Plant Material Suitability Matrix

		Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
Botanical Name	**Common Name**	**Characteristics**													**Culture**								**Use**									
Rhododendron canescens	Native Azalea	▲		▲					▲		▲					▲	▲			▲	▲					▲			▲	▲		
Rhododendron indicum	Southern Azalea*		▲		▲				▲		▲				▲	▲	▲			▲	▲				▲	▲			▲	▲		
Rhus copallina	Flameleaf Sumac	▲			▲	▲		▲					▲	▲			▲					▲				▲			▲		▲	
Spiraea spp.	Spirea*	▲			▲	▲			▲		▲		▲				▲				▲				▲	▲						
Viburnum spp.	Viburnum*	▲	▲		▲	▲			▲		▲		▲			▲	▲		▲	▲	▲				▲	▲		▲				
Yucca filamentosa	Adam's Needle		▲		▲			▲			▲		▲			▲	▲					▲								▲		
GROUNDCOVERS																																
Cyrtomium falcatum	Holly Fern*		▲		▲					▲			▲		▲	▲				▲	▲					▲			▲			
Echinacea purpurea	Purple Coneflower		▲		▲			▲			▲			▲			▲	▲			▲	▲				▲						
Euonymous fortunei 'Radicans'	Wintercreeper*		▲		▲					▲			▲			▲	▲			▲	▲				▲	▲			▲			
Gelsemium sempervirens	Carolina Jessamine		▲		▲	▲			▲		▲		▲		▲	▲	▲		▲		▲					▲			▲		▲	
Hemerocallis spp.	Daylily*	▲				▲	▲	▲	▲		▲		▲			▲	▲		▲	▲	▲	▲				▲			▲			
Juniperus spp.	Juniper*		▲		▲					▲			▲				▲		▲		▲	▲				▲			▲			
Liriope spp.	Monkey Grass*		▲		▲	▲		▲			▲		▲		▲	▲		▲	▲		▲					▲			▲			
Ophiopogon japonicus	Mondo Grass*		▲			▲		▲		▲			▲		▲	▲		▲	▲		▲					▲						
Pachysandra terminalis	Japanese Spurge*		▲	▲	▲				▲	▲			▲		▲				▲		▲					▲						
Phlox subulata	Thrift		▲		▲				▲		▲		▲				▲	▲	▲			▲				▲			▲			
Rudbeckia fulgida	Yellow Coneflower		▲		▲			▲			▲			▲			▲	▲			▲	▲				▲						
Thelypteris kunthii	Maiden Fern*	▲				▲				▲			▲			▲				▲	▲					▲			▲	▲		
Trachelospermum asiaticum	Asian Jasmine*		▲			▲				▲			▲		▲	▲	▲				▲					▲			▲			
Vinca minor	Periwinkle*		▲			▲			▲		▲		▲		▲	▲			▲		▲	▲				▲			▲			
VINES																																
Bignonia capreolata	Cross Vine	▲	▲			▲			▲		▲		▲	▲		▲	▲		▲	▲	▲	▲			▲	▲			▲			
Campis radicans	Trumpetcreeper	▲				▲	▲	▲			▲			▲		▲	▲	▲	▲	▲	▲	▲				▲			▲			
Gelsemium sempervirens	Carolina Jessamine		▲		▲				▲		▲		▲		▲	▲	▲		▲		▲				▲	▲			▲			
Lonicera sempervirens	Coral Honeysuckle		▲		▲			▲	▲		▲			▲	▲	▲	▲		▲	▲	▲	▲			▲	▲			▲			

CAMP MERRILL
PLANT SELECTION LIST
Plant Material Suitability Matrix

		Type		Growth			Flower				Interest				Light			Resistant		Soil Moisture			Function									
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Inconspicuous	Flower	Bark	Foliage	Fruit / wildlife	Shade	Sun/shade	Sun	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover / Natural Area	Specimen	Open area/site	Not available in nurseries
Botanical Name	**Common Name**	**Characteristics**													**Culture**								**Use**									
Parthenocissus quinquefolia	Virginia Creeper	▲			▲					▲			▲	▲		▲	▲		▲		▲					▲			▲		▲	▲
Trachelospermum jasminoides	Confederate Jasmine*		▲			▲		▲	▲		▲		▲			▲	▲				▲				▲	▲			▲	▲		
Vitis app.	Grape Vine	▲				▲				▲		▲		▲		▲	▲	▲			▲				▲	▲			▲	▲		
TURFGRASSES																																
Axonopus affinis	Carpet Grass	▲			▲	▲				▲			▲				▲	▲		▲	▲								▲		▲	
Cynodon dactylon	Bermuda Grass (or suitable hybrids, including Tifway 419)	▲				▲				▲			▲				▲				▲	▲							▲		▲	
Lolium multiflorum	Annual Ryegrass	▲	▲			▲				▲			▲			▲	▲				▲								▲		▲	
Wildflower Seed Mix	see note **	▲	▲			▲	▲	▲	▲		▲		▲	▲		▲	▲	▲			▲	▲				▲			▲		▲	
Zoysia spp.	Zoysia Grass	▲		▲						▲			▲		▲	▲	▲	▲			▲	▲							▲		▲	

*Species not native to the area.

**All wildflower seed mixtures to contain 40% annuals, 20% biennials, and 40% perennials with a mixture of spring, summer, and fall blooming species using a minimum of 12 species. Mixture can be adapted for erosion control, shade tolerance, and/or height restrictions.

Appendix P – 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 COS website.

Army Facilities Standardization Program Centers of Standardization	
Assigned Center	**Facility Type**
U.S. Army Engineering and Support Center, Huntsville **Attn: CEHNC-ED-CS-A and IS** **P.O. Box 1600** **Huntsville AL 35807** **Telephone: 256-895-1673/1672/1535**	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) *replaces: Military Operations Urban Terrain (MOUT)*
	Training Range
	Youth Activity Center
	Bowling Center (RFP)
	Army Community Service Centers
	Consolidated Fire/Police/Safety Facility
U.S. Army Engineer District, Louisville **ATTN: CELRL-ED-D-A** **600 Martin Luther King Jr. Place** **Louisville, KY 40202 Tel: 502-315-6250**	Army Reserve Center
U.S. Army Engineer District, Norfolk **ATTN: CENAO-TS-EA** **803 Front Street** **Norfolk, VA 23510** **Telephone: 757-441-7702**	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

Army Facilities Standardization Program Centers of Standardization	
Assigned Center	**Facility Type**
U.S. Army Engineer District, Omaha **ATTN: CENWO-ED-DG/PM-M** **215 North 17th Street** **Omaha, NE 68102** **Telephone: 402-221-4552/443**	Army Chapel
	Chapel Family Life Center
	Religious Education Facility
	Small Site Chapel
	Access Control Points
	Airfields, Railroads, Pavements, Bridges, & Dams
U.S.Army Engineer District, Mobile **ATTN:CESAM-PM-SI** **P.O. Box 2288** **Mobile, AL 36652-2288** **Telephone: 251-394-3600**	National Guard Armory
U.S. Army Engineer District, Savannah **ATTN: CESAS-EN-E** **P.O. Box 889** **Savannah, GA 31402** **Telephone: 912-652-5212**	Company Operations Facility (COF)
	Military Entrance Processing Station (MEPS)
	Tactical Equipment Maintenance Facility (TEMF)
	Unaccompanied Enlisted Personnel Housing (UEPH), New & 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)
U.S. Army Engineer District, Tulsa **ATTN: CESWT-EC-D** **1645 S. 101ST East Avenue** **Tulsa, OK 74128** **Telephone: 918-669-7033**	*Advanced Individual Training (AIT) Barracks
	*Basic Combat Trainee (BCT)
	Reception Barracks
*AIT & BCT to be transferred to Savannah, upon completion by Tulsa.	

