Fort Bragg
Installation Design Guide

March 2009

Word copy of Web version made on 19 September 2016.
No reply comments and suggestions may be sent to:
john.j.rose.civ@mail.mil Reference line must start with IDG.
Updated version in progress.

Welcome to the Installation Design Guide for a Sustainable Fort Bragg, a resource for design professionals.

This document contains the complete content of the IDG in WORD format. **There are no links internal or to the Web in this Word document**

Navigate to any section of the IDG using the table of contents, or proceed directly to Chapter 1, Design and Development Principles, Chapter II, Implementation, or Section III, Guide Specifications including MILCON Transformation RFP.

Specific topics can be located using either the alphabetical index or the site map

Maps are available for each of Fort Bragg's visual districts.

The four approved colorways (Khaki, Neutral Almond, Warm Gray and Blue Gray) provide detailed specifications for interior materials and finishes at the LAST PAGE

The United States Green Building Council (USGBC) provides detailed information on LEED standards and credits.

Further assistance may be obtained by contacting the Directorate of Public Works.

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Fort Bragg Design and Development Principles

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1. Introduction

Fort Bragg is a Total Army Community that supports its Mission and the soldiers, families, civilians, and retirees who are dependent upon the installation. This support must be provided in an efficient, pleasant, and sustainable physical environment that is conducive to attracting, retaining, and motivating personnel.

The Installation Design Guide for a Sustainable Fort Bragg (IDG) provides a guide for design and development decisions that will enhance the physical environment. The IDG includes the methodology to improve physical assets, and promote visual order and sustainability for the long term future of the installation.

2. Sustainability

This IDG for a Sustainable Fort Bragg integrates visual and design quality with quality of life, environmental performance, and economic return. This IDG is unique in the incorporation of design and visual quality as an integral part of sustainability.

Sustainability at Fort Bragg is defined as the conducting of operations and missions today in a manner that will not prevent or preclude the ability to conduct necessary operations and missions in the future, and will not affect the ability of surrounding communities to be healthy places to live and work. This IDG embraces sustainability as its primary concern.

Sustainability Integrates Design Quality, of Life, Environmental Quality, and Economic Return

3. LEED

The U.S. Army has adopted the Leadership in Energy and Environmental Design (LEED) standards for the purpose of promoting sustainability in the design and development process. All plans for new Army facilities must be evaluated and scored using the LEED-NC (New Construction) credit system.

Because of the relationship of design and sustainability, the format of the IDG is designed to replicate the LEED format. The IDG defines the LEED guidelines and provides recommendations to achieve the sustainable goals of LEED in a functional, visually, and spatially attractive environment. LEED defines achievement goals in levels defined as: Certified, Silver, Gold, and Platinum.

4. IDG Approach

The process of reviewing and defining the visual quality of a military installation requires a basic understanding of the principles of design. This IDG defines the design principles and illustrates how they interact to establish the design image in sustainable context.

The IDG defines the design image according to visual and environmental assets and liabilities. Assets are desirable visual features that should be preserved and enhanced. Liabilities are elements that detract from the visual image and should be eliminated.

5. IDG Organization

Sustainability Includes Maintenance of Visual Order

The Installation Design Guide for a Sustainable Fort Bragg consists of three parts. Chapter I, Fort Bragg Design and Development Principles, includes installation background information, design goals, design principles, and a visual survey and analysis of the installation.

Chapter II, Implementation of Fort Bragg Principles, defines the design and development implementation process utilizing the LEED categories. These categories include: Site Development; Water; Energy; Materials; Indoor Environmental Quality; and Innovation and Design.

Chapter III includes Fort Bragg Guide Specifications and graphics that supplement and enhance the U.S. Army Corps of Engineers Guide Specifications and must be followed in construction at Fort Bragg.

6. Sustainable Design Goals

The primary goal of this IDG is the provision of standards, approach, and maintenance of visual, spatial, and environmental considerations that form an attractive, sustainable installation. Fort Bragg has adopted a series of goals for the future that are directed toward achieving a Platinum LEED rating by 2020.

The goals for a sustainable Fort Bragg are grounded in the design history of the installation which incorporates Beaux-Arts design principles. It is recommended that Fort Bragg return to its Beaux-Arts design roots. All new development should be based upon the campus design principles of the original installation - The Old Post Historic District.

Historic Main Post Chapel is a Visual Asset to be Preserved & Enhanced

7. Visual Survey and Analysis

A detailed visual inventory was conducted to identify the visual components at Fort Bragg. The inventory included visual analysis, data collection, and interviews. It was conducted at a post-wide level and for the 11 image districts that have been identified within the post. Image districts are identified by their architecture and predominant visual impact.

8. Implementation of Sustainable Design Principles

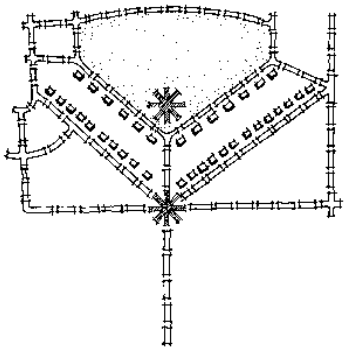
The implementation of sustainable design principles is organized to comply with LEED. LEED provides six categories that are incorporated into the Fort Bragg IDG.

8.1 Site Development

Site development includes site planning, roads and paths, parking, landscape, signage, site furnishings, lighting, utilities, and security.

8.1.1 Site Planning

Design Goals Preserve Visual Assets



Site Plans for Fort Bragg Should Incorporate the Campus Community Design Theme

Site planning is a primary consideration in achieving sustainable development. The site plan defines the areas to be developed and determines environmental and spatial relationships. The site planning process must include consideration for the installation mission and its impact on the environmental, ecological, physical and visual character. Site plans for the future of Fort Bragg should include the campus community design theme.

8.1.2 Roads and Paths

A Sustainable Circulation System Addresses Vehicles, Pedestrians, & Bicycles

Vehicular, pedestrian, and bicycle corridors form the circulation system that provides for the organized movement of people and materiel throughout the installation. The circulation system also provides the primary vantage points for viewing the installation and has a significant impact on the overall visual image.

A sustainable circulation system includes a safe, attractive, and comfortable hierarchy of walkways, bikeways, and mass transit that provide an alternative to the automobile and reduce air pollution.

8.1.3 Parking

There is extensive area utilized for parking at Fort Bragg. These parking areas are large, unattractive expanses of open pavement. There must be a conscious effort made to soften the inherent harshness and minimize the negative visual impact of parking lots, and to provide alternative pedestrian, bicycle and mass transit systems to reduce dependence on the automobile.

Site Plans for Fort Bragg Should Incorporate the Campus Community Design Theme

8.1.4 Landscaping

Landscaping plays a dominant role in the visual and environmental quality of an installation. Fort Bragg should commit to an ongoing program of plant installation and maintenance to create environmental sustainability. The use of native trees, shrubs, and groundcover is recommended because they require less water, fertilizer, and maintenance.

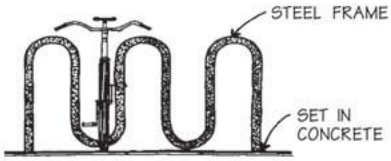
8.1.5 Signage

Signs are used to visually communicate information. They are highly visible features and should be designed and located to be attractive and harmonious parts of the visual environment. The creation of a coordinated signage system will enhance Fort Bragg's visual image and improve the circulation efficiency. The use of recycled materials for signage enhances sustainability.

8.1.6 Site Furnishings

Design & Locate Signs to be Visually Attractive

Site furnishings include utilitarian outdoor amenities such as benches, trash receptacles, fences, and bus shelters, as well as symbolic features, such as flagpoles, memorials, and static military displays. Site furnishings should be convenient, comfortable, and safe to use. They should fulfill their intended functions while contributing to the installation's visual

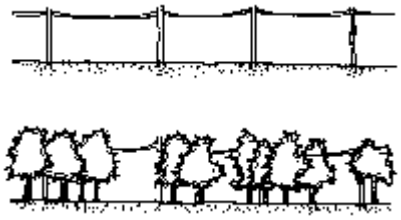


Bicycle Rack is a Site Furnishing

quality. Consistent use of a visually unified site furnishing system will enhance visual continuity. The use of recycled materials for site furnishings enhances sustainability.

8.1.7 Lighting And Utilities

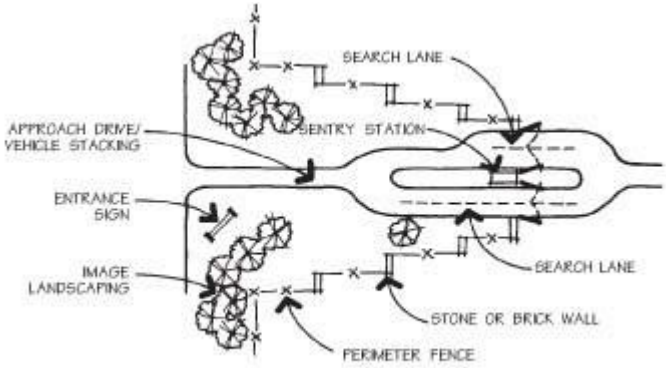
External lighting, utility structures, overhead wires, drainage and sewer systems, and their structural requirements have a significant visual impact. The visual appearance of these utility systems can be improved through appropriate location, screening and detailing of utility structures. High efficiency lighting, light sensors, and placement of utilities underground enhance sustainability.



Landscaping will Soften the Impact of Overhead Utility Lines

8.1.8 Security

Military installations have become targets for acts of terrorism and violence. As a result, all installations are required to incorporate DoD Force Protection Antiterrorism Construction Standards Guidance in all development. At Fort Bragg, design solutions to meet antiterrorism, force protection (AT/FP) requirements should be conceived to convey a positive public image.



Layout Showing Typical Entrance Sequence for Access Control Points

8.2 Water

The availability of potable and non-potable water at Fort Bragg is a primary issue for the future of the installation. Design for development sustainability must incorporate consideration for limiting water requirements and preserving water supply. The use of native plants in landscaping reduces irrigation requirements. If some irrigation is necessary, high efficiency irrigation systems greatly reduce water consumption. Surface water retention ponds can be included to reduce flooding, and to hold water on-site to be utilized as an irrigation source. Gray water can be used for irrigation, and to flush toilets.

Waterless urinals and low-flow toilets and showers reduce the use of water. Also, new technology in the use of recycled rainwater and treated effluent may offer water saving alternatives in the future.

8.3 Energy

The management of energy source is a design concern for the future. Concerns for energy are inherent in the orientation of buildings to take advantage of breezes and reduce heat generation in summer. The selection and placement of deciduous trees can provide cooling shade in summer while allowing sun to warm the building in winter.

High efficiency systems that require less energy to operate should be incorporated in lighting, HVAC, and other systems. Buildings should meet high standard, measurable goals for energy management.

Proper Placement of Buildings and Trees Reduce Energy Demands

8.4 Architecture

The architectural character of buildings and structures determines the primary visual image at Fort Bragg. An architectural design theme is recommended to create a consistent, sustainable architectural environment. This theme includes the use of similar materials and design details.

Proper Placement of Buildings and Trees Reduce Energy Demands

Design details of buildings include exterior materials, windows, roof design and finish, overhangs, columns, trim detail, and other appurtenances. Repetition of dominant details that presently exist at Fort Bragg will unify new and remodeled construction with the predominant architecture.

8.5 Interior Architecture

The IDG includes a comprehensive and cohesive manual to assist in the design, renovation, and maintenance of the interiors for 11 building types. The goal is to establish interiors that are designed to include sustainable and durable materials that are visually cohesive, and create a pleasant interior environment.

8.6 Facility Delivery Process

The process by which a facility is designed and constructed is a significant sustainability concern. Buildings should be designed meet the requirements of the user, but also to be flexible to meet the ever changing spatial requirements of the military. The facility design and construction process should incorporate all users to insure that the facility meets all functional requirements, mission requirements and sustainability economic and environmental concerns.