Army Facilities Standardization Program Centers of Standardization	
Assigned Center	**Facility Type**
CFSC **Telephone: 703-681-1506**	Army Lodging
	Clubs/FBE Facilities
	Golf Courses
	Recreational Lodging

Links
Go to Appendix Q
Go to Table of Contents

Appendix Q – Standards and References

Q.1 Standards and References

Standards and References for the Army Installation Design Standards (IDS)

Q.1.1 Chapter 2, Site Planning Design Standards

Q.1.1.1 Army Standards

- Americans with Disabilities Act Accessibility Guidelines (ADAAG)
- Uniform Federal Accessibility Standards (UFAS)
- AR 200-2, *Environmental Effects of Army Actions*
- AR 210-20, *Real Property Master Planning for Army Installations*
- AR 415-15, *Army Military Construction Program Development and Execution*
- AR 420-70, *Buildings and Structures*

Q.1.1.2 References

- UFC 1-300-05A, *Installation Support*
- UFC 3-210-01A, *Design: Area Planning, Site Planning, and Design*
- UFC 3-210-06A, *Design: Site Planning and Design*
- UFC 3-210-10, *Design: Low Impact Developing Manual*
- UFC 3-230-15FA, *Design: Subsurface Drainage Facilities for Airfields and Heliports*
- UFC 3-230-16FA, *Design: Drainage and Erosion Control Structures for Airfields and Heliports*
- UFC 3-230-17FA, *Design: Drainage for Areas Other than Airfields*
- UFC 3-250-01FA, *Design: Pavement Design for Roads, Streets, Walks and Open Storage Areas*
- UFC 3-250-18FA, *Design: General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas*
- UFC 3-260-02, *Design: Pavement Design for Airfields*
- UFC 3-400-01, *Design: Energy Conservation*
- Whole Building Design

Q.1.2 Chapter 3, Building Design Standards

Q.1.2.1 Army Standards

- AR 140-483, *Army Reserve Land and Facilities Management*
- AR 350-19, *The Army Sustainable Range Program*
- AR 420-70, *Buildings and Structures*
- UFC 3-310-04, *Design: Seismic Design for Buildings*
- UFC 3-520-01, *Interior Electrical Systems*
- UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*
- UFC 4-022-01, *Security Engineering: Entry Control Facilities / Access Control Points*
- UFC 4-171-05, *Design: Guide for Army Reserve Facilities*
- NG PAM 415-12, *Army National Guard Facilities Allowances*
- 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 Guide for Installation Information Infrastructure Architecture (I3A). Available through Army Knowledge Online (AKO). Search for "I3A".
- TM 5-809-10/Navy NAVFAC P-355/Air Force AFM 88-3, Chap 13, *Seismic Design for Buildings*
- 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*
- Standards of Seismic Safety for Existing Federally Owned and Leased Buildings
- Quality Standards for New and Replacement Residential Communities Initiative (RCI) Family Housing
- Army Lodging Standards
- Design Manual for Remoted Target Systems (RETS) Ranges, CEHNC 1110-1-23 Manual
- Unexploded Ordinance Considerations in the Planning, Design, and Construction of Ranges, Supplement to CEHNC 1110-1-23 Manual
- Army Standard for Religious Facilities Construction
- Army Standards for Company Operations Facilities (COFs)
- Army Standards for Child Development Center Construction (for school-age children)
- Army Standards for General Instruction Building (GIB) and Army Continuing Education System (ACES) Standards
- The Army Standard for Army Lodging
- The Army Standard for Access Control Points (ACPs)
- The Army Standards for Electronic Key Card Access for all Facilities

Q.1.2.2 References

- AR 190-13, *The Army Physical Security Program*
- AR 200-1, *Environmental Protection and Enhancement*
- AR 200-2, *Environmental Effects of Army Actions*
- AR 210-20, *Master Planning for Army Installations*
- AR 405-45, *Real Property Inventory Management*
- AR 405-70, *Utilization of Real Property*
- UFC 1-200-01, *Design: General Building Requirements*
- UFC 3-120-10, *Interior Design*
- UFC 3-400-01, *Design: Energy Conservation*
- UFC 3-510-01, *Design: Foreign Voltages and Frequencies Guide*
- UFC 3-600-01, *Design: Fire Protection Engineering for Facilities*
- UFC 4-510-01, *Design: Medical Military Facilities*
- UFGS 096800, *Carpet*
- UFGS 099000, *Paints and Coatings*
- ER 1110-345-122, *Engineering and Design, Interior Design*
- DA PAM 200-4, *Cultural Resources Management*
- Department of Defense (DoD) Interior Design Resources Website
- TI 800-01, *Design Criteria*
- TI 811-16, *Lighting Design*
- TM 5-683, *Electrical Interior Facilities*
- Army Knowledge Online
- Army Brand Theme Operations Home Page
- 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
- Air Force Sustainable Facility Guide
- Engineering Knowledge On-line (EKO) Sustainable Design and Development
- Whole Building Design Guide
- Unified Facilities Guide Specifications (UFGS), "Division 12 - Furnishings", Construction Criteria Base
- Engineering and Construction Bulletins
- Construction Criteria Base

Q.1.3 Chapter 4, Circulation Design Standards

Q.1.3.1 Army Standards

- Manual For Railway Engineering
- UFC 3-210-02, *Design: POV Site Circulation and Parking*
- UFC 3-250-01FA, *Design: Pavement Design for Roads, Streets, Walks and Open Storage Areas*
- UFC 3-260-02, *Design: Pavement Design for Airfields*
- UFC 3-550-03FA, *Design: Electric Power Supply and Distribution*
- UFC 4-010-01, *Design: DoD Minimum Antiterrorism Standards for Buildings*
- UFC 4-860-01FA, *Design: Railroad Design and Rehabilitation*
- 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.1.3.2 References

- 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.1.4 Chapter 5, Landscape Design Standards

Q.1.4.1 Army Standards

- UFC 3-210-05FA, *Design: Landscape Design and Planting Criteria*
- UFC 4-022-01, *Security Engineering: Entry Control Facilities / Access Control Points*
- TM 5-630, *Natural Resources Land Management*
- American Standard for Nursery Stock, ANSI Z60.1
- Overseas (Host Nation Standards)

Q.1.4.2 References

- USAF Landscape Design Guide
- C. Brickell and D. Joyce. Pruning and Training, 1996

Q.1.5 Chapter 6, Site Elements Design Standards

Q.1.5.1 Army Standards

- DoD 4525.8-M, *DoD Official Mail Manual*
- AR 420-70, *Buildings and Structures*
- UFC 4-010-01, *Design: 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)
- MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings

Q.1.5.2 References

- AR 1-33, *Memorial Programs*
- AR 840-1, *Department of the Army Seal, and Department of the Army Emblem and Branch of Service Plaques*
- TI 811-16, *Lighting Design*
- TM 5-663, *Child Development Center, Play Area Inspection and Maintenance Program*
- 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.*
- UFGS, Division 12 – FURNISHINGS, UFGS 129300, Site Furnishings
- Illuminating Engineering Society of North America (IESNA) Recommended Practice Manual: Lighting for Exterior Environments (RP 33-99)

Q.1.6 Chapter 7, Force Protection Design Standards

Q.1.6.1 Army Standards

- UFC 4-010-01, *Design: DoD Minimum Antiterrorism Standards for Buildings*
- UFC 4-010-02, *Design (FOUO): DoD Minimum Standoff Distances*. (This document is a "For Official Use Only [FOUO]" publication. For web site access refer to paragraph 7.2.2.2 above.
- Uniform Federal Accessibility Standards (UFAS)
- Americans with Disabilities Act Accessibility Guideline (ADAAG)
- DoD Instruction 2000.16, DoD Antiterrorism Standards

Q.1.6.2 References

- 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
- Army Regulation (AR) 525-13, The Army Force Protection Program (Available only through the Army Knowledge Online web portal).
- UFC Security Engineering series are, UFC 4-020-01FA, UFC 4-020-02FA, UFC 4-020-03FA, and UFC 4-020-04FA (replaced by UFC 4-020-04A). The four volumes cover; Project Development, Concept Design, Final Design, and Electronic Security Systems respectively. Access to the other UFC's can be gained through the Whole Building Design Guide or the U. S. Army Corps of Engineers' Protective Design Center (PDC) web-based library. A user name and password are required. Site entry is restricted to U.S. Government agencies and their U.S. contractors. Also, a copy of the manuals can be acquired via a standard publications account.

Q.1.7 Appendix D, Sustainable Design

Q.1.7.1 Army Standard

In a 5 January 2006 memorandum, the Assistant Secretary of the Army for Installations and Environment announced that the Army will transition from Sustainable Project Rating Tool (SPiRiT) to the LEED Green Building Rating System® effective with the FY08 MILCON Program. Projects prior to the FY08 MILCON program can use the LEED rating system if the LEED Silver level can be achieved within the program amount. The Sustainable Project Rating Tool (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-FY07 MILCON projects, the minimum SPiRiT rating requirement is "Gold".

Q.1.7.2 References

- 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), Engineering Knowledge Online Website
- Air Force Sustainable Facilities Guide
- Whole Building Design Guide

Q.1.8 Appendix M, Historic Preservation Guidelines

Q.1.8.1 Army Standards

- Department of the Army Pamphlet (DA PAM) 200-4, *Cultural Resources Management*
- U.S. Army Environmental Command website
- The Secretary of the Interior's Standards for the Treatment of Historic Properties

Q.1.8.2 References

- Advisory Council on Historic Preservation
- United States Army Environmental Center

Links

Go to Appendix R

Go to Table of Contents

Appendix R – DOIM Requirements

R.1 Introduction

R.1.1 Purpose

This section provides guidance for the planning, design, and implementation of the Installation Information Infrastructure Architecture (I3A) for Army installations in the Continental United States (CONUS). This section establishes an implementation concept that can be used to shape architectural templates and influence the design process. It will identify proven infrastructure construction techniques, define common practices, and serve as an authoritative implementation guide.

R.1.2 Background

In previous engineering designs each area of communications was addressed separately, to include design standards, schedule, and funding. This approach led to confusion, design re-engineering, and duplication of effort. The I3A concept was initiated to synchronize the efforts and formulate a more efficient and effective design process. I3A establishes an Army-wide Information Technology (IT) architectural design standard. I3A is the source to fuel effective Army Knowledge Management necessary to support the Army Transformation Campaign Plan. I3A captures installation infrastructure, synchronizes the implementation of automation programs, provides for analysis of operational force and sustaining base connectivity, and identifies costs associated with IT modernization. The I3A Configuration Control Board (CCB) manages I3A issues and tracks developments in IT, information assurance, enterprise systems management and automation information systems (AIS). The CCB, which oversees several working groups that address IT issues, meets quarterly.