8.7 Operation and Sustainment

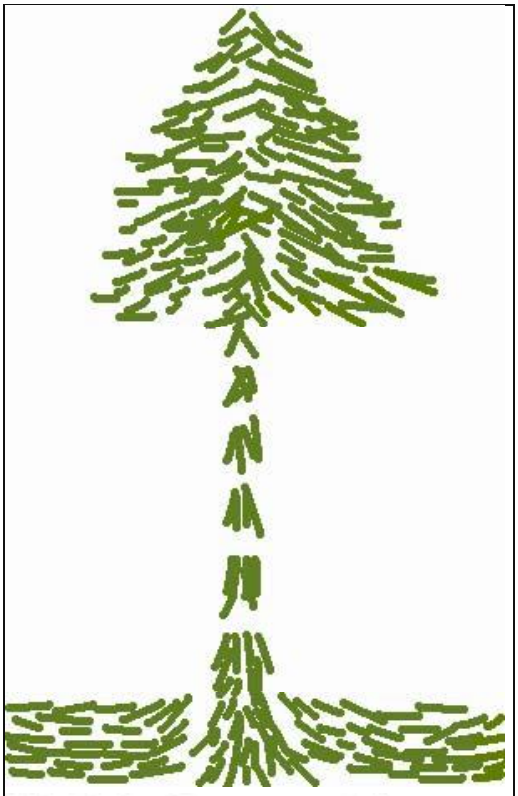
All facilities must be efficient to operate and maintain, safe and desirable to occupy, optimize the infrastructure, and be responsive to change.

8.8 Extended Functional Life and Adaptation

All facilities must be designed and constructed to provide flexibility for uses other than those it is designed to incorporate. The facilities maximize flexibility while minimizing wasted space.

1.1 Introduction

1.1.1 Purpose and Goals



The Design Tree represents the never ending recycling required for a sustainable Fort Bragg.

Military installations must provide an efficient and pleasant physical environment conducive to attracting and retaining skilled and motivated personnel. The Installation Design Guide for a Sustainable Fort Bragg (IDG) provides a guide for design and development decisions that will enhance the physical environment and sustainability of the installation. The IDG includes methodology that promotes spatial and visual order, consistent architectural character, and development sustainability.

Sustainability has been defined by Fort Bragg as the conducting of operations and missions today in a manner that will not prevent or preclude the ability to conduct necessary operations and missions in the future, and will not affect the ability of surrounding communities to be healthy places to live and work.

The primary purpose of the IDG is to establish an appropriate theme that promotes sustainable, efficient, orderly, and aesthetic development without jeopardizing the historic fabric of Fort Bragg. To establish the theme, design and sustainability goals have been established (See 1.3 Design Goals). The goals aim to improve Fort Bragg's visual and environmental assets and minimize visual and environmental liabilities, while enhancing the ability of the installation to continue to perform into the future.

Assets are visual or natural elements or features that enhance the image, environmental quality, or sustainability of the installation. They should be preserved, enhanced, replicated, and incorporated into the installation, wherever practicable.

Liabilities are elements or features that detract from the visual image, environmental quality, or sustainability of the installation. Liabilities should be identified so that they can be eliminated and avoided in future development.

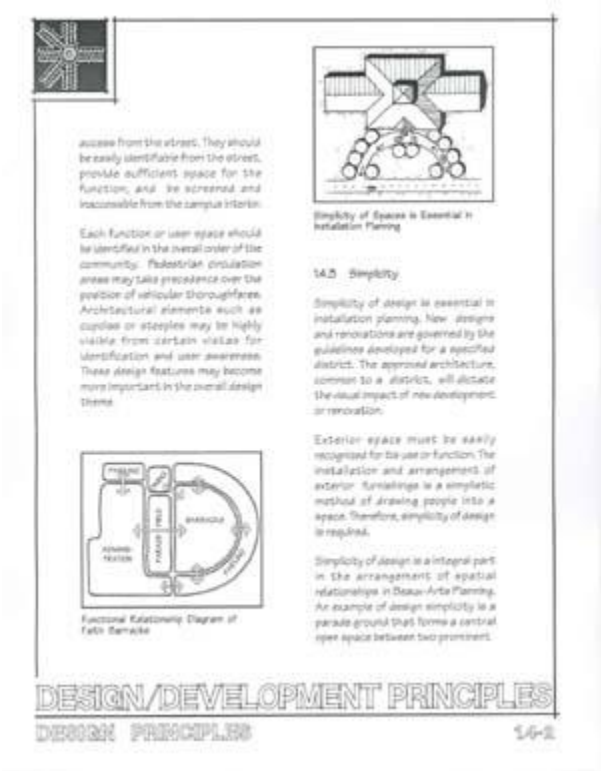
The process of identifying assets and liabilities is achieved by defining the elements that combine to form sustainable design and development. The visual elements include site planning, architecture, interior architecture, roads and paths, parking, landscape, signage, site furnishings, lighting, utilities, and security. Integral to these elements are the use of water and energy as well as design, development, and maintenance procedures.

The design guidelines provide background and recommendations for all of the installation elements that should be incorporated into all new construction, additions, or renovations.

1.1.2 Guideline Use

The Installation Design Guide for a Sustainable Fort Bragg (IDG) consists of three parts:

- Chapter I, Fort Bragg Design and Development Principles;
- Chapter II, Implementation of Fort Bragg Principles; and
- Chapter III, Fort Bragg Guide Specifications and Fort Bragg Specific MILCON Transformation RFP (TRFP) Requirements.


access from the street. They should be easily identifiable from the street, provide sufficient space for the function, and be screened and inaccessible from the campus interior.

Each function or user space should be identified in the overall order of the community. Pedestrian circulation areas may take precedence over the position of vehicular thoroughfares. Architectural elements such as cupolas or steeples may be highly visible from certain vistas for identification and user awareness. These design features may become more important in the overall design theme.

Simplicity of Spaces is Essential in Installation Planning

14.5 Simplicity

Simplicity of design is essential in installation planning. New designs and renovations are governed by the guidelines developed for a specified district. The approved architecture, common to a district, will dictate the visual impact of new development or renovation.

Exterior space must be easily recognized for its use or function. The installation and arrangement of exterior furnishings is a simplistic method of drawing people into a space. Therefore, simplicity of design is required.

Simplicity of design is a integral part in the arrangement of spatial relationships in Beaux-Arts Planning. An example of design simplicity is a parade ground that forms a central open space between two prominent

Functional Relationship Diagram of Fatih Barracks

DESIGN/DEVELOPMENT PRINCIPLES

DESIGN PRINCIPLES 14-1

The Installation Design Guide for a Sustainable Fort Bragg (IDG) consists of three parts:

The effectiveness of this IDG will depend on a clear understanding of the intent and consistent application of the design and development standards by installation personnel. The document encourages the user to look at each proposed project in the context of sustainability, site considerations, visual theme, and specific design criteria for each design element.

Once a project has been identified, the project manager should determine the visual district in which it is located, then copy the appropriate design guidelines package from Chapters I, II, and III to create a Design Guideline Package for the project designers. A Design Guideline Package should include:

- Background information
- Appropriate post-wide design guidelines
- District-specific guidelines pertaining to project location
- Fort Bragg specific design standards and specifications

This IDG should be used in conjunction with existing technical manuals, Army regulations, and LEED guidelines when formulating the scope-of-work for a project.

1.2 Installation Profile

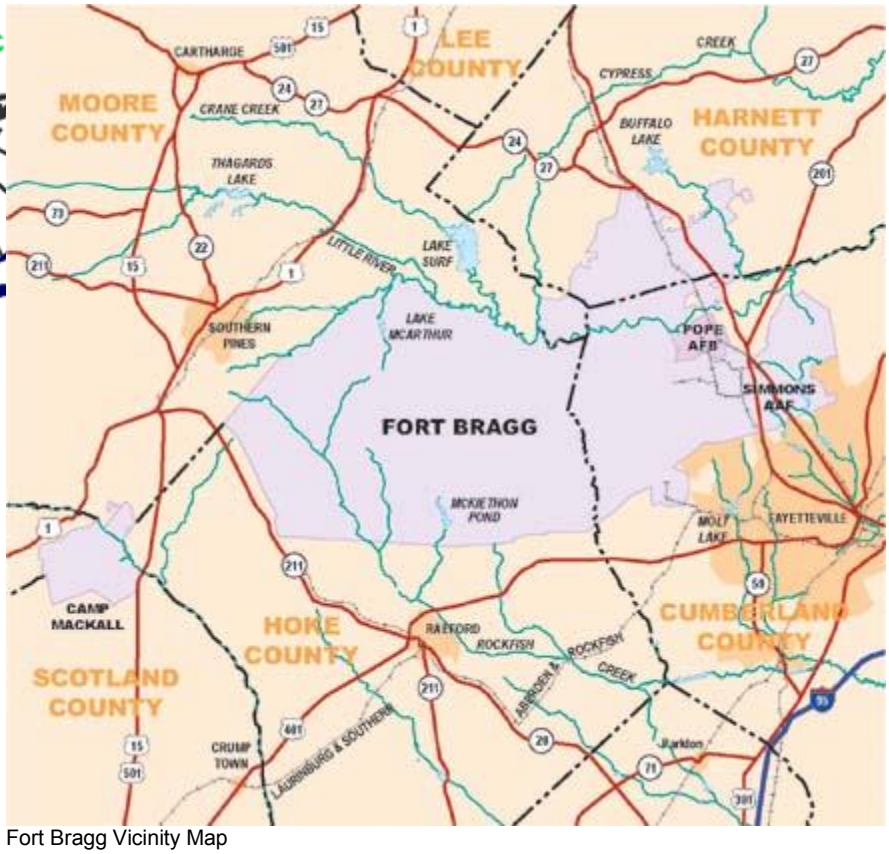
1.2.1 Mission

Retreat Ceremony at Main Post Parade Field

Today, as "Home of the Airborne", Fort Bragg must provide the resources for the training and rapid deployment of a significant military contingent. The primary mission involves the training, logistical, installation operations, and mobilization support of the XVIII Airborne Corps, U.S. Army Special Operations Command (USASOC), and other major tenant organizations such as the Joint Special Operations Command (JSOC), U.S. Army Operational Test Command, Airborne and Special Operations Test Directorate. Fort Bragg has a rich history and a strong vision for today and the future. It is firmly rooted in some of the Army's greatest traditions, the XVIII Airborne Corps and the Special Forces (Green Berets). It is the dedication of these forces which help make Fort Bragg one of the premier installations in the Army.

1.2.2 Location

Fort Bragg Location Map



Fort Bragg Vicinity Map

The Fort Bragg military installation is located ten miles northwest of downtown Fayetteville, North Carolina, in the south central portion of the state. Fort Bragg proper stretches into four counties: Cumberland, Hoke, Moore, and Harnett. The installation occupies an irregularly-shaped parcel of land covering 152,843 acres. The cantonment area, approximately 11,520 acres in size, is located in Cumberland County. The range and training areas are primarily in Hoke, Moore, and Harnett counties. Fort Bragg is situated within the Sandhills region of North Carolina. Major regional landmarks include: Cape Fear River (six miles to the east); Interstate 95 (12 miles to the east); and Pinehurst Golf Course (28 miles to the west).

1.2.3 Cultural Resources

Historic Main Post Chapel

Fort Bragg has a rich military history dating back to the Revolutionary War. At that time, the area in and around what is now Fort Bragg was a center of wartime activity. During the Civil War, the Fort Bragg vicinity was the scene of an engagement between Union and Confederate forces.

Officer Housing at Main Post

Camp Bragg was established as an Army Installation in 1918, and named for Braxton Bragg, a North Carolina native and general in the Confederate Army. The installation area included 120,200 acres to be used as a field artillery training camp.

In 1922, Camp Bragg officially became Fort Bragg. During World War II, Fort Bragg became the site for the Airborne ground forces and home of the 82nd Airborne Division. Today, as home of the Airborne and Special Operations forces, Fort Bragg supports the mission of the XVIII Airborne Corps, the U.S. Army Special Operations Command, and the All-American Division - the 82nd - to deploy by air to anywhere in the world.