R.1.3 Goal

This section will assist the communications designer by supplying common standards and architecture. Through the use of this section, all communications engineering should follow the same standards that will facilitate a concerted installation effort.

R.1.4 Scope

This section is intended to support the necessary requirements gathering, site surveys, analysis, design and implementation of Information Technology. This guide also assists the designer in the integration of the premise wiring, Local Area Network (LAN), Outside Plant (OSP) cabling, and network backbone.

R.1.5 Future Concerns and Planning

Telecommunications planning must not only consider the current customer requirement but future user requirement that will impact the network, i.e. projected growth, higher processing speeds and throughput. More advanced user requirements and bandwidth sensitive applications (e.g., tele-medicine, desktop video teleconferencing, media rooms and educational applications) require faster processors and distributed client/server computing that are driving the enterprise network evolution to upgrade the information infrastructure. All require higher performance/throughput, greater network predictability, higher network availability, and enhanced security than is currently available in the existing communications infrastructure.

R.1.6 Challenges

Installation networking engineers and cable distribution designers face challenges such as systems integration, interoperability, identifying the most efficient technologies, and leveraging government contracts for purchasing equipment. This section assists the planner in making informed decisions that are technically correct and financially feasible.

R.1.7 Future Growth

The advent and spread of services such as Video Teleconferencing (VTC), Voice over IP (VoIP), streaming video, and the migration towards web based documentation has led to a desire for larger bandwidth and faster connection. At the same time, most users are currently connected to an ISDN capable switch for voice and a LAN for data. The designers for Information Infrastructure should look at the future needs, and ensure that new designs meet not only the immediate needs, but also leave room for growth. The designed supporting infrastructure should allow the migration to higher data transfer rates and more data intensive services.

R.2 Inside Plant

R.2.1 Outlet Density

For planning purposes, when actual outlet locations are not known and cannot be determined with available information, reasonably accurate total outlet count estimations can be obtained based on the size and dedicated usage of the space. Calculations are based on gross square footage (overall building footprint without deducting for hallways, equipment rooms, restrooms, etc.), and the average outlet density for that specific category of facility space. Currently, ten categories of facility space are identified, each with its own average outlet density. The factors fall within the ranges given in TIA/EIA-569-A.

Facility Space Category Area (SF) per Outlet

a. Administrative Space	80
b. Laboratory/Technical Space	100
c. Barracks Space	315
d. Medical/Clinic Space	80
e. Classroom XXI Space	80
f. Warehouse Space	5,000

g. General Instruction/Other SPACE	500
h. Clerical	140
i. High Density	50
j. Army Family Housing (see below)	

For Army Family Housing (AFH) Units, the number of rooms in the AFH unit determines minimum outlet quantities. In general provide one telephone outlet and one CATV outlet (as a minimum) in each of the following rooms: kitchen, living room, dining room, family room/area, each bedroom, and any other logical location deemed appropriate. In Senior Officer Quarters there should also be at least one data outlet in each of the rooms listed above, except for the kitchen – for general officers there should be at least two data drops in each room, with one certified for SIPRNET connectivity.

Telecommunications Outlet Types

The following outlet types are commonly used in military construction projects. Sketches of these outlets are included in Figure 2-5: Telecommunications Outlet Types.

a. Administrative Outlet. Two 8-pin modular (RJ45 type) connectors in a single or double gang outlet faceplate, one connector dedicated to voice use and one dedicated to data use.

b. Administrative w/Fiber Outlet. Two 8-pin modular (RJ45 type) connectors in a single or double gang outlet faceplate, one connector dedicated to voice use and one dedicated to data use, and two fiber optic connectors, dedicated to data use. Use of administrative outlets with fiber optic connectors is at specific user request for each project.

c. Medical Facility (hospital) Outlet. Two 8-pin modular (RJ45 type) connectors in a double gang outlet faceplate, one unkeyed, dedicated to voice use, one keyed or unkeyed, dedicated to data use, and two dedicated blank positions for fiber optic connectors. Use of keyed modular connectors for data and installation of fiber optic connectors is at specific user request for each project.

d. Furniture Outlet. Two 8-pin modular (RJ45 type) connectors in a modular furniture outlet faceplate with outlet box extender, one connector dedicated to voice use, and one connector dedicated to data use. Connector voice and data dedication may be reassigned as requirements dictate. Use of modular furniture outlets with fiber optic connectors is at specific user request for each project.

e. Wall Outlet. One 8-pin modular (RJ45 type) connector in a single gang outlet faceplate with mounting lugs dedicated to voice use.

f. Special Outlet (FAX, Counter Top, etc.). Configuration generally similar to administrative or wall outlets but dedicated to special use and mounted at special heights usually defined by user (i.e., wall outlet mounted at 18'' (450mm) above finished floor, or administrative outlet mounted just above countertop level.)

g. Pay Phone Outlet. One 8-pin modular (RJ45 type) connector in a single gang outlet faceplate with mounting lugs dedicated to voice use.

h. Barracks Outlet. One 8-pin modular (RJ45 type) connector in a single gang outlet faceplate, dedicated to voice use.

i. Barracks Outlet (TRADOC Schools). Two 8-pin modular (RJ45 type) connectors in a single gang outlet faceplate, one dedicated to voice use and one dedicated to data use.

R.2.2 Outlet Box

The following specifications pertain to telecommunications and connector outlets: For standard administrative and medical facility (hospital) outlets use a recess mounted 4-11/16" by 4-11/16" double gang electrical box with the faceplate flush with the wall surface. Double gang electrical boxes should be full depth to provide dedicated space for current and possible future fiber optic cable installation. For single connector outlets, such as voice, data, cable television (CATV) or closed circuit television (CCTV), use a full depth, single gang, electrical box recess mounted, with the faceplate flush with the wall surface.

R.2.3 Outlet Faceplate

For standard administrative outlets use a full (double gang) faceplate with connector locations for all copper and (if used), fiber optic cable. Standard administrative outlets may, by specific user request, use single gang outlet faceplates in conjunction with a reducing ring. For single gang outlet boxes, use a single gang outlet faceplate with appropriate connector locations and, if required, mounting lugs for wall phones.

R.2.4 Outlet Connectors

The following specifications pertain to copper, fiber optic and coaxial cable connectors.

R.2.5 Copper Connectors

Copper connectors should be EIA/TIA category 6 (Cat 6) or enhanced category 5 (Cat 5e), 8-pin/8-position insulation displacement terminations wired per T568A (default configuration) or T568B (if required to maintain system configuration uniformity, security or other user-specified reasons). Category 3 (Cat 3) rated connectors should not be used in new construction or rehabilitation projects. Copper connectors and plugs should be unkeyed unless the user requires keyed connectors and plugs to maintain system uniformity, security, or other user specified reasons.

R.2.6 Copper Termination

Unless otherwise specified by the DOIM, all copper distribution cable used for voice or data circuits should be terminated at the TR on 110-type (or similar) Cat 6 compliant termination panels mounted in an equipment rack (very small installations, i.e., one or two phones, can use a EIA/TIA Category qualified block).

a. Voice and data cables should normally be terminated on the same patch panel or block and individually identified. Note: in the standard cabling scheme, the designations "voice" and "data" are arbitrary and do not imply that one outlet is better than the other – the outlets are identical in capability.

b. Where physical security is required, or by specific user request, data cable may be terminated in an enclosed 19-inch cabinet to provide enhanced protection for terminations, data equipment, and patching facilities.

Copper Voice Patch Cables:

Voice patch cables should have a standard 8-pin/8-position (RJ45 type) connector on one end and a termination compatible with the incoming voice circuit block or panel on the other end. Although it's not required for voice patch cable to be Cat 6 compliant, it is recommended.

Copper Data Patch Cables:

Unless otherwise specified by the DOIM, data patch cables should be 4-pair, stranded UTP, 24 AWG, Cat 6 cable.

Fiber Optic Connectors:

The default choice for fiber optic connectors should be EIA/TIA "SC" type (568SC). EIA/TIA "SC" type connectors are preferred in new systems as the international standard now accepted by the Federal Government. Small form factor connectors (available from several manufacturers), offer a potential for significant installation cost reduction, however the EIA/TIA has declined to select any individual product for inclusion in the standards. Any type of fiber connector used shall meet the performance requirements specified within Annex A of TIA/EIA-568-B.3, and meet the requirements of the corresponding TIA Fiber Optic Connector Intermateability Standard (FOCIS) document.

Fiber Optic Termination:

All fiber optic distribution cable should be terminated in rack-mounted patch panels. Duplex patch cables should be used. Where required, and if space allows, all fiber optic cable should be terminated in an enclosed 19-inch cabinet to provide greater protection for terminations, data equipment, and patching.