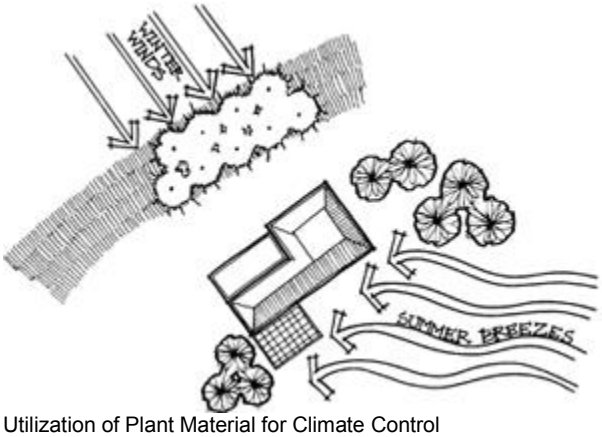
Longstreet Church - 1847

Fort Bragg has a wealth of cultural resources. It has established a Cultural Resources Program (CRP) that supports the installation mission to facilitate the continued readiness training of the XVIII Airborne Corps while implementing the Integrated Cultural Resources Management Plan (ICRMP) (See www.bragg.army.mil/culturalresources/icrmp.htm).

The ICRMP establishes the programs and procedures that apply to renovations of historic structures and new construction near or within designated historic districts and buildings . The Old Post Historic District, Water Plant, Sandy Grove Church, Longstreet Church, Overhills Historic District, and various cemeteries are examples of resources addressed in the ICRMP.

1.2.4 Climate

The climate for Fort Bragg is humid and subtropical, characterized by hot summers and mild winters. Snow and sleet occur infrequently. Rainfall is evenly scattered throughout the seasons, averaging 43 inches annually. Of this, 60 percent usually falls between April and September, the growing season for most crops. July and August have the highest rainfall totals, while October and November have the least.



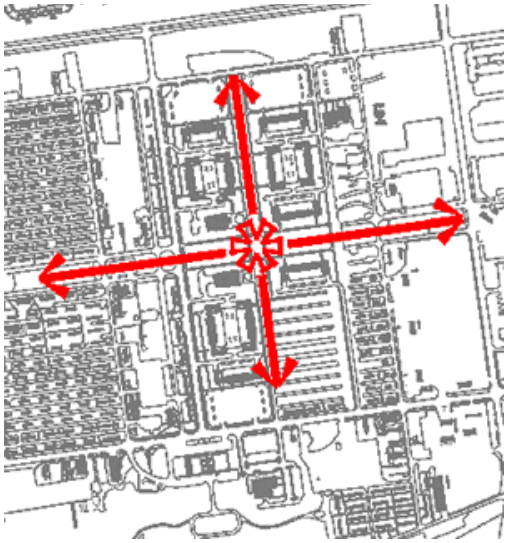
Utilization of Plant Material for Climate Control

The range between extremes of temperature is reported to be less than that recorded for most places on the Inner Coastal Plain. The mean daily maximum temperature is 73.4 degrees Fahrenheit (ºF) and the mean daily minimum temperature is

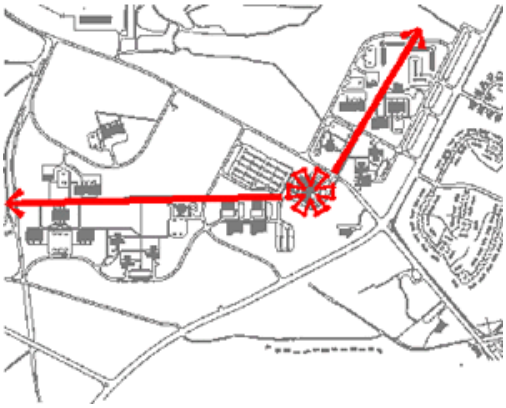
48.8ºF. The record high temperature at Fayetteville is 105ºF. Average daily humidity varies from 85 percent at sunrise to 45 percent by early afternoon. Prevailing winds are from the north except during October and November, when the wind is more from the south. It is this climate that helps make Fort Bragg a superb year-round training location.

1.2.5 Beaux-Arts Planning

Site planning in the Old Post is characterized by the rigid and formal geometry of the Beaux-Arts school which influenced military site planning in the late nineteenth and early twentieth centuries. Beaux-Arts principles are best displayed in "campus planning." This practice is based in the analogy of the art of landscaping and the science of city planning. Spaces are organized into patterns with buildings formally arranged around a quadrangle or central mall. Diagonal roadways are characteristic, with visual axes utilized to accentuate and enframe views. Monumental elements are often sited to create a visual terminus. A well known example of Beaux-Arts planning is the mall at Washington, D.C.



The Open Space Axis of the East Post



Pedestrian Walks Form an Axis in the South District

The Multiple Axis in the Old Post District

1.2.6 Sustainable Design

Global natural resources are being depleted. Human beings are dependent upon natural resources to sustain their lives. Therefore, natural resources must be preserved and perpetuated if humans are to sustain themselves indefinitely. The approach to this concern for preservation is defined as sustainability. The objectives of sustainability are to:

- Reduce the consumption of energy, land, materials, water, and other nonrenewable resources
- Minimize the waste of energy, land, materials, water, and other limited resources
- Protect the natural environment that is the source of all resources
- Create livable, healthy, and fiscally productive environments for existing and future generations

To achieve sustainability, the design and development process must adopt a mind-set that embraces a less-consumptive life style. The process must recognize the impact of design decisions on natural and cultural resources, and on local, regional, and global environments.

1.2.7 LEED

The Army promotes sustainability in the design and development process. Leadership in Energy and Environmental Design (LEED) was developed by the United States Green Building Council

(USGBC) as a series of criteria to define and measure "green buildings" (For more information on LEED, See http://www.usgbc.org). LEED includes the following six categories:

- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation and Design Process

LEED has rating criteria for several categories: NC-New Construction, EB-Existing Buildings, and CI-Commercial Interiors. All plans for new government facilities are evaluated according to the LEED-NC checklist. Points are achieved based upon the sustainability issues addressed in the design. The design is certified based upon the following certification levels:

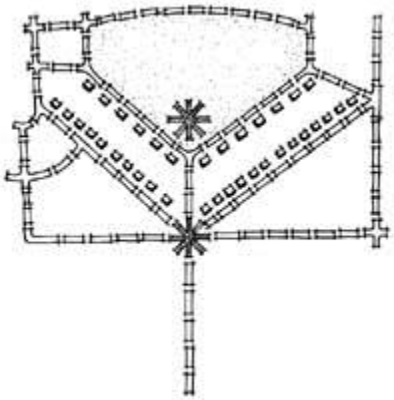
- LEED-NC Certified 26 to 32 Points
- LEED-NC Silver 33 to 38 Points
- LEED-NC Gold 39 to 51 Points
- LEED-NC Platinum 52 to 69 Points

Fort Bragg has been at the forefront of the effort to include sustainability in design and development processes. The "Fort Bragg Executive Sustainability Conference" was held in 2001 to define sustainability at the installation. The sustainability goal for new construction is LEED-NC Silver under current Army policy, a LEED-NC Gold rating by 2015 and a Platinum rating by 2020. The Sustainable Fort Bragg Web Page (www.bragg.army.mil/sustainability/default) includes a list of long-term goals for sustainability.

Chapter II of this Installation Design Guide provides Fort Bragg's approach to promoting sustainability through the coordination of installation design with LEED.

1.3 Design Goals

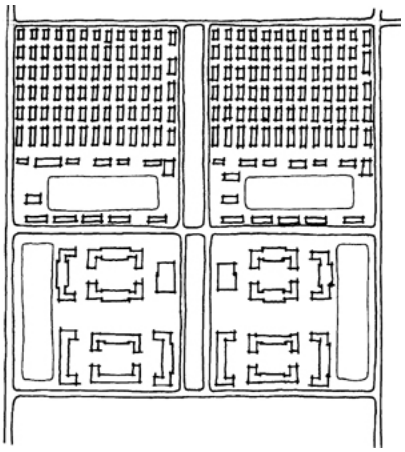
1.3.1 Design for Sustainability



Beaux-Arts Principles Include Diagonal Roadways, Central Mall and Visual Axes

Sustainability in the design and development process includes simultaneous concern for economic success, environmental quality, and quality of life. Design for sustainability must include goals to achieve these concerns.

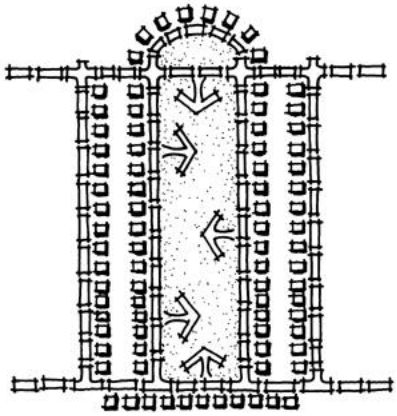
Fort Bragg has defined sustainability, and has adopted a series of goals for sustainability that are included on the Sustainable Fort Bragg Web Site (www.bragg.army.mil/sustainability/goals.htm). These goals are directed toward the achievement of a LEED-NC Silver rating under



Gridiron Circulation and Checkerboard Development Characteristic of World War II Construction

current Army policy, a LEED-NC Gold rating by 2015 and a Platinum rating by 2020.

1.3.2 Design History



Housing At Bastogne Gables is Sited Around A Central Mall

At Fort Bragg, there is a tradition of excellence that is reflected in the design of the installation. Much of the early post development followed the design principles and philosophy of the Beaux-Arts School. The Beaux-Arts design principles are based upon a rigid and formal geometry balanced with landscaping. These the principles are most evident at Fort Bragg in the campus planning of the Old Post Historic District. The area includes the design concepts of symmetry, organized spatial patterns, buildings formally arranged around quadrangles or central malls, and diagonal roadways that create axes or visual lines of sight are found throughout the district.

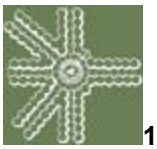
In the years following World War II, site planning on the installation was characterized by a grid system of blocks and circulation with repetitive, checkerboard construction that was intended to be temporary. Much of this development still exists and constitutes visual and spatial liabilities. Examples of these liabilities have been identified in all eleven (11) image districts at Fort Bragg.

Faith Barracks Incorporates Beaux-Arts Design Principles.

1.3.3 Approach to Sustainability

As World War II structures are replaced with new facilities, it is recommended that Fort Bragg return to its Beaux-Arts design roots. Sustainable new development should be based upon the campus design principles of the original development. This campus planning is exemplified in the design of Faith Barracks, and should be incorporated into all of the image districts to create a series of compatible campus communities throughout the installation.

The goals for sustainability that Fort Bragg has developed set the standard for the quality and sustainability of design for the installation. This IDG for a Sustainable Fort Bragg provides an approach to achieving design continuity and spatial relationships that help achieve sustainability.



1.4 Design Principles

There are fundamental principles of design that provide the framework for sustainable, sound, safe and visually and spatially attractive development. Sustainability is not going to be achieved without a joint effort on the part of the military and civilians at Fort Bragg. The commitment to the Post needs to be so strong as to refer to Bragg as home. The design of facilities inside and out must be done in a way that is personal and inviting - what we call “human scale”.

The design principles are to be used throughout the installation because of their association with human scale that creates a sense of ownership. Ownership and sense of belonging is the foundation upon which the residents will ultimately support our sustainable installation.

The principles require the designer to reflect the existing Bragg architecture and built environment. They are applicable to every building, group of buildings and details of buildings and spaces around

buildings. Buildings are tied to one another (by matching roof slopes, colors, materials, style of building and detailing). Spaces between and around buildings are made positive (by treating these outdoor spaces as if they had walls with thought being given to making the space a place worth spending time in or accentuating the function as a transition space). Further, the spaces between buildings form links between buildings, e.g., the design of the pedestrian paths related to the human in terms of width, material and visual texture. The combined effect of considering the scale of the outdoor spaces with the size of buildings leads the designer to select a hierarchy of details reflecting the importance of structures and spaces.

These Principles along with the Predominant Materials and Colors give the more creative designers a frame of reference and a well defined kit of parts as a basis of design.