Fiber Optic Patch Cables:

Fiber optic patch cables should be using the same fiber optic cable type and connectors as the patch panels they are interconnecting.

Copper Voice and Data Cable:

Two Cat 6, 4-pair 24 American Wire Gauge (AWG), 100-ohm, solid, unshielded twisted pair (UTP) cables should be installed to each standard dual connector outlet and one Cat 6, 4-pair 24 AWG, 100 ohm, solid, UTP cable should be installed to each single connector outlet. Use only cable that has passed the Underwriters Laboratory (UL) LAN certification program and is labeled with UL acceptable markings. Plenum cables should be specified when required. Termination should be performed using an 8-pin (RJ45 type) connector. All terminations should be wired in accordance with TIA/EIA T568A. In a standard cabling scheme, horizontal cables are arbitrarily designated "voice" and "data" to identify and differentiate their purpose. Each voice outlet should be assigned a unique telephone number.

Cable Length:

Copper data cable length should be limited to 295 feet from patch panel termination in the TC to the data outlet termination in accordance with EIA/TIA-568-B.1. For planning purposes, in most administrative buildings where the TC is centrally located, assume an average of 120 feet of cable from the TC to each outlet. For non-administrative buildings (example: barracks), building renovations, or where the TC is not centrally located, adjust the average cable length for planning purposes as required (i.e., average measured length).

Fiber Optic Cable:

A minimum of 12 strands of 50/125-micron or 62.5/125-micron multimode fiber optic cable and 12 strands single mode fiber optic cable should be installed between the main telecommunications room or main cross connect and each TC. The data fiber optic cable riser should be terminated in a patch panel installed in an equipment rack or cabinet. If requested by the user, only 12 strands of one type of fiber may be used. Any type of fiber connector used shall meet the performance requirements specified within Annex A of TIA/EIA-568-B.3, and meet the requirements of the corresponding TIA Fiber Optic Connector Intermateability Standard (FOCIS) document. Plenum cables should be specified when required. The designer should note that the network architecture recommends single mode fiber optic cable between TCs. Plenum cables should be specified when required.

Vertical Riser Cable:

The voice riser cable originating in the main TC or main cross connect should be terminated in each Telephone Room (TR) on 110 type punch blocks mounted on the telephone backboard. Plenum cables should be specified when required.

Coaxial Cable:

When CATV or CCTV requirements are identified, either a 75-ohm broadband coaxial cable or single-mode fiber optic cable system should be installed. When a coaxial system is installed, care should be taken to ensure the correct cable is used. The designer should coordinate with the cable service provider where franchised agreements are in place. Plenum cables should be specified when required. The table below lists cable type with corresponding distance limitation. This table is derived from vendor specifications (Anixter) for coaxial cable. Cable Distance RG-59 <=150 feet, RG-6 <=250 feet, RG-11<=400 feet.

The following subparagraphs pertain to patch panel, distribution facilities, and outlet labeling.

Outlet/Patch Panel Labels:

The telecommunications systems labeling should be done in accordance with TIA/EIA 606. All outlets and patch panel positions should be labeled as to their function and with a unique identifier code. All devices, outlet locations, and designations should also appear on the system drawings. As a minimum the following should be reflected in the outlet/patch panel labeling:

- Security Level (if applicable)
- Room Number
- Alpha or Numeric Designator

- Labeling should be a minimum of ¼-inch high

Conformance to Existing Standards:

The labeling system used should conform to any existing labeling, to the Director of Information Management (DOIM) standard, or if neither exists to the method described above. All designations should be done in standard commercial labeling. Handwritten labels should not be used for the final configuration.

Telecommunications Outlet Labeling:

Outlet labeling should be done in accordance with TIA/EIA-606. Each outlet location should be labeled with a unique designator and level of classification, in sequence starting with “A” or “1” and proceeding clockwise around the room. The left or top 8-pin (RJ-45 type), Cat 6 compliant connector should be designated for voice and be labeled "VOICE." The right or bottom 8-pin (RJ-45 type), Cat 6 compliant connector should be designated for data and be labeled "DATA.” All LAN components in the system should also be labeled with similar designations in accordance with TIA/EIA 606. For fiber optic connections, the left or top fiber optic connection should be labeled "A" and the right or bottom fiber optic connection should be labeled "B."

Telecommunications Patch Panel Labeling:

Patch panel labeling should be done in accordance with TIA/EIA 606. Each position should be labeled with a unique designator corresponding to the outlet location. The top or left 8-pin (RJ-45 type), Cat 6 compliant port for each outlet location should be designated for voice and be labeled "VOICE." The bottom or right 8-pin (RJ-45 type), Cat 6 compliant port for each outlet location should be designated for data and be labeled "DATA." Fiber-optic port labeling should be done in accordance with TIA/EIA 606. The left or top connection should be labeled "A." The right or bottom connection should be labeled "B."

Distribution System Labeling:

The distribution system is described in EIA/TIA 606 for pathways. In addition, all transitions and changes in distribution system size and type should be labeled. Each cabinet should be labeled at the top with a unique designation.

Systems Furniture Wiring:

The use of interconnected systems furniture has become more prevalent in the current office environment, and presents some unique challenges for the communications designers and implementers. Although systems furniture is designed for quick reconfiguration of office space, experience has shown that power and communications connections within the system furniture cannot be reconfigured easily.

Direct Connection:

Figure 2-6: Systems Furniture Wiring shows two possible solutions for direct wiring to the systems furniture. This concept is one of a continuous home run from the TC to the furniture outlet. Continuous runs allow flexibility in cabling. Testing of the installed cable plant is simplified by providing an end-to-end circuit, without an additional connection point.

MultiUser Telecommunication Outlet Assembly (MUTOA) TIA/EIA-568-B.1 section 6.4.1 allows for MUTOA within an open office. This option provides greater flexibility in an office that is frequently reconfigured, but does introduce an additional connection and point of loss. If the MUTOA is used, it should be sized to support the number of users in the area plus 25%.

Telecommunications Room (TR):

Telecommunications Room Standard Premise Distribution. TIA/EIA-568-B.1 has replaced telecommunications Telephone Room (TC) with telecommunications room (TR).

Multi-Story Buildings:

In multi-story buildings, a minimum of one TR should be located on each floor (small facilities, i.e., air traffic control towers, firing ranges, etc., may use one TR for the entire facility). TRs on successive floors should be vertically stacked wherever possible. A minimum of three 4-inch rigid steel conduits should be installed between stacked Telephone Rooms on successive floors, in accordance with EIA/TIA 569A.

Telephone Room Sizing:

TRs should be sized in accordance with EIA/TIA-569-A for all new construction projects with primarily administrative function (small mixed-use facilities should not require full compliance with EIA/TIA-569-A). Generally, the TR should be sized to approximately 1.1% of the area it serves. For example, a 10,000 square foot area should be served by a minimum of one 110-square foot TR. TR sizing allowances should be made only in cases of construction projects involving building renovation, and under no circumstances should a Telephone Room be smaller than 70 square feet (7’ x 10’).

Telephone Room Location:

TRs shall be dedicated spaces not shared with other functions (i.e., electrical rooms, mechanical rooms, etc). TRs should be located centrally in the area they serve. TRs should be located such that maximum copper cable distance from the patch panel through the structured cabling system to the furthest outlet does not exceed 295 feet. In rehabilitation projects, rooms containing transformers, air handling units, etc., should be avoided if at all possible.

Telephone Backboards:

In new construction and in existing renovation when possible, telephone backboards should cover a minimum of two walls in the TR. Backboards should be ¾-inch thick and 96 inches tall, finished with a fire resistant coating and rigidly attached to the wall to support all attached equipment. When renovating an existing Telephone Room that does not have adequate space, the backboard should be sized as large as possible to accommodate the protected entrance terminal (PET) and 110-type blocks.

Equipment Racks:

Equipment racks should be floor mounted 19 inches wide located at or near the center of the TR. If mounting requirements for oversize equipment are anticipated, 23 inches may be substituted. In narrow

or crowded Telephone Rooms, equipment racks may be floor mounted adjacent to a wall, but should provide a minimum 36 inches space both in front and in back of the rack.

Equipment Cabinets:

Equipment cabinets should be used to mount secure or mission critical equipment or in circumstances where controlled access is desired, such as CATV or CCTV distribution in barracks. Cabinets should provide, at a minimum, sufficient space for current and anticipated future equipment requirements. Equipment cabinets may be floor or wall mounted and should be logically grouped based on the purpose of the equipment they enclose. Air conditioning or fans shall be provided in all equipment cabinets.

Ladder Cable Tray:

Channel type ladder cable tray should be used in the TR to provide distribution between the telephone backboard, equipment racks, riser conduits, and the distribution cable tray.

Telephone Room Lighting:

Light fixtures should be mounted a minimum of 102 inches above the finished floor and provide a minimum of 50 foot candles of illumination measured 39 inches above the finished floor.

Telephone Room Climate Control:

Each TR should be independently climate controlled, capable of providing cooling year round (24 hours/day, 365 days/year) to protect all installed electronic equipment. Rooms should be provided with positive atmospheric pressure to exclude dust.

Telephone Room Contaminants:

Information system equipment should not be installed in spaces where moisture, liquid or gaseous spillage, or other contaminants may be present.

Electrical Power:

A minimum of two dedicated 15-ampere, 110-volt alternating current (AC) outlets should be installed with each equipment rack or cabinet to provide power for the installed equipment. Additional utility outlets should be placed on each wall in the telecommunications room.

Voice Communications:

Each TR should have one wall-mounted telephone installed at or near the entry door.

Grounding:

All telecommunications racks and supporting structures shall be bonded to the TGB or TMGB as defined in J-STD-607-A and TIA/EIA-569-A.

Building Point Of Entrance:

NEC defines the point of entrance as the location where “the wire or cable emerges from an external wall, from a concrete floor-slab, or from a rigid metal conduit or an intermediate metal conduit grounded to an electrode in accordance with 800.400(B).”

The Telecommunications Entrance Facility (TEF) /Telephone room (TR): The TEF is the space housing the point of entrance of the telecommunications service. The TEF is also the space where the inter- and intra-building backbone facilities join. Telecommunication-related antenna entrances and electronic equipment may also be located in the TEF/TR.

Copper Cable Entrance:

The OSP copper cable shield, armor, and metallic strength member shall be bonded to the TMGB as close as possible to the building point of entrance with a No. 6 AWG or larger ground wire. The designer should use a non-bonded splice case for the transition from OSP rated cable to interior rated cable, or should indicate that the implementer not install the splice case carry-through bonding conductor. If the designer must extend the OSP copper cable past 50 feet in accordance with NEC 2002 section 800.50, the metallic strength member shall be bonded to the TMGB as close as possible to the conduit egress point with a No. 6 AWG or larger ground wire.

Fiber Cable Entrance:

The OSP fiber optic cable armor, and metallic strength member shall be bonded to the TMGB as close as possible to the building point of entrance with a No. 6 AWG or larger ground wire. The designer should use a non-bonded splice case for the transition from OSP rated cable to interior rated cable, or should indicate that the implementer not install the splice case carry-through bonding conductor. If the designer must extend the OSP fiber cable past 50 feet in accordance with NEC 2002 section 770.50, the metallic strength member shall be bonded to the TMGB as close as possible to the conduit egress point with a No. 6 AWG or larger ground wire. If inside/outside cable is used, a cable shield isolation gap shall be incorporated.

Copper Protector Block:

All OSP copper cables shall be terminated on primary protector blocks, equipped with 5-pin gas protector modules. The protector blocks shall be bonded to the TMGB with a No. 6 AWG or larger ground wire. Blocks shall be UL listed. Place the protector block as close as possible to the TMGB.

FORT BENNING, GEORGIA

VOICE AND NETWORK

INFRASTRUCTURE WIRING REQUIREMENTS

FORT BENNING, DOIM

1. NEW BUILDINGS:

All new buildings and/or structures require the placement of CAT-6 Voice and Network wiring. Blue colored cable will be used for networking and white will be used for voice. Orange RJ45 jacks will be used for networking and Ivory jacks will be used for voice. All CAT-6 cabling, jacks and patch panels shall be Systymax approved and wired to 568 B standards. If alternate vendor parts are being used, they must be Systymax compatible and be manufactured, approved and provide Systymax certification and warranty.

2. EXISTING BUILDINGS:

Existing buildings currently wired with CAT-5 E wiring shall remain and any additional wiring shall also be CAT-5 E. All wiring, patch panels and jacks shall be wired to 568 B standards.

3. MAXIMUM CABLE LENGTHS:

The maximum horizontal cable length is 90 m (295 ft.). This is the length from the work station wall outlet to the telecommunications closet cross connect. A total of 10 meters is allowed for cords in the work area and for patch cords or jumpers in the telecommunications closet.

4. PULLING TENSIONS:

The maximum pulling tension for a 4 pair horizontal cable is 25 LBF. This is the amount of force that may be exerted on a cable before transmission performance begins to deteriorate.

- Excessive pulling tension may occur during installation. This can result in damage to the cable geometry, torn jackets from snagging or excessive abrasion and in severe conditions, elongation of the copper conductor may occur.

5. MAXIMUM BEND RADIUS:

Exceeding the minimum bend radius can distort the cable geometry and result in degradation of transmission performance. There are two common places where exceeding the minimum bend radius may occur:

- At the work station wall outlet. After the cable is terminated, too often the remaining cable is jammed into the wall outlet or worse, wrapped around itself and shoved into the outlet. A better practice would be to gently work the excess cable length back through the wall outlet into the wall.
- At the wiring closet during routing of the cable to the terminal block or patch panel, prior cable placement practices may have encouraged making the cable appear form fitting or tight against a routing structure (cable tray or rack) as possible. A better practice would be to incorporate gently sweeping curves along with a cable path, avoiding sharp bends or changes in direction.

- The maximum bend radius is 4 times the cable diameter. Never exceed a 90 degree bending radius. Any kinking or twisting as a result of former cable dressing techniques may result in irreparable damage to the cable geometry, resulting in loss of transmission performance. Every effort should be made to insure the path the cable follows has smooth gradual sweeps at any transmission point. A cable bending radius may be exceeded when the cable is installed in conduit with a sharp bend radius.

6. OVER STRESSING:

Eliminate cable stress caused by tension in suspended cable runs and tightly cinched cable bundles.

- Excessive cable loading or stress can also occur if a cable is incorrectly suspended in a cable run. If the distance between supports, such as D-Rings, J-Hooks or similar functioning hardware, is too great the weight of the cable and/or in combination with any other cables in the support may create excessive stress on the cable. Recommended cable support spacing is 48" to 60" centers for up to 50 cables. For 50 or more cables, special supports are required to support and distribute the additional weight.
- Cable bundles, which are cinched excessively tight to the point of jacket deformation, can result in distortion of cable geometry. Also, large cable bundles laid in a tray or duct can exert undue stress on the bottom layers of cables. Both instances can result in a loss of optimum transmission performance. Loosely applied cable ties, Velcro and D-Rings or J-Hooks, when used correctly, offer excellent cable management.
- Avoid twisting of cable during installation. Excessive twisting may result in distortion of cable geometry and in severe cases tears in the jacket.

7. ADDITIONAL INSTALLATION REQUIREMENTS:

- Apply cable ties loosely and at random intervals
- Do not over tighten cable ties and avoid applying with periodic spacing
- Minimize amount of jacket twisting
- Buy the right UTP cabling: the higher the application being run, the higher the cable's performance should be.
- Wire towards anticipated data rates or higher. This will ensure headroom for testing and performance for future applications.
- Keep maximum runs to 90 meters (295 ft.)
- When terminating cable, allow no more than 1/2" untwisting of the conductors in a pair. Keep the twists of each pair as close to the termination on the IDC as possible.
- Do not use any splices or bridge taps in the horizontal cabling, as they are not allowed.
- Provide 1 to 3 foot service loop at each work station to allow for flexibility with moves, adds or changes.
- Remember to fire stop when going through walls, floor or ceiling spaces.
- Remember to ground shielded systems to avoid potential voltage shifts.
- No shared sheath applications, running multiple applications under the same jacket; such as voice and data.
- Different punch down blocks or patch panels should be used for voice and data to facilitate moves, adds or changes.
- Match patch cords and connecting hardware to the category grade of cable installed.
- Patch cords are often viewed as the weakest link. Keep them as short as possible to reduce potential problems.
- Avoid walking or stepping on high performance cable. Avoid running over high performance cable with hand trucks or fork lifts. This can exert excessive force on the cable, distorting cable geometry or crushing the pairs, resulting in electrical shorts.

- Avoid the use of staples, either from a staple gun or mounting in a traditional manner with a hammer. These can exert excessive force on the cable and distort the pair geometry.
- D-Rings, J-Hooks, or Velcro straps all offer acceptable cable management techniques without compressing the cable.
- Avoid cable runs near heat sources. These may negatively impact cable attenuation.
- Maintain a 5" minimum spacing between cables and sources of EMI, such as fluorescent lights or unshielded power lines.

8. TESTING REQUIREMENTS:

All CAT-5 E and CAT-6 cable should be tested with a level 3 test set. All tests should be made at a minimum of 100 meg. All circuits shall be tested and documented and a copy of test results shall be provided to the Ft. Benning DOIM.