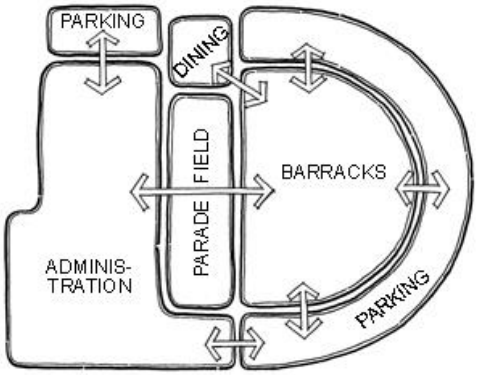
1.4.1 Unity

Common architectural elements of design such as color, texture, roof lines and detailing create unity within a district. These design elements complement and work in harmony with one another to establish a visually compatible and integrated environment. The creation of a unifying design is a key element in the establishment and maintenance of individual identities for post-wide visual districts.

Repetitive Architectural Forms Create Unit in a Design

1.4.2 Function

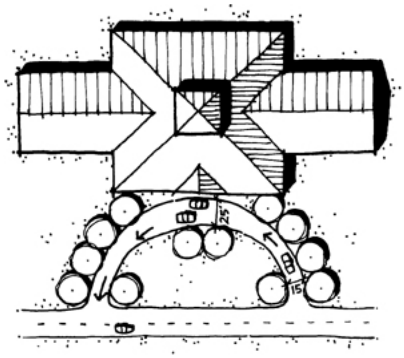
The functions of closely related military operations should be located adjacent to one another. This type of design produces a campus setting and provides an efficient and sustainable means of moving between functional areas without the use of vehicles. Access to roadside building entrances should accommodate pedestrian and automobile traffic safely. Sidewalks should accommodate pedestrians moving between parking and the interior campus. Service areas should provide for safe and immediate access from the street. They should be easily identifiable from the street, provide sufficient space for the function, and be screened and inaccessible from the campus interior.



Functional Relationship Diagram of Faith Barracks

Each function or user space should be identified in the overall order of the community. Pedestrian circulation areas may take precedence over the position of vehicular thoroughfares. Architectural elements such as cupolas or steeples may be highly visible from certain vistas for identification and user awareness. These design features may become more important in the overall design theme.

1.4.3 Simplicity

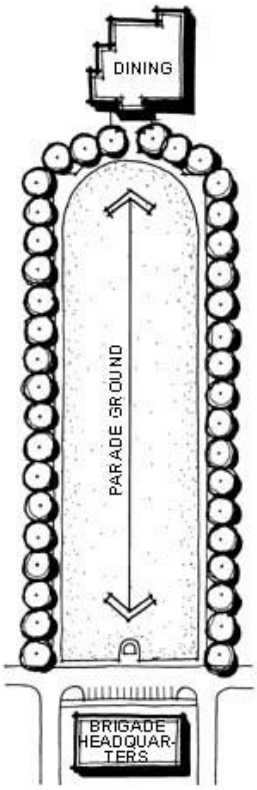


Simplicity of Spaces is Essential in Installation Planning

Simplicity of design is essential in installation planning. New designs and renovations are governed by the guidelines developed for a specified district. The approved architecture, common to a district, will dictate the visual impact of new development or renovation.

Exterior space must be easily recognized for its use or function. The installation and arrangement of exterior furnishings is a simplistic method of drawing people into a space. Therefore, simplicity of design is required.

Simplicity of design is a integral part in the arrangement of spatial relationships in Beaux-Arts Planning. An example of design simplicity is a parade ground that forms a central open space between two prominent



Simplicity of Design is Strengthened by Perimeter Tree Plantings

1.4.4 Scale

Scale is one of the most important design principles. The scale of spaces and buildings establishes a hierarchy of function within an installation. Larger scale buildings typically house important functions. The scale of these buildings identify them as centers of activity. The recognition of these centers of activity provides orientation for personnel and visitors.

Scale is commonly perceived in two different ways - Pedestrian and Vehicular. Pedestrian scale elements differ from vehicular scale elements. A pedestrian on a sidewalk will only require a small sign to direct him to his destination. This sign may be more detailed and embellished. A driver traveling at 30 miles per hour will require a larger, simple sign. In this case, the driver has a short time span to see the sign and make a decision. Scale, therefore, plays an important role in his safety.

Scale Creates a Sense of Proportion for the User

1.4.5 Vista

A vista is a confined view, usually toward a terminal or dominant element. Each vista has a viewing station, an object to be seen (usually architectural in nature), and an intermediate ground plane. The tree-lined street connecting the flag plaza and “Iron Mike” is an excellent example of a vista found within the Old Post Historic District. Future site planning at Fort Bragg should include vistas into new or existing development.

Tree-Lined Walkway

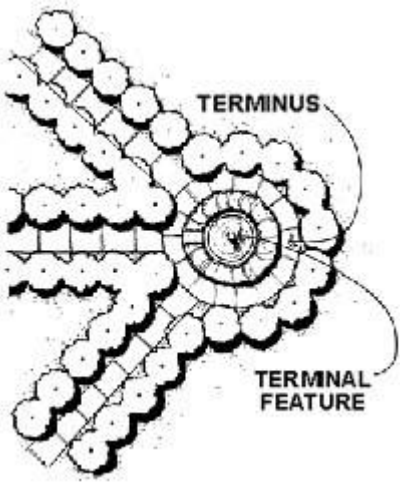
1.4.6 Enframement

A vista has a singular view bounded by three planes of enframement: the ground plane, side vertical planes, and overhead plane. These planes may be natural, architectural, or a combination of both. New or existing structures, sited in areas devoid of landscaping, would benefit from the addition of enframing elements. Trees and shrubs serve to enframe, soften, and provide a backdrop to accentuate the architecture.

The Building is a terminal feature and is Enframed and Accentuated by the Tree-Lined Street

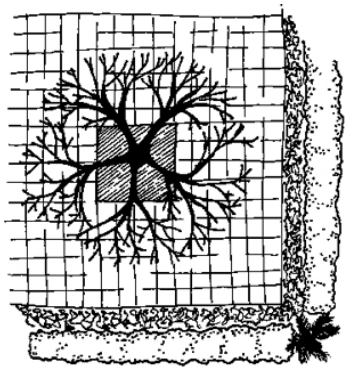
1.4.7 Terminus

A terminus is a feature or space containing a focal element that stops the viewers gaze from moving beyond the element. A terminal feature may be a flag plaza, a monument, or significant piece of architecture. Plant material can serve to define and accentuate terminal features.



Monuments are Often Utilized as Terminal Features In Design

1.4.8 Color and Texture



Paving and Plant Material Provide a Variety of Color & Texture

Buildings, space and structures come to life with the application of colors and textures. An identity is formed and the foundation for further development is laid. Color and texture may be applied in many ways. It is important to follow district specific guidelines with regard to the application of these materials. A more coarse texture of material with the same color can actually change the hue of the color. Simple boldness of design depends on the degree of contrast between material colors and textures. Too many colors or textures can create ambiguity in the design and may result in an district color scheme that is not unified.

1.4.9 Hierarchy

A hierarchy of development provides a strong sense of orientation for the user. This design element formulates a relationship between user and functional identity of an area. Each area requires and occupies a certain amount of space. These dedicated spaces are organized into a sequence of spaces. The order of these spaces should be designed according to the importance of function. For example, an Installation Headquarters may be flanked by smaller administrative buildings.

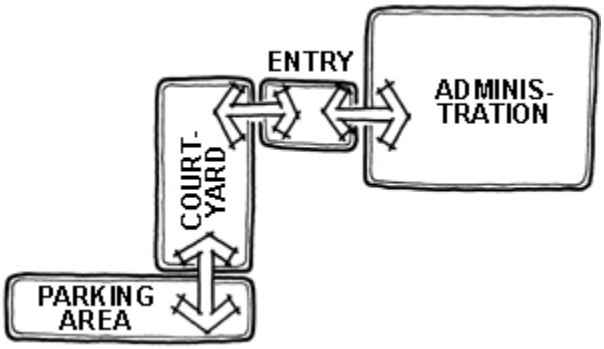
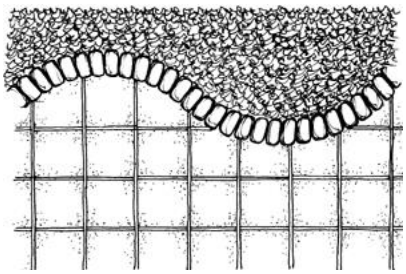


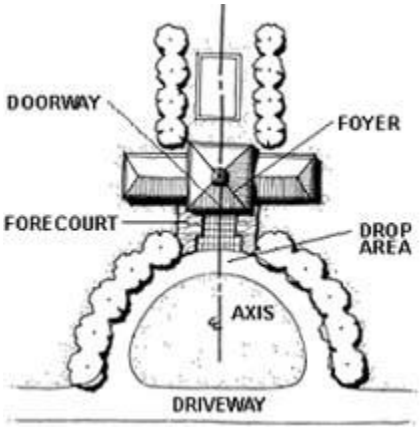
Diagram of Hierarchy of Spatial Sequences

1.4.10 Line


Variety of Lines in Pavement Textures

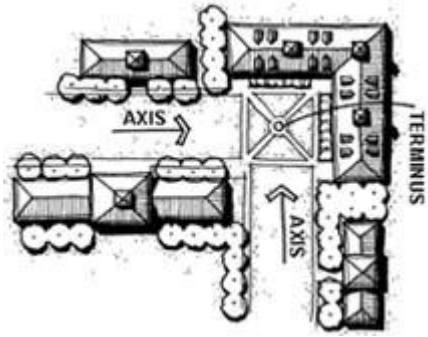
Line is created when two separate materials, textures, colors, or forms contrast one another. Simplicity of line is created when the designer selects only a few choice materials and forms them into intelligible lines. Line may also be used to accent or articulate form. Vertical lines perceptually enlarge scale while horizontal lines tend to reduce scale.

1.4.11 Axis



Variety of Lines in Pavement Textures

An axis is a linear progression of space connecting two or more dominant features. An axis may be a mall, court, or garden. An axis may also be a road, sidewalk, or plaza. Even a building entrance creates an axis: the driveway, the drop-off, the doorway, and the foyer.

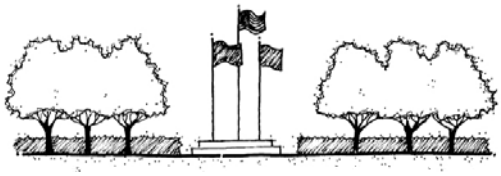


Axis Incorporated as a Unifying Element

A terminus of one axis may function as a terminus of another axis thereby forming a unified design for the project site as a whole. An axis may be symmetrical or asymmetrical.

1.4.12 Symmetry

Symmetry is the balance of identical design elements around a central space or feature. The visual impression is that of perfect balance of visual elements. The central feature might be a building, a flagpole or the plaza that contains it.



In Symmetrical Design the Right Side Mirrors the Left Side

1.4.13 Asymmetry

The Building is Asymmetrical but is Balanced Visually

Asymmetry includes design elements that are not symmetrical, but provide a visual image of balance through the use of unit, scale, color, and texture.

2.1 Introduction

This Installation Design Guide (IDG) is one of the tools used in the preparation of development plans. This section of the IDG defines how the visual and spatial impacts are implemented. Because of the importance of sustainability in design and development, this section on the implementation of design principles is formatted to comply with LEED (See www.usgbc.org).

2.1.1 Process

The implementation of sustainable design and development requires an approach that includes concern for visual quality, economic success, environmental quality, and quality of life. The measurement of the level of success in the design process has been defined by LEED. LEED includes the following levels of certification:

- LEED-NC 26 to 32 Points
- LEED-NC Silver 33 to 38 Points
- LEED-NC Gold 39 to 51 Points
- LEED-NC Platinum 52 to 69 Points

LEED points are achieved through the provision of specific sustainable attributes in the design, and development of a facility. LEED includes mandatory requirements for which no points are achieved and elective requirements that result in points to achieve the LEED goal adopted by Fort Bragg.

The LEED goals adopted for design and development by Fort Bragg are to achieve:

- Silver Standard by 2010
- Gold Standard by 2015
- Platinum Standard by 2020

The point system that determines certification levels is defined in the LEED-NC Checklist.