9. DIGS – LOCATES:

In Georgia, call 1-800-282-7411; or Shaw 545-7264 (Donna)

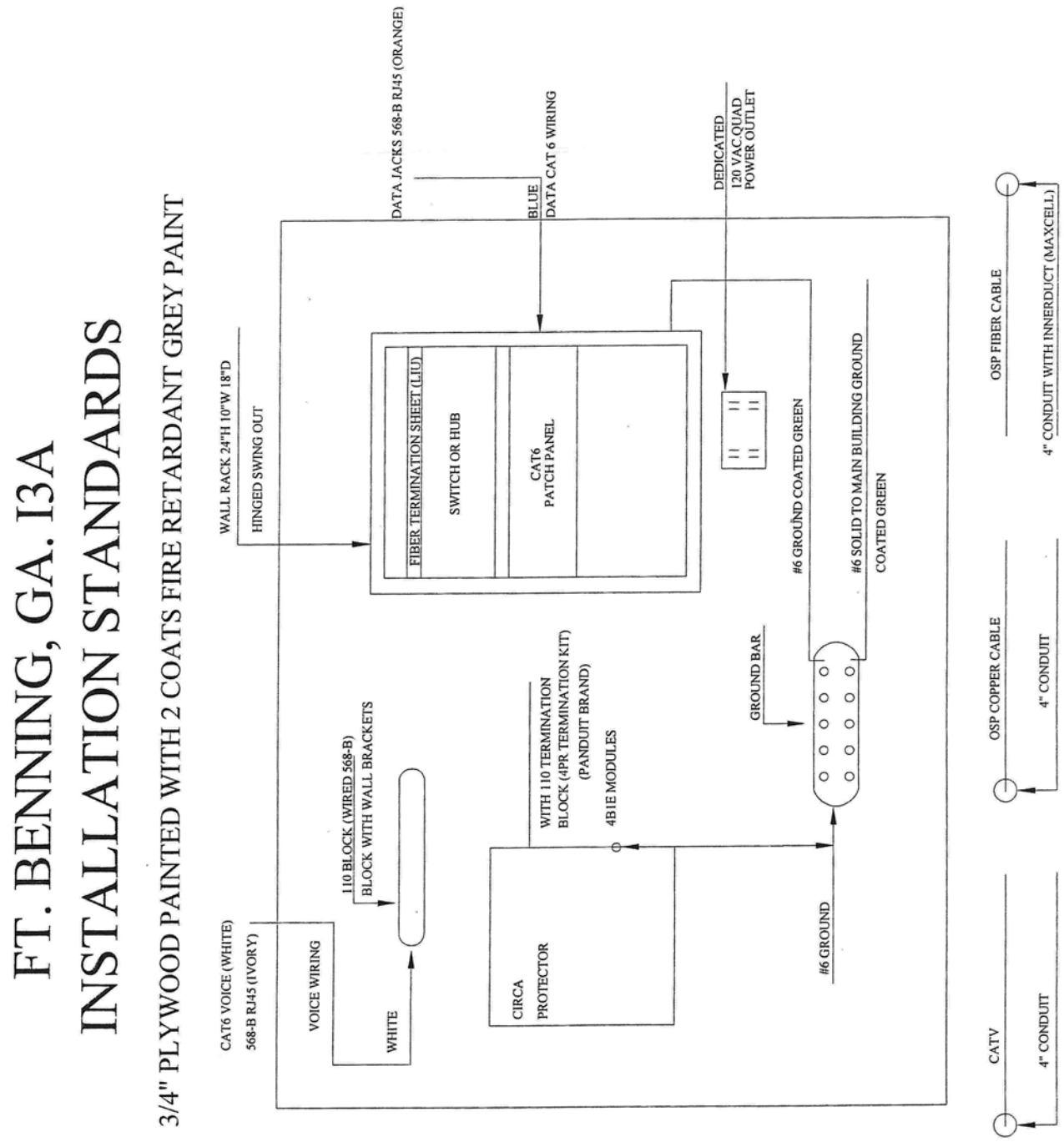


Figure R.1 – Fort Benning I3A Installation Standards

R.3 Outside Plant

Much of the OSP work references Outside Plant Conduit and Manhole Installation Requirements (13 July 2006) from the Directorate of Information Management Policy and Plans Directorate Fort Benning, Georgia. Also refer to TR No. AMSEL-IE-TI 08-001-7, United States Army Information Systems Engineering Command (USAISEC) Worldwide Outside Plant Design and Performance Requirements (OSPDRP), November 2007.

FORT BENNING, GEORGIA

OUTSIDE PLANT CONDUIT AND MANHOLE

INSTALLATION REQUIREMENTS

FORT BENNING, DOIM

1. MANHOLE TYPE:

Manhole shall be 6'X12'X7' Communication "T" Type pre-cast:

- 36" Frame and Cover rated at H-20 loading
- Complete communication racking package including stand-offs, wall racks, steps and corner brackets
- Quantity 1-15" pre-cast collar
- Water proof sealer shall be placed between bottom and top half of manhole
- Quantity 1-3/4"X10' copper ground rod shall be placed outside the manhole in the conduit ditch line. The ground must have 25 OHMS or less resistance to ground. If not additional rods must be driven. A number 2 solid ground shall be placed from the ground rod into manhole. The entrance of the ground wire shall enter the manhole at the top of the hole. The ground wire shall enter the manhole no more than 4" from the inside roof and 6" from the inside wall of the manhole. The ground wire entrance shall be sealed with a watertight sealer. The new ground wire shall be bonded to existing bonding ribbon in pre-cast hole.
- Manhole shall be placed level and shall have a minimum of 24" cover over top of manhole
- A minimum of 6" of number 57 crushed stone shall be placed in the bottom of the excavation before bottom half of manhole is placed
- All newly installed manholes will be stenciled with a manhole number that will be provided by Ft. Benning, DOIM.
- Manhole shall be equipped with sump pump hole with cover and cable pulling eyes.

2. CONDUIT INSTALLATION:

In main duct runs a minimum of 6, 4" PVC conduits shall be placed between manholes. A minimum of 3, 4" PVC conduits shall be placed from manholes to EUB's. Examples of conduit types include the following:

- Encased Buried (EB)-20 - for encasement in concrete
- EB-35 - for encasement in concrete
- DB-60 - for direct burial or encasement in concrete
- DB-100 - for direct burial or encasement in concrete
- DB-120 - for direct burial or encasement in concrete
- Rigid Nonmetallic Conduit Schedule 40 - for direct burial or encasement in concrete

- Rigid Nonmetallic Conduit Schedule 80 - for direct burial or encasement in concrete
- Multiple Plastic Duct (MPD) - for direct burial or installation in conduit
- Rigid Metallic Conduit - for direct burial or encasement in concrete
- Intermediate Metallic Conduit - for direct burial or encasement in concrete
- Fiberglass Duct - for direct burial or encasement in concrete
- Innerduct Polyethylene (PE) - for direct burial or installation in conduit
- Innerduct Polyvinyl Chloride (PVC) - for direct burial or installation in conduit
- High Density Polyethylene (HDPE) - for directional drilling
- EB-20 and DB-60 conduit wiI meet National Electrical Manufacturers Association (NEMA) Standard TC-6
- EB-35 and DB-120 conduit will meet NEMA Standard TC-8
- Schedule 40 and Schedule 80 rigid nonmetallic conduit will meet NEMA Standard TC-2
- Nonmetallic conduits will be encased in concrete of minimum 20,700 kPa (3,000 Ib/in^2) compressive strength where vehicular traffic (i.e., automotive, railway) is above the pathway, or where a bend or sweep is placed.
- Spacers will properly support concrete-encased ducts. Spacers will be installed in accordance with manufacturer's specifications. If the manufacturer's specifications are unknown, a spacer will be installed a minimum of one spacer every 3 m (10 ft). Ducts supplied in 6.1-m (20-ft) lengths require spacers every 1.5 m (5 ft). The duct will not be damaged, cracked, or crushed prior to or during installation. Conduit systems not encased in concrete will be installed in layers with backfill installed around and between the ducts. Construction vehicles will not be driven over DB conduits.
- Ensure the integrity of the orientation of the duct bank between maintenance holes. Do not allow the ducts to twist or tangle between maintenance holes.

3. DUCTS TO BE INSTALLED IN TRENCHES:

- The type of duct for new installation will be PVC, Schedule EB, DB, or Schedule 40. Schedule EB duct will be used only if the duct is encased in concrete. Schedule DB or Schedule 40 duct will be used for applications where the duct is DB or encased in concrete.
- Ducts will be joined in such a manner as to be soil tight. Joints will form a sufficiently smooth interior surface between joining sections so that cables will not be damaged when pulled past the joint. Joints between dissimilar types of ducts (PVC,HDPE, galvanized steel pipe (GSP), EB, DB, etc.) will use the appropriate connectors designed for the purpose of providing a seal between the ducts and preventing damage to cables pulled through these joints.
- Accomplished changes in direction of runs exceeding a total of 10 degrees, either vertically or horizontally, by long sweeping bends having a minimum radius of 7.62 m (25ft.). Long sweeps may be made up of one or more curved or straight sections and/or combinations thereof. Bends made manually will not reduce the internal diameter of the conduit. There will be no more than the equivalent of two 90 degree bends (180 degrees total) between pull points, including offsets and kicks with a curvature radius of less than 30m (100 ft.). Back-to-back 90 degree bends will be avoided.
- Where the radius is less than 12m (40ft.), 4.6m (15ft.) radius-manufactured bends must be used. If possible, the entire change in direction should be made with a single arc of 4.6m (15ft.) radius. Manufactured bends may be used on subsidiary/lateral conduits at the riser pole or building entrance. Manufactured bends will have a minimum radius of 10 times the internal diameter of the conduit in accordance with NEC Chapter 9 and ANSI/TIA/SIA-758.
- Bends and sweeps will be concrete-encased to protect the duct from the pressures developed while pulling cables. Where a duct enters a building and sweeps up through a floor slab, galvanized RSC will be used. For ducts transitioning from the lower duct window of a maintenance hole to the nominal trench depth, the transition will be accomplished in no

less than 9.1m (30 linear ft) from the maintenance hole in order to reduce the radius of the bends. The duct should be concrete-encased in the transition area.