Sustainable Sites	14 pts. max.
Water Efficiency	5 pts. max.
Energy / Atmosphere	17 pts. max.
Materials / Resources	13 pts. max.
Indoor Environmental	15 pts. max.
Innovation/Design Process	5 pts. max.
TOTAL	69 pts. max.

The implementation of LEED principles in this section of the Installation Design Guide for a Sustainable Fort Bragg includes the following categories:

1. Site Development
    - Site Planning
    - Roads and Paths
    - Landscaping
    - Signage
    - Site Furnishings
    - Exterior Lighting and Utilities
    - Security
2. Water
3. Energy
4. Architecture
    - Sustainable Architecture
    - Architectural Character
    - Historic Preservation
    - Renovations and Additions
    - Entrances
    - Color and Materials
5. Interior Architecture
6. Facility Delivery
    - Charrettes
    - VE Process
    - Source Selections (RFP's)
    - SRM Manuals
7. Operation and Sustainment
    - Maintainability
    - SRM Programs

Extended Functional Life and Adaptation

2.2 Site Development

2.2.1 Sustainable Site Development

All new site development at Fort Bragg will be reviewed for compliance with LEED criteria. Therefore, LEED credits are included as a part of this design guide.

LEED-NC - Sustainable Sites is of particular concern for Site Development. LEED-NC lists the categories to be included in the design and development of sites. These categories are listed below together with their intent and points that can be achieved. Refer to LEED-NC (www.usgbc.org/leed/nc) for the details on requirements, technology, and strategies.

2.2.1.1 Construction Activity Pollution Prevention (Mandatory)

Create and implement an Erosion and Sedimentation Control (ESC) Plan for all construction activities associated with the project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit. The Plan shall describe the measures implemented to accomplish the following objectives:

- Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse
- Prevent sedimentation of storm sewer or receiving streams
- Prevent polluting the air with dust and particulate matter

The Construction General Permit (CGP) outlines the provisions necessary to comply with Phase I and Phase II of the NPDES program. While the CGP only applies to construction sites great than 1 acre, the requirements are applied to all projects for the purposes of this prerequisite. Information on the EPA CGP is available at: http://cfpub.epa.gov/npdes/stormwater/cgp.cfm.

2.2.1.2 Site Selection (Total Possible Points = 1)

Do not develop buildings, hardscape, roads or parking areas on portions of sites that meet any one of the following criteria:

- Prime farmland as defined by the USDA in the USC of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5)
- Previously undeveloped land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by FEMA
- Land that is specifically identified as habitat for any species on Federal or State threatened or endangered lists
- Within 100 feet of any wetlands as defined by USC of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR within setback distances from wetlands prescribed in state or local regulations, as defined by local or state rule or law, whichever is more stringent
- Previously undeveloped land that is within 50 feet of a water body, defined as seas, lakes, rivers, streams and tributaries which support or could support fish, recreation or industrial use, consistent with the terminology of the Clean Water Act
- Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner

2.2.1.3 Development Density and Community Connectivity (Total Possible Points = 1)

The intent is to channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.

OPTION 1 – Development Density: Construct or renovate building on a previously developed site AND in a community with a minimum density of 60,000 sq. ft. per acre net. (Note: density calculation must include the area of the project being built and is based on a typical two-story downtown development.) OR

OPTION 2 – Community Connectivity: Construct or renovate building on a previously developed site AND within ½ mile of a residential zone or neighborhood with an average density of 10 units per acre net AND within ½ mile of at least 10 Basic Services AND with pedestrian access between the building and the services. Basic Services include, but are not limited to: 1) Bank; 2) Place of Worship; 3) Convenience Grocery; 4) Day Care; 5) Cleaners; 6) Fire Station; 7) Beauty Shop; 8) Hardware; 9) Laundry; 10) Library; 11) Medical/Dental; 12) Senior Care Facility; 13) Park; 14) Pharmacy; 15) Post Office; 16) Restaurant; 17) School; 18) Supermarket; 19) Theater; 20) Community Center; 21) Fitness Center; 22) Museum.

Proximity is determined by drawing a ½ mile radius around the main building entrance on a site map and counting the services within that radius.

2.2.1.4 Brownfield Development (Total Possible Points = 1)

Develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment or a local Voluntary Cleanup Program) OR on a site defined as a brownfield by a local, state or federal government agency.

2.2.1.5 Alternative Transportation (Total Possible Points = 3)

Intended to reduce pollution, negative land development impacts of automobile use, and improve overall accessibility. One point each can be achieved by including the following:

1. Locate project within ¼ mile of one or more stops for two or more public or campus bus lines usable by building occupants (1 Point).
2. For commercial or institutional buildings, provide secure bicycle racks and/or storage (within 200 yards of a building entrance) for 5% or more of all building users (measured at peak periods), AND, provide shower and changing facilities in the building, or within 200 yards of a building entrance, for 0.5% of Full-Time Equivalent (FTE) occupants (1 Point).
3. Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site (1 Point).

2.2.1.6 Site Development (Total Possible Points = 2)

The intent is to conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity. One point each can be achieved by including the following:

1. On previously developed or graded sites, restore or protect a minimum of 50% of the site area (excluding the building footprint) with native or adapted vegetation. Native/adapted plants are plants indigenous to a locality or cultivars of native plants that are adapted to the local climate and are not considered invasive species or noxious weeds. Projects earning SS Credit 2 and using vegetated roof surfaces may apply the vegetated roof surface to this calculation if the plants meet the definition of native/adapted (1 Point).
2. For areas with no local zoning requirements, provide vegetated open space area adjacent to the building that is equal to the building footprint (1 Point)

2.2.1.7 Storm water Design, Quantity Control (Total Possible Points = 1)

The intent is to limit disruption of natural water flows by minimizing storm water runoff, increasing on-site infiltration, and reducing contaminants. One point can be achieved by selecting one of the following options:

OPTION 1 – Existing Imperviousness Is Less Than or Equal to 50%: Implement a storm water management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year, 24-hour design storms. OR Implement a storm water management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies. OR

OPTION 2 – Existing Imperviousness Is Greater Than 50%: Implement a storm water management plan that results in a 25% decrease in the volume of storm water runoff from the two-year, 24-hour design storm.

2.2.1.8 Heat Island Effect: Roof (Total Possible Points = 1)

The intent is to reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact to microclimate and human and wildlife habitat. One point can be achieved by including the following:

Use roofing materials having a Solar Reflectance Index (SRI) equal to or greater than 78 for roofs with a slope less than or equal to a ratio of 2:12 or an SRI greater than or equal to 29 for roofs with a slope greater than a ratio of 2:12 for a minimum of 75% of the roof surface.

2.2.1.9 Light Pollution Reduction (Total Possible Points = 1)

The intent is to minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments. One point can be achieved by using the following criteria:

FOR INTERIOR LIGHTING – The angle of maximum candela from each interior luminaire as located in the building shall intersect opaque building interior surfaces and not exit out through the windows. OR All non-emergency interior lighting shall be automatically controlled to turn off during non-business hours. Provide manual override capability for after hours use. AND

FOR EXTERIOR LIGHTING – Only light areas as required for safety and comfort. Do not exceed 80% of the lighting power densities for exterior areas and 50% for building facades and landscape features as defined in ASHRAE/IESNA Standard 90.1-2004, Exterior Lighting Section, without amendments.

All projects shall be classified under one of the following zones, as defined in IESNA RP-33, and shall follow all of the requirements for that specific zone:

LZ3 – Medium (Commercial/Industrial, High-Density Residential)

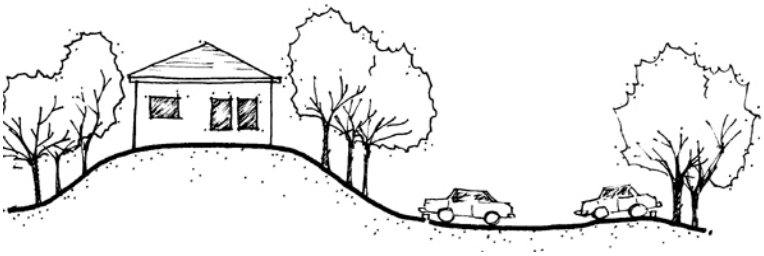
Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.20 horizontal and vertical foot-candles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 5% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

LZ4 – High (Major City Centers, Entertainment Districts)

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater that 0.60 horizontal and vertical foot-candles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 10% of the total initial designed site lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

2.2.2 Site Planning

Site planning is a primary element in the site design and development process. The site plan establishes the relationship of development to its natural and built environment. The decisions made will affect the environment and how changes to existing conditions will impact the surroundings in either a positive or negative way. Sustainable site planning concepts, incorporated into the design process, will help minimize the negative impacts of future site development.



Site Planning Should Highlight Positive Views and Screen Undesirable Views

Site planning must support and enhance the mission requirements of Fort Bragg as well as the installation's unique ecological, physical and visual character. The development and enhancement of the circulation system and the perception and continuity of the built environment are also essential. The Fort Bragg design

theme of "campus communities" fits with the overall mission of soldier training. Future development will embrace this theme.

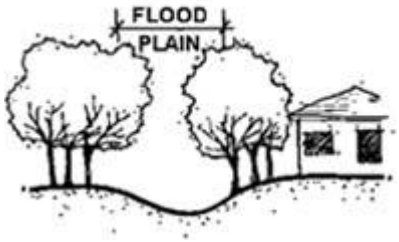
2.2.2.1 Natural Site Conditions

The preparation of site plans that respect the natural environment requires careful consideration of site conditions. Existing wildlife habitat, topography, vegetation, tree cover, climate and natural view sheds should be preserved. The careful preservation or alteration of natural site features enables new facilities to blend with their natural setting. Such practices minimize environmental disruption and provide a more sustainable solution to site development.

Landscape Character - Apply the following sustainable principles to minimize adverse impacts to the landscape.

- Preserve mature trees and established masses of shrubs.
- Proper planning will also provide for transplanting of select vegetation.
- Large scale, expansive building footprints are discouraged in lieu of pedestrian scale/multi-story buildings.
- Locate facilities that have expansive building footprints and parking requirements on relatively flat terrain (less than six percent slope gradients). If this is not feasible, site the structure to minimize cut and fill.
- Use moderately sloping areas (6 to 15 percent slope gradient) for building types that can adapt to sloping terrain.
- Avoid development on steeper slopes (greater than 15 percent slope gradient). Erosion problems, construction costs, and site maintenance costs escalate dramatically when slopes are greater than 15 percent.
- Orient buildings on an east -west axis to minimize solar gain.
- Avoid development in natural drainage ways and floodplains. Floodplain area land uses should be limited to open space and non-structural outdoor recreation facilities.
- Retaining walls and tree wells are encouraged to preserve trees and reduce erosion problems.

Protecting and Preserving Existing Vegetation Enhances Visual Image



Floodplains Should Remain as Preserved Greenspaces Where Development Is Prohibited

<b
New Construction should be Designed to Balance Cut and Fill</b</b

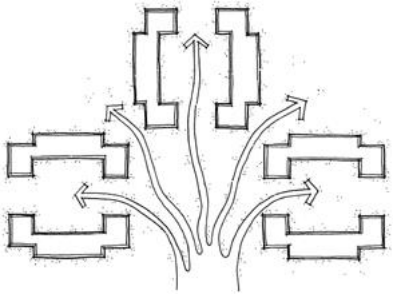
Climate - Sustainable design considerations incorporate prevailing winds, solar orientation and microclimatic conditions to minimize the energy consumption of a building's heating and cooling systems. Properly planned landscaping reduces the adverse effects of climate as well. Vegetation, landform, and structure design should be used to channel breezes and provide shade.

Existing Vegetation and Proposed Plantings can be Utilized to Channel Breezes

Encourage closely located, but physically separated, building arrangements. This will promote air circulation and reduce the effects of radiant heat collecting between buildings. Orient buildings to maximize cooling breezes produced by prevailing winds and to minimize solar gain.

During the design process, establishing proper building/site relationships is necessary.