4. SECTION LENGTHS AND FORMATIONS:

- The section length of conduit will not exceed 183 m (600 ft) between pulling points in main conduit runs without U.S. Government approval. The section length of subsidiary duct is limited mainly by the size of the cable to be pulled into it and the number of bends it will contain.
- Ducts between the cable vault and the first manhole will be based upon the size of the switch, the number of outside cable pairs served from the switch location, the fiber optic requirements, and future growth.
- A main duct run includes the manholes and ducts from a DCO or node and provides the pathways for large feeder cables and/or core FOCs. New main duct runs will consist of a minimum of 6-way, 4-in duct banks.
- A lateral duct run is defined as a minor branch run from the main duct run between manholes. New lateral duct runs will be a minimum of three-way 4-in. duct banks. One of the ducts will contain two runs of three-way maxcell innerduct.
- Depth of Cover - At least 600 mm (24 in) of cover is required above the top of the duct bank. At least 457 mm (18 in) of cover is required under roads or sidewalks (if duct is concrete-encased). For ducts installed in solid rock, the cover will consist of at least 150 mm (6 in) of concrete. If rock is encountered below grade, the minimum cover above the concrete-encased duct will be 300 mm (12 in).
- Trench Width - The contractor will engineer the trench width to the minimum width required to support the size of the duct bank being installed. For installing ducts, the trench width depends on the number of ducts, size of ducts, arrangement of ducts, and space around ducts (at least 50 mm [2 in]). Additional width may be required to work in deep trenches or with large count duct banks. Shoring of walls or sloping will be performed as required by the Occupational Safety and Health Administration (OSHA) and/or local requirements. The trench width for DB conduit will be wide enough to permit tamping of dirt on the sides of the conduit formation.
- Concrete Encasement - The duct system will be concrete-encased in all main cantonment areas. At a minimum, the duct system will be encased under all traffic areas, where any bend/sweep exceeds 10 degrees, in any direction, and in any stream/drainage area subject to washing out. Concrete-encased duct, galvanized RSC, or pipe casings will also be placed under all paved road surfaces and certain heavy traffic non-surfaced roads as documented in the site-specific SOR/EDP. The encasement/pipe will be extended a minimum of 1.8-m (6 ft) beyond the roadbed for all road crossings. The contractor will use only one brand of Portland cement that conforms to ASTM C 150. The concrete will be a wet type mix and placed in such a manner as to ensure the concrete completely surrounds all ducts and that no air or voids are trapped in the mix. Concrete used to encase conduits will be a minimum 17,220 kPa (2,500 lb/in^2) compressive strength.
- Duct Placement - New ducts will be swept down and installed in the lowest available duct positions within the lowest available duct window in the manhole. Additional ducts required in the future will be placed on top of the existing ducts. Ducts placed under this project will not prevent placement of future ducts in the upper duct positions. Conduits will terminate in bell ends or duct terminators at the point of entrance into the manholes and buildings. All newly installed duct runs require a minimum of 36" cover from top of duct.
- Reinforcement of Existing Ducts - New ducts installed to reinforce an existing duct bank will be placed above the existing duct bank if the minimum top cover of 600 mm (24 in) can be maintained. If there is not sufficient top cover available, the new duct will be placed beside the existing duct bank.

- Pull String/Rope/Tape - Once ducts have been mandrelled to verify their integrity, a pull string, pull rope, or pull tape rated at not less than 890-newton (N) (200-lb) tensile strength will be installed in each new conduit and innerduct/subduct. A minimum of 1.5 m (5 ft) will be provided at each end of the conduit. The string/rope/tape will be coiled and secured at each end in such a manner as to prevent it from being accidentally pulled back into the duct.
- Plugs - All ducts, subducts, and innerducts, whether main or subsidiary runs, will be plugged using universal duct plugs in maintenance holes, hand holes and building entrances. Foam sealant is not acceptable in a building.
- Duct Seals - The area between the entrance conduits and the penetrated floors and/or walls of a building or maintenance hole will be sealed to be waterproof or fire-stopped as appropriate. Use of hydraulic cement between the duct and wall is acceptable for waterproofing the duct entry point.
- For road crossings not using

5. CONDUIT ROAD CROSSINGS:

- For road crossings not using not using the cut and restore method, RSC or steel pipe casings will be used as specified in the site-specific SOR/EDP. The RSC and steel casings will be placed under the highway in a manner that does not damage the conduit or casing.
- The contractor will use a steel casing, a minimum of 300-mm (12-in) diameter with a minimum wall thickness of 5-mm (3/16-in), for pushing under commercial railroad crossings and for multiduct conduit runs under non-commercial railroad beds. The steel casing will have an inner diameter, a minimum of 100-mm (4-in) wider than the outer diameter of the conduit formation (with spacers) that is to be placed within the casing. A single 100-mm (4-in) diameter RSC can be installed under non-commercial railroad beds in single conduit applications. After the duct installation, the casing must be filled with fine sand (blown in with air pressure) or slurry and sealed on both ends with at least a 75-mm (3-in) thick concrete wall.

6. RODDING AND MANDRELLING DUCT:

Rodding a duct entails inserting or pushing a rod into the duct to:

- Determine the length of the duct
- Locate the other end of the duct
- Determine if the duct is usable or blocked
- Insert a pull string in the duct
- Mandrelling a duct consists of pulling a test mandrel or slug through the duct to insure that the duct diameter is intact and ready for the installation of cables. Mandrelling can also be used to clean any mud, sand, or dirt out of the duct. The mandrel's diameter, 13-mm (1/2-in) less than the duct's inside diameter, depends on the type and size of the ducts. New ducts in main and subsidiary duct runs will be mandrelled with a test mandrel (non-flexible) or slug that is approximately 300 mm (12 in) in length and 13 mm (1/2 in) less than the duct inside diameter. The test mandrel will be used to verify the integrity of the duct joints, to test for out-of-round duct, and to verify that sweeps are not so severe as to preclude the placement of large diameter cables. The 300-mm (12-in) test mandrel will not pass through ducts with 90-degree sweeps. A 150-mm (6-in) length test mandrel may be used to test duct runs to buildings or riser poles. Flexible mandrels, wire brushes, rubber duct swabs, leather washer duct cleaners, etc., may be used to clean the ducts.

7. DIRECTIONAL BORING:

Horizontal Directional Drilling (HDD) is a trenchless method for installing ducts for underground cable. Ducts are installed by drilling or boring a path through the soil and placing the ducts within this path. The vertical profile of the bore alignment is typically in the shape of an inverted arc.

- Ducts installed using the HDD method under roads will be deep enough to clear existing utilities and meet H-20 load ratings. The ducts placed by HDD will not directly enter a maintenance hole but will be attached to conduit stub-outs that extend a minimum of 3 m (10 ft) from the maintenance hole. The HDD may be done in areas approved by the U.S. Government or as stated in the site SOR/EDP. The maximum radius curvature of a bore is limited to the maximum conduit diameter times 30.5 m per 25 mm (100 ft per in).
- The HDD is a multi-stage process consisting of drilling a pilot bore along a predetermined path and then pulling the desired product back through the drilled space. When necessary, enlargement of the pilot bore hole is accomplished by back reaming. In order to minimize friction and provide a soil-stabilizing agent, a drilling fluid is introduced into the annular space created during the boring operation. The rotation of the bit in the soil wetted by the drilling fluid creates slurry. This slurry acts to stabilize the surrounding soil and prevents collapse of the borehole and loss of lubrication.
- In order to confine any free flowing slurry at the ground surface during pull back or drilling, sump areas will be created to contain any escaping slurry that might damage or be hazardous in surrounding areas. All residual slurry will be removed from the surface and the site restored to preconstruction conditions.
- A mixture of bentonite clay or other approved slurry and potable water will be used as the cutting and soil stabilization fluid. The viscosity will vary to best fit the soil conditions encountered. Water used will be clean and fresh, with a minimum of a 6-pH level. No other chemicals or polymer surfactant (surface-active substance) are to be used in the drilling fluid without the written consent of the U.S. Government and after a determination is made that the chemicals to be added are environmentally safe and not harmful or corrosive to the facility. When drilling in suspected contaminated ground, the drilling fluid will be tested for contamination and disposed of appropriately. Any excess material will be removed upon the completion of the bore.
- The contractor will provide a method of locating and tracking the drill head during the pilot bore and will ensure the proposed installation is installed as intended. All facilities will be installed in such a way that their location can be readily determined by electronic designation after installation. For nonconductive installations, this will be accomplished by attaching a continuous conductive material externally, internally, or integrally with the product. A copper wire line or a coated conductive tape may be used for this conductive material.
- Materials must meet or exceed EIA, TIA standards
- An HDD conduit will be placed with soil tight joints. Joints between dissimilar types of ducts (PVC, HDPE, GSP, EB, DB, etc.) will use the appropriate connectors to provide a seal between the ducts and to prevent damage to cables pulled through these joints.
- The site will be restored after installation of the conduit is complete. The work site will be cleaned of all excess slurry remaining on the ground. The contractor performing the boring is responsible for removal and final disposition of excess slurry or spoils as the conduit is introduced.
- The DOIMJDPW

8. OTHER CONSIDERATIONS:

- The DOIM/DPW may have special depth requirements for certain areas (i.e.,tank tracks, ranges, etc.), which will be provided in the site-specific SOR/EDP.