Special consideration should be given to microclimatic conditions, especially variances in anticipated directions or intensities of prevailing winds. The velocity of winds may change as a result of structural relationship established by the site plan. Site conditions caused by the diffusing effect of existing trees will change if the trees are removed or the landforms changed. Site climatic conditions should not be identified solely on the basis of generalized regional patterns. Actual on-site features must be verified and noted by inspection.


Faith Barracks Building Orientation Maximizes Effects of Cooling Breezes

2.2.2.2 Sustainable Design

Every new construction or renovation, project should include the evaluation of the following site sustainability issues.

Energy Considerations - Careful site planning is cost efficient in regard to energy consumption, and cost effective in regard to the labor and equipment costs required for site work. A cost benefit can be realized from working with existing landforms and minimizing the need for extensive earthwork. Retention of natural features and flexible site planning should be encouraged for their energy saving potential.

Techniques that should be encouraged include the following:

- Buildings should be clustered to reduce the amount of roads required as well as amount of infrastructure needed to serve the development. Clustering also preserves the natural environment by reducing land requirements.

Preserving Existing Vegetation Provides Cost Benefits in New Construction

Landscaping and Architectural Features can be Utilized for Controlling Solar Heat Gain

- Use the most current energy conservation technology when specifying architectural materials and mechanical systems.
- Minimize solar gain by orienting building on an east-west axis.
- Minimize solar heat gain to reduce the need for cooling during warmer months. Use overhangs, deciduous trees, recessed windows or other elements for sun protection.
- Maximize solar heat gain during winter months for heating. Place deciduous trees in front of large volumes of glass. Passive solar heating results as the trees drop their leaves in the winter.

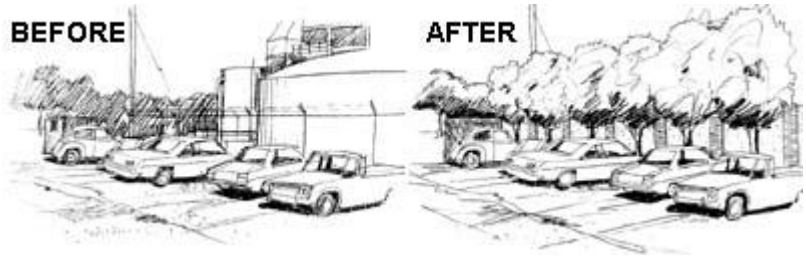
2.2.2.3 Site Organization

The arrangement of facilities relative to each other on the site affects how efficiently they can be used and the quality of their appearance. The following are key issues in site organization.

Circulation and Parking - Complete vehicular, bicycle, and pedestrian systems must be established for adequate site access, circulation, and parking.

- Parking facilities should be shared, where possible.
- The layout of roads, parking and walkways should avoid locations directly over underground utilities.
- Pedestrian walkways should be adequately wide and separated from the road by trees, bushes, or plants for safety and visual appeal.
- The site plan should incorporate adequate space for access by service vehicles, such as fire trucks, ambulances, and sanitation trucks.

The Circulation System Addresses Both the Vehicle and the Pedestrian



Landscaping and Walls can be Used Effectively to Screen Utility Areas

- Drop-off areas shall meet all DoD Force Protection Construction Standard requirements (www.hnd.usace.army.mil/techinfo/ufc/ufc4-010).
- Provide a balanced and coordinated circulation system to serve a group of buildings, including walkways, bikeways, and automobile traffic lanes.
- Locate all building loading docks, mechanical equipment and service areas, out of sight of main roadways and building entrances. Use appropriate fencing and/or planting to screen these areas.

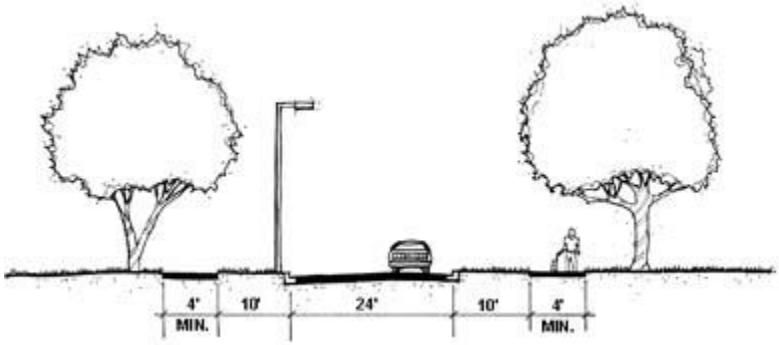
Building Entrances - The design and site plans of all major building entries should convey a sense of arrival. Entrances should be linked to both the vehicular and pedestrian circulation system. Common design elements that should be considered include the following:

- Signage to direct and inform individuals arriving at the facility.
- Lighting to provide security and safety for night time use.
- Site amenities such as special paving, trash receptacles, benches and fountains should be utilized as appropriate based upon the area's importance or use.
- Landscaping provides a natural enhancement to the building entrance. Plantings also frame and identify the entrance.
-

Landscaping for Army Womack Medical Center Defines & Accentuates the Entry

2.2.3.3 Secondary Roads

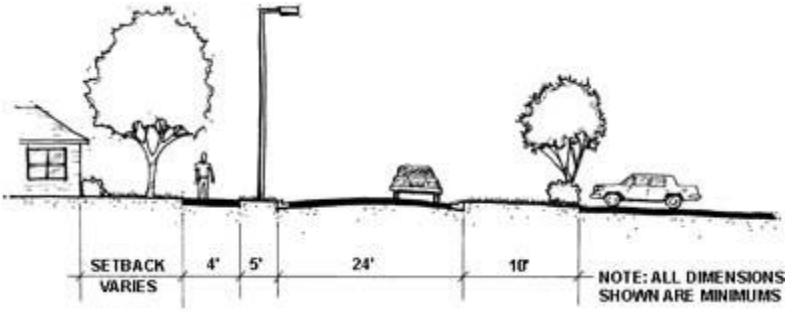
Secondary roadways generally provide traffic movement between primary and tertiary roads and typically connect primary roads with individual use areas. The smaller volumes of traffic carried by these roads permit slower design speeds to accommodate for stop-and-go traffic. On-street parking should be prohibited on secondary roadways throughout the installation. Appropriate street lighting, walkway and bicycle lanes, signage, and landscape planting should be incorporated in the design. Examples of secondary roads are Normandy Drive, Bastogne Drive, Woodruff Street, and Ardennes Street.



Secondary Roadway Section

2.2.3.4 Tertiary Roads

Tertiary roadways or residential roadways handle lower volumes of more localized traffic and on-street parking when necessary. Their main function is to provide vehicular access to individual facilities, parking areas, and service areas. Street lighting, walkway and bicycle lanes, signage, and landscape planting should be incorporated in the design.



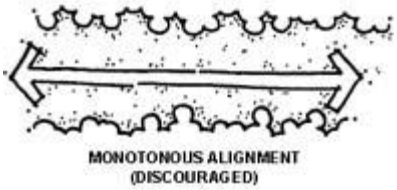
Tertiary Roadway Section

2.2.3.5 Post-Wide Roadway Design

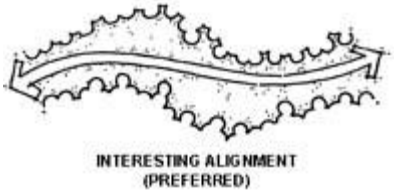
The design, construction, and renovation of all roads and pathways must meet or exceed standards set by TM5-822-2 “General Provisions and Geometric Design for Roads, Streets and Walks”. Design and construction approval must be cleared through the appropriate divisions of the Directorate of Public Works (DPW).

General sustainable guidelines that should be followed when renovating existing roadways or constructing new roads include the following:

- Specify use of recycled asphalt and/or recycled concrete for grading, bedding and top coat applications.
- Design roads to minimize disturbance to existing vegetation, revegetate areas that are disturbed, and reduce the visual impact of disturbed landscape.
- Route truck traffic to roadways that impact less sensitive land uses.
- Harmonize new road alignments and existing road improvements with natural site conditions and the land use pattern of the installation.
- Use irregular or free-form clearing limits with undulating edges to vary the sequence of enclosure along the road to add visual variety, promote a natural landscape appearance, and relieve visual monotony.
- Roadways should include crosswalks with pedestrian controlled stoplights, and curb cuts to facilitate biking, walking, and wheelchairs.



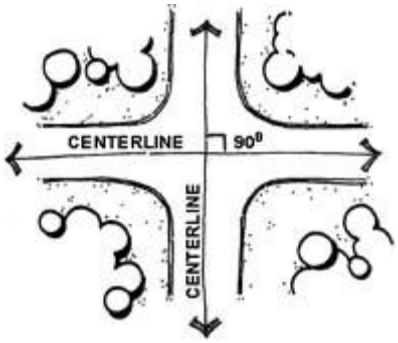
Minimize Long, Continuous and Unbroken Roadway Sections



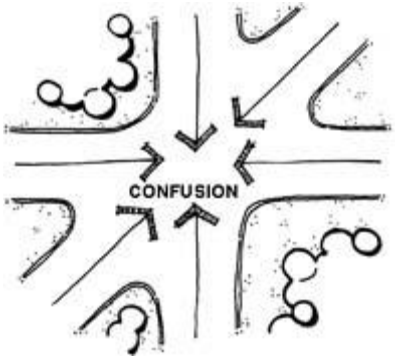
Undulating Roadways Promote Visual Variety

- For all new road construction and renovation projects, contact a transportation planner to incorporate alternative transportation considerations that include sidewalks, bike paths, and pedestrian crosswalks that meet ADA standards.
- All roads and streets, unless otherwise noted, have a 70-foot right-of-way (ROW).
- Building setbacks from road ROW shall meet DoD Force Protection Construction Standards (http://www.ccb.org/docs/UFC/4_010_01.pdf). The following setbacks shall be used if they are more restrictive than those required for force protection.
  - One/Two Stories - 30 Feet
  - Three Stories - 45 Feet
  - Four Stories - 60 Feet
  - Five Stories - 75 Feet
  - Six Stories - 90 Feet
- Building setbacks from service drives, parking lots and drop-off areas shall meet DoD Force Protection Construction Standards. The following setbacks shall be used if they are more restrictive then those required for force protection.
  - One/Two Stories - 20 Feet
  - Three /More Stories - 30 Feet
- Set back utility structures that are necessary along roads (electrical trans- formers, telephones switch gear, etc.) as far as possible and screen them from view based on DoD Force Protection Construction Standards.
- Design street widening projects to save existing trees. Contact an arborist during the design phase to recommend techniques to prevent damage and/or death to existing trees.
- Use noise abatement techniques such as earth berms, landscaping, or sound walls to reduce noise levels generated by traffic adjacent to sensitive land use areas.

2.2.3.6 Intersections



Intersections Should Align at 90 Degrees



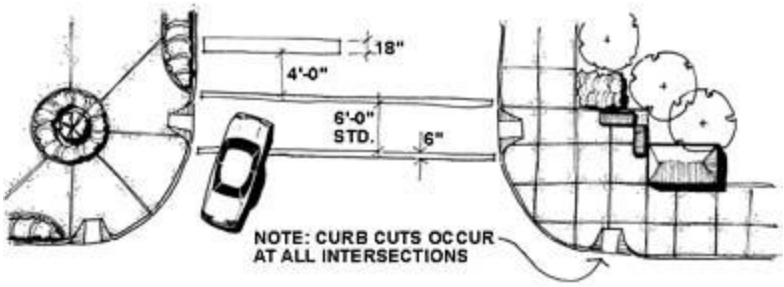
Roadway intersections provide an opportunity to improve the visual quality of the transportation network by incorporating the use of landscape materials, special pavers, and lighting. The removal of unsightly elements will reduce visual clutter and improve visibility and safety.

Improper Alignments Create Dangerous and Confusing Intersections

Align intersecting roads, parking entrances, and other roadway access areas at 90 degrees. For safety, comfort and convenience, align multiple intersections on opposite sides of the roadway.

All intersections shall be marked with crosswalks and stop stripes, where necessary, and shall be accompanied by the required regulatory signage. All signalized intersections shall have adequate stop light signals for pedestrians. Crosswalks in highly focal areas shall be delineated by paving materials with contrasting color to that of the roadway paving material. Curb cut ramps meeting the latest ADA criteria should be incorporated into the intersection for handicap and bicycle access.

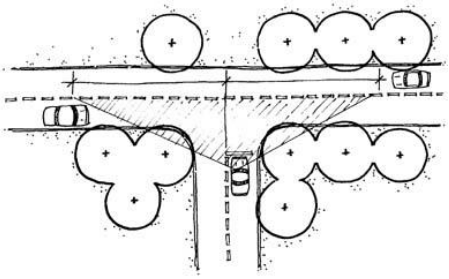
Sight distance is an important concern at intersections. The area around the corner of intersections should be kept clear of visual obstructions from the location where the driver is waiting to cross or enter a traffic lane to a point 75 feet down the centerline to the right and left. This sight triangle should be kept clear of tree trunks, mail boxes, large shrubs, light poles, and other vertical elements that obstruct the drivers view of oncoming traffic.



Recommended Intersection Walkway Treatment

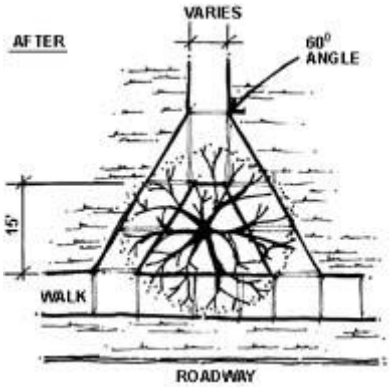
2.2.3.7 Curbs and Gutters

Curbs and gutters should be consistent in design and application. The use of curb and gutter for applications other than named streets in the cantonment (Tables B-I) shall have approval of the IDG Board. Curbs shall include cuts that allow storm water to flow into a bio-retention area instead of a gutter. Asphalt paving shall have a steel edge strip and direct runoff to energy dissipating or absorbing materials. The use of pervious pavements and runoff retention structures is preferred. Curb painting is prohibited.



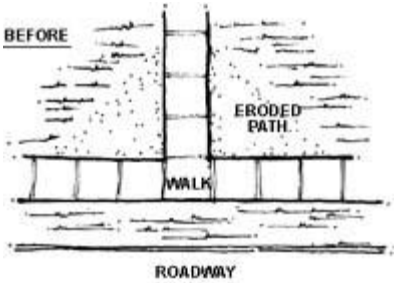
Sight Triangles Must be Maintained at all Intersections

2.2.3.8 Sidewalks



Incorporated New Walkway to Allow for most Direct Access

Sidewalks serve as pedestrian connectors between buildings and ancillary facilities, define landscaped areas, and serve as an extension of the architecture to promote and enhance the Beaux-Arts principles of axis and vista. The incorporation of sidewalks provides an essential link between proposed projects and existing adjacent land uses.



Desire Lines" or "Cow Paths" Created by Unplanned Pedestrian Circulation

Sidewalks that cross roadways shall be constructed as defined in Section 2.2.3.6 Intersections.

Sidewalks are typically constructed of concrete or asphalt. The use of alternative materials such as pervious concrete or pervious pavers is strongly encouraged.

In areas where street lights do not exist or do not provide adequate illumination, pedestrian lighting shall be provided. Lighting levels shall be high enough to illuminate all hazardous areas, such as steps, ramps, edges of walkway, and other obstacles (minimum one footcandle).

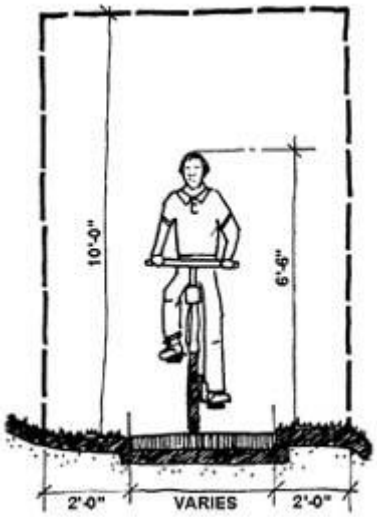
Plan sidewalks to avoid conflict with existing trees, utilities, and future development. The path chosen shall be the most practical and efficient route possible, but should respond to existing topography. A sweeping curvilinear form allows for pleasant transit combined with efficient movement.

2.2.3.9 Bicycle Paths

The inclusion and integration of a complete bicycle network into new and existing traffic systems is essential to a sustainable Fort Bragg. An increase in bicycle use would reduce the pollution and energy consumption of motor vehicle traffic, thereby providing a sustainable transportation solution as well as improving traffic flow efficiency and alleviating overcrowded parking.

Grates Parallel to Bikeways Create Potential Hazard

To integrate a bike path into the roadway, the roadway cross section width must be increased by a minimum of five feet for a one-direction bikeway. For safety, it is preferable to physically separate the bike route from traffic lanes. This can be accomplished with precast raised concrete curb sections with spaces left for drainage flow and for entry/exit. Fort Bragg's generous setback requirements (see District Specific Guidelines - 2.2.3.10) and preserved Greenbelt Areas provide an excellent opportunity to incorporate bikeways throughout the cantonment area.

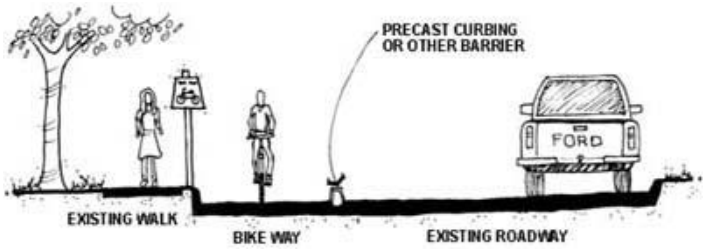


Clearance Design Requirements for Bike Path

Eliminate the danger of drainage grates with openings parallel to bike travel. Grates parallel to the bikeway will not be permitted. Improved grates have been developed and modifications are possible to make existing grates safe. However, the effect of these alternatives on the drainage capabilities of the grate must be evaluated.

Drainage grates can be eliminated by utilizing proper Low Impact Development (LID) concepts for the management of storm water.

Provide a 10-foot vertical clearance from the surface of the bikeway to any overhead stationary obstacle. A two-foot wide clearance is required from the edge of pavement to grade changes or obstacles.



Bike Path Integrated with Roadway

Bike Path/Walkway Physically Separated from Roadway

MILCON Transformation RFP for MILCON TRFP projects.

2.2.3.10 District Specific Guidelines

The following are district specific guidelines for roadway design. Only those items which vary from the post-wide standards or are particular to a district are shown. Adhere to post-wide design standards unless otherwise specified as a district specific guideline in this section or as provided in the

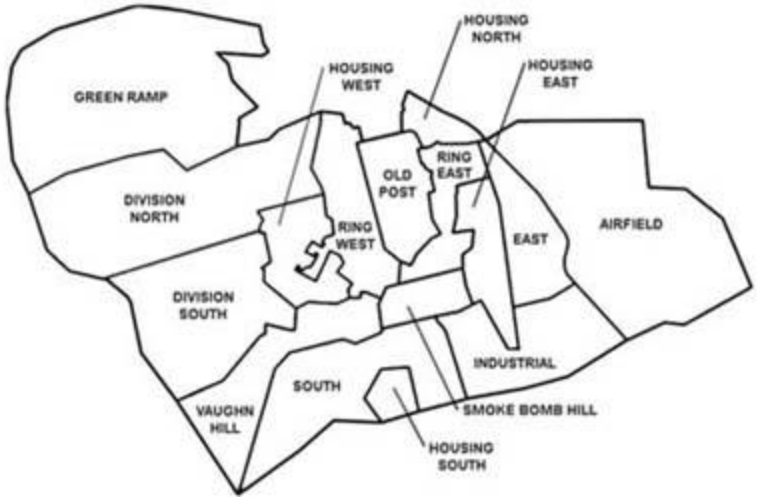


Table B Fort Bragg Rights-of-Way (ROW)

Table C Old Post District Building Setbacks from Right-of-Way (ROW)

Table D Ring District Building & Parking Setbacks from Right-of-Way (ROW)

Table E Division District Building & Parking Setbacks from Right-of-Way (ROW)

Table F Vaughn Hill District Building & Parking Setbacks from Right-of-Way (ROW)

Table G Smoke Bomb Hill District Building & Parking Setbacks from Right-of-Way (ROW)

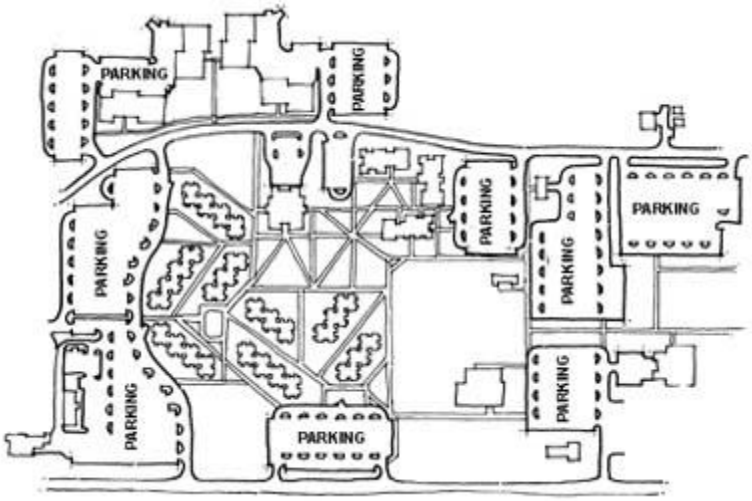
Table H South District Building & Parking Setbacks from Right-of-Way (ROW)

Table I Airfield District Building & Parking Setbacks from Right-of-Way (ROW)

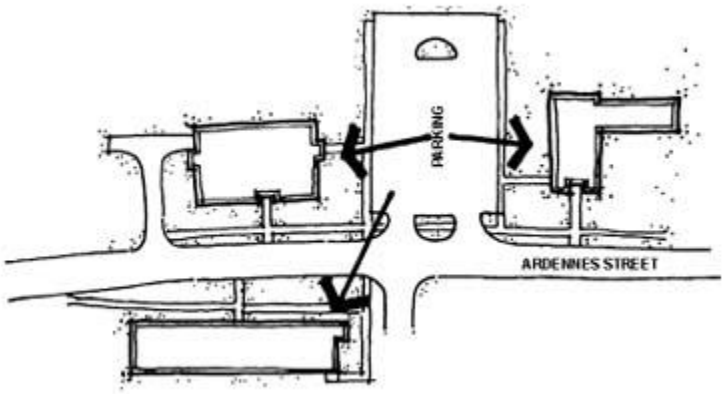
2.2.4 Parking

The Fort Bragg cantonment area contains an extensive amount of parking. These parking areas project a dominant visual impression at the installation. In many areas they appear as large expanses of pavement void of landscaping, signage, sidewalks, and adequate lighting. Because they serve as major transition areas from a vehicular to pedestrian environment, there must be a conscious effort to soften their inherent harshness and minimize their visual impact

while accommodating parking requirements. Through proper planning and design, visual and functional conflicts can be avoided while providing an attractive and pleasant transition between the parking areas and the adjacent land uses they serve.



Extensive Parking Areas Project a Dominant Visual Impression at Fort Bragg



Joint-Use Parking Between Facilities should be Encouraged when Feasible

2.2.4.1 Parking Requirements

Parking requirements vary depending on the function and population of the land uses the parking area serves. For planning purposes, 400 square feet per car should be allocated (includes access drives and planting islands). Parking areas can be minimized by selecting a site that will allow shared parking with other related activities. Supporting and planning for sustainable means of circulation, such as bikeway and pedestrian systems, can reduce parking requirements by eliminating dependence on automobiles.

Table J lists the minimum required number of spaces for non-organizational vehicles as listed in "Architectural and Engineering Instructions".

2.2.4.2 General Design Standards

Off-street parking lots should be designed to the following standards:

- Develop parking lots as permanent facilities with the required paving, signing, lighting, sidewalks and landscape plantings. Standard edge of paving for parking lots is no curb and gutter. Wheel stop should be provided.