DOIM BUILDING REHABILITATION INSTRUCTIONS & CHECKLIST

Instructions

1. During building rehabilitation projects, the DPW COR is responsible for ensuring that the DOIM Plans Office is notified no later than two weeks prior to its start.

2. A time and date must be firmly established for the DPW COR to meet with the Plans Office Representative and conduct a review of all planned work to be accomplished.

3. The DPW COR will provide the DOIM Plans Office a copy of the work order - whether generated by the customer or DPW prior to approving the requested work.

4. For each Rehabilitation project, the DOIM Plans Office will complete a Building Rehabilitation Checklist, noting the date the DOIM was notified by DPW of planned project, the date that a site survey was conducted and the date that DPW provided a copy of the DPW work order.

5. The Plans officer must sign off that upon review of the work order, and/or following completion of the site survey, that either communications work is/is not required as part of the rehabilitation project.

6. If communications work will be necessary, the DOIM Plans Officer will initiate a TrackIt Project ticket. The Plans Officer shall annotate his understanding of the scope of the project on the first page of the ticket and the attach copies of the Building Rehabilitation Checklist, DPW Work Order, and DOIM SOR/BOM and/or Cost estimate.

7. The TrackIt Project ticket will be tasked to the DOIM Communications and VI Divisions for review and comment on all attached documents.

8. Communications and VI Division shall attach to the TrackIt Project Ticket, their written concurrence with, or comments requesting specific changes in, the SOR. Each Division will also annotate the actions taken in the body of the TrackIt ticket – annotations must include the initials of the action officer and the date the action was completed.

9. Once all internal DOIM reviews are complete the SOR and a copy of the building rehab checklist will be provided to the DPW COR, and the action annotated in the TrackIt Project Ticket, by the Plans Officer.

10. Prior to award of any contract containing communications work, the DOIM will be provide a copy of the proposed statement of work for review and concurrence.

11. Following award of any contract in which the DOIM has identified a requirement for communications work, the DPW COR, will provide the DOIM Operations section with a copy of the awarded statement of work specific to the communications work along with a copy of the construction schedule, and request that the DOIM identify a COTR and alternate COTR for the project.

12. The DOIM COTR will conduct inspections of all communications work during construction and prior to testing of the communications work. No trench or wall containing communication conduit,

wiring, fiber or equipment maybe filled or closed prior to inspection by, and the written approval of, the DOIM COTR.

13. The ISEC building checklist shall serve as the standard for all communications inspections, both inside plant and outside plant, for all communications work contracted out on Fort Benning and Camp Merrill.

14. The checklist shall be completed and signed by the DOIM COTR (or alternate) and a copy provided to the DPW COR and attached to the DOIM TrackIt Project Ticket.

15. Throughout the project the DPW COR shall coordinate any change in schedule or scope of work with the DOIM COTR. Written approval of any change in scope of work from the original contract or project plans must be approved in writing by the DOIM COTR prior to it being approved by Contracting. DOIM coordination and approval is required regardless of whether the COR or the KO thinks the change will impact the communications work or not.

16. A record of all requests for changes and the actions of the COTR in response to these requests shall be annotated on the main page of the DOIM TrackIt Project Ticket, and a copy of all documents received or sent by the COTR shall be attached to the ticket as well.

17. The DPW COR shall notify the DOIM COTR Not Less Than five working days prior to scheduling contractor testing, or the COR inspecting, any communications work that is conducted as part of the rehabilitation project. The DPW COR shall coordinate a mutually agreeable date and time for all such inspections/testing with the DOIM COTR, and a DOIM COTR must be present at all inspections/testing – unless approved in writing by the DOIM Chief of Operations.

18. Prior to inspection/testing, the contractor shall provide the DOIM with current as-built/redline drawings (i.e. one hard copy and one soft copy in AUTOCAD) showing all communications work that is to be inspected/tested. Drawings and files will be provided through the DPW COR to the DOIM COTR.

19. Following testing, the Contractor shall provide the DOIM COTR, through the DPW COR, a hard copy of all required test results.

20. The DOIM Communications Division shall review all test results, conduct validation testing as required, and then provide written comments as to the acceptability of the results to the DPW COR.

21. If the test results are not acceptable, the DOIM COTR will provide a list of detailed deficiencies to the DPW COR for conveyance to, and correction by, the contractor.

22. After correcting all deficiencies/discrepancies, the Contractor will provide to the DOIM, through the DPW COR, a written accounting of all actions taken to correct the deficiencies/discrepancies, and then coordinate a date for the DOIM to re-inspect the Contractor's work and observe a re-test.

23. Once the DOIM determines that there are no outstanding deficiencies/ discrepancies (i.e. all discrepancies have been corrected, satisfactorily re-tested, and validated in writing by the DOIM), the DOIM COTR will provide a signed Memorandum of acceptance to the DPW COR.

24. The DPW COR is not authorized to approve payment of any communications work on any rehabilitation project until having received a signed written Memorandum of Acceptance for that work from the DOIM.

25. Once all aspects of the communications work specified in the contract are satisfactorily completed, as indicated by the signed Memorandum of Acceptance from the DOIM, the contractor shall provide a copy of a contractor's written warranty to fix and or replace, at no cost to the government, all equipment installed by the contractor for a period of three years – or as specified in the equipment manufacture warranty. A copy of all manufacture's written warranties will accompany the Contractor's warranty.

Checklist

1. DPW COR_____

2. Project Name_____

3. Project description_____

_____

_____

4. Date of Site Survey_____

5. Copy of Work Order received date_____

6. Communications (circle one) will be affected/will not be affected.

Signature of DOIM Rep_____

7. Copy of signed Checklist provided to DPW COR
   Date provided_____

8. Notification of Start of Work received by DOIM Rep from DPW COR (must be a minimum of five working days or as specified in the SOR
   Date of Start of Work_____Date Received_____

9. Copy of Contractor work schedule provided to DOIM Rep
   Date_____

10. Dates work inspected by DOIM Rep_____, _____, _____. _____, _____, _____, _____

11. Inspection Checklist/s (ISEC) completed by DOIM Rep Name_____
    Checklist completed (ex Cabling, Duct) _____
    _____, _____
_____, _____

12. Deficiencies Found Yes_____No_____

13. List of deficiencies provided to DPW COR (Date)_____

14. Follow-up inspection—(minimum three days notice) (Date)_____

15. Deficiencies Found Yes_____No_____

16. Inspection Checklist annotated--Corrected
    Yes____No____Date_____

17. Date of cable and/or fiber testing provided by DPW COR
    Date_____

18. DOIM Rep who witnessed testing—
    Name_____Date_____

19. Test Results provided to DOIM Rep
    Date_____

20. Test Results Reviewed by DOIM Rep
    Name_____Date_____

21. Tests results pass_____fail_____
    Name of DOIM Rep_____

22. DPW COR notified of failing test results
    Date:_____Name of DOIM Rep_____

23. DPW COR notification of corrective actions completed and new test results provided to DOIM Rep
    Date_____

24. New Test Results Reviewed by DOIM Rep
    Date_____Pass_____Fail_____
    DOIM Rep Name_____

25. As-built drawings (one soft copy and one hard copy) provided to DOIM Rep in AUTOCAD (Date Received)_____
    DOIM Rep Name_____

26. Signed Copy of Checklist Provided to DPW COR
    Date_____
    DOIM Rep Name_____
    DPW COR Name_____

Links
Go to Appendix S
Go to Table of Contents

Appendix S – Example Specifications

There are several items that are standardized according to the installations while other items are standardized according to UFGS specifications. UFGS specifications are continually revised, and the updates are available online at the Whole Building Design Guide website: http://www.wbdg.org/ccb/ccb.php. All specifications should be in accordance with both the installations and the most recent UFGS updates.

Per a December 2004 Memorandum, electronic key card access is an Army Standard for all buildings. The standard was effective immediately and must be applied to new building construction and major renovations on all Army installations.

Items standardized specifically to the installations include:

- The use of Best brand cylinders and locks.
- Fire detection systems. Fire detection systems should include a direct digital panel with programmed heads that are compatible with the system of the fire department, which is a Monoco Wireless Transfer System
- Heat and smoke detectors
- Fire sprinklers spec
- Fire doors and hold open devices
- Exit signs
- Elevators
- HVAC equipment
- Toilet accessories
- Drawings

The Tri-service spatial data standards codify naming for drawings. Drawings are 36” x 24” in Microstation. All drawings are converted to TIF format for storage.

Links

Go to Appendix A

Go to Table of Contents