Design Parking Lots to Complement Existing Site Conditions

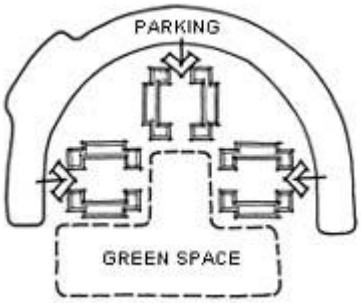
- At least 10 percent of the area within the outer curb line of all parking lots are to remain unpaved and receive landscape plantings consisting of ground covers and shade trees. Ground covers, provide reduced maintenance costs while shade trees provide microclimate cooling benefits.

- Site new parking lots on level ground to avoid excessive grading and erosion.
- Design and grade parking lots to complement the natural contour of the site. Design multiple-level lots on steep and rolling slopes.
- Specify use of recycled asphalt and/or recycled concrete for grading, bedding and top coat applications of parking lots.

Landscaped Islands Soften the Harshness Associated with Parking Areas

- Paved parking lots shall direct runoff to energy dissipating or absorbing materials. The use of options such as permeable pavement, or other technologies that facilitate infiltration of stormwater on site rather than channeling it off-site is encouraged. Other technologies include the use of recessed islands, rain gardens, and bioswales to catch stormwater and use it to irrigate the plant material while also being filtered.
- At new construction sites, proposed parking areas should be used for the storage of material and equipment to avoid soil compaction in proposed landscape areas.
- Stripe all permanent parking lots in white to designate parking stalls (single striping is preferred).
- Build construction phase parking lots that will be used less than 12 months with at least four inches of gravel.
- Design all parking lots to meet ADA accessibility standards and provide required number of handicap spaces.
- Reserved parking is highly discouraged but may be provided for general officers, Command Sergeant Majors, and managers at the main commissary and exchange. Parking for each special group should not exceed one space per parking lot.
-

- Maximum driveway grades at road curb cuts shall not exceed two percent for a driveway distance of 25 feet.
- Minimum finished parking lot grades are one percent. Maximum transverse slopes are 1-1/2 percent.
- Provide visitor parking as required, not to exceed four percent of the total number of spaces.
- Maximum parking lot connectors and drives are not to exceed six percent.
- Areas of trees that provide shade and screening should be included in parking lots to mitigate the heat generated by large areas of pavement.



The New Faith Buildings are Sited on Large Green Spaces with Parking Located on the Sides and Rear

- Lighting in parking lots should be located and focused down to provide illumination of the parking lot without spill over that impacts adjacent development.

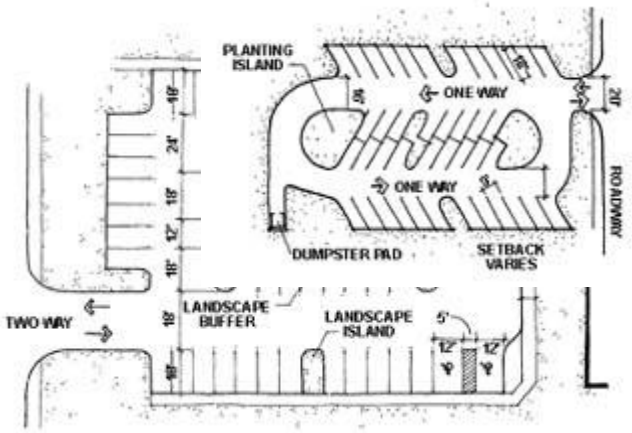
2.2.4.3 Parking Lot Location

The location of parking lots can play an essential role in developing and promoting the "campus communities" theme for Fort Bragg. Ideally, parking would be located on the sides and/or rear of a facility, allowing the front to be sited on a large green space or quadrangle. This will allow for unobstructed views of the building and the opportunity to design a formal entry. Visitor parking shall be designed to orient the visitor to the building formal entry point. Parking lots and buildings should be located to encourage joint use of the parking facilities. Parking lots shall be separated from buildings as required in the DoD Force Protection Construction Standards (http://www.ccb.org/docs/UFC/4_010_01.pdf).

2.2.4.4 Circulation and Layout

New or realigned parking layouts for Fort Bragg will need to be analyzed and reviewed on a site by site basis.

Facility use and population will dictate the requirements and conditions needed to set design goals. However, there are guidelines and criteria that are applicable to most parking areas and should be included in the design when possible.



Typical 90º Parking Standard with Two-Way Circulation

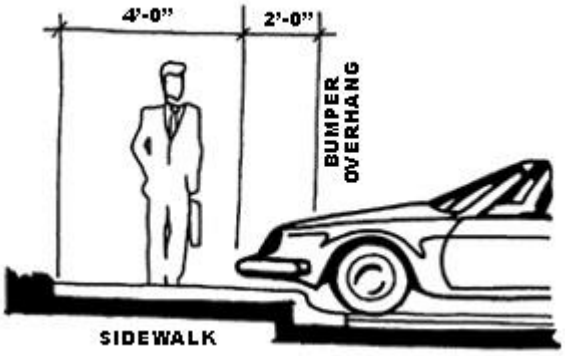
The preferred and most efficient parking configuration is 90 degree angle parking with two-way circulation aisles. The aisles should be aligned toward the main entrance of the building so that pedestrians do not have to walk between parked cars. For smaller parking areas, one way circulation systems with 60 degree angle parking is optional. On-street parallel parking should be prohibited in new construction. Existing on-street parallel parking should be reduced when possible. On-street parking should be limited to residential areas, tertiary streets, and where infrequent visitor or temporary overflow parking needs occur.

Recessed Planted Medians will Enhance the Visual Impact of Large Expanses of Open Pavement

Recessed planting islands measuring a minimum of 9 feet by 36 feet shall be provided at the end of all rows of 90 degree parking. Recessed planting islands should occur at least once every 10 spaces to prevent long unbroken rows of parking. A continuous poured in place concrete curb shall not be built. Wheel stops shall be used to define the end of a parking space. Large expanses of open pavement are visually and climatically undesirable and should be reduced when possible. Preserve and enhance existing vegetation in the medians with stormwater runoff. Plant ground cover on recessed islands to reduce the maintenance cost of mowing turf.

Administration buildings and other high-profile facilities parking areas require special design consideration. Design parking areas with a 12-foot, width, depressed planting area between each parking row.

Clearly define vehicular circulation routes through parking lots with signs, pavement markings and curbed planting areas. Walkways at the head of parking stalls should be increased in width by two-feet to allow for bumper overhang. Pedestrian movement from the parked vehicle to the major designation points on site should be clearly defined and separated from vehicular circulation.

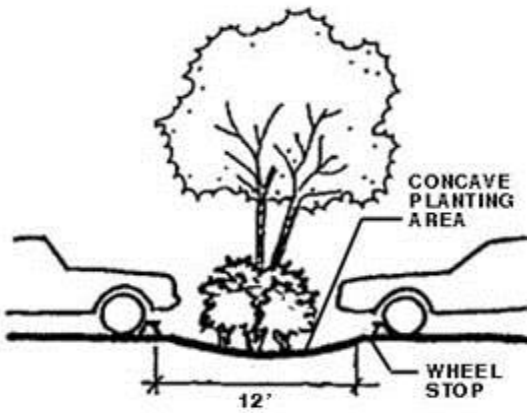


Six-Foot Sidewalks Adjacent to Parking Stalls Allow for "Bumper Overhang"

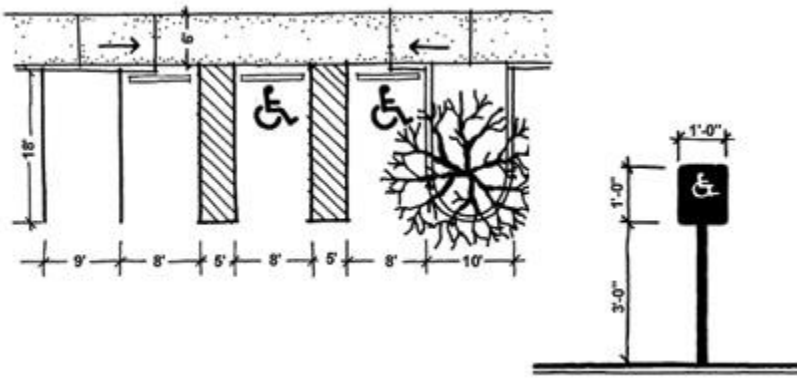
Separate service, maintenance and loading zones from employee / visitor parking areas. Visitor drop-off zones and parking shall be provided near visitor entrances but must meet DoD Force Protection Standards.

Typically, two regular parking spaces are reserved for four motorcycles. A four-foot high, four-inch diameter metal pole may be installed in the parking lot surface. The pole should be painted brown with a reflective white band, six-inches from the top. Space these poles 4-1/2 feet on center, 16 feet from the head of the stall.

Official use vehicle parking may be provided but ordinarily does not exceed one reserved space per non-organizational parking lot.



Incorporate a 12-Foot Minimum Width Planting Median in High Profile Parking Areas



Accessibility Parking Spaces should be Easily Identifiable and Located within the Parking Area

2.2.4.5 Accessibility Parking

Parking for disabled persons shall be provided around all public buildings. Accessible parking spaces serving a particular building shall be located on the shortest route of travel from adjacent parking to an accessible entrance.

Accessible parking spaces shall be at least 96 inches wide, and may share a 60 inch wide loading zone. Parking access aisles shall be part of an accessible route to the building or facility entrance and shall comply with ADA requirements. Two accessible parking spaces may share a common access aisle. Parking vehicle overhangs shall not reduce the clear width of an accessible route. Parking spaces and access aisles shall be level with surface slopes not exceeding two percent in all directions.

Accessible parking spaces shall be designated as reserved by a sign showing the symbol of accessibility.

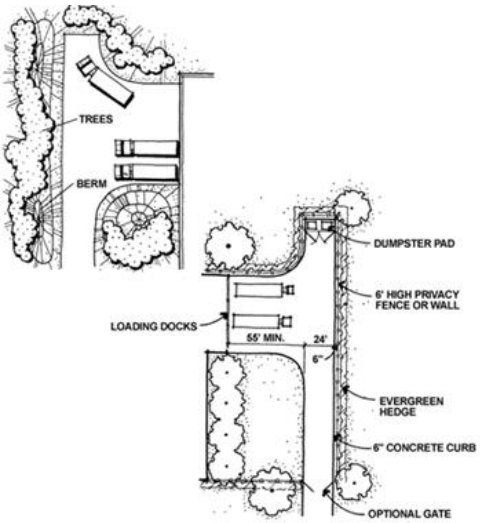
Required Handicap Parking Requirements

Total Parking in Lot	Required Minimum 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 400 401 to 500 501 to 1,000 1,001 and over	8 9 2% of Total 20 plus 1 of each 100 over 100
The above requirements are not applicable if a facility is designed for 100% staffing by military personnel.	

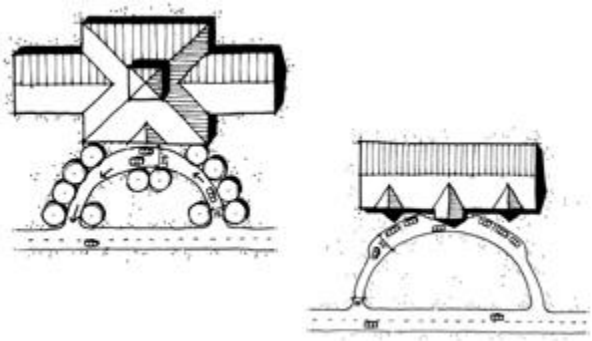
2.2.4.6 Service Areas

A facility that requires deliveries or pickups shall have an area that allows easy access to a loading/unloading dock exclusively used for service vehicles. These areas shall provide easy circulation, ample turnaround and backup space, and a raised platform for efficient material transfer. These areas shall be designed to incorporate DoD Force Protection Construction Standards. They should also be fully screened from public view based on DoD Force Protection Construction Standards. Orienting the service area away from major streets during initial site planning will reduce the visual impact of the area.



Service Areas Should Provide Adequate Area for Operations and be Screened From Public View

2.2.4.7 Drop-Off Areas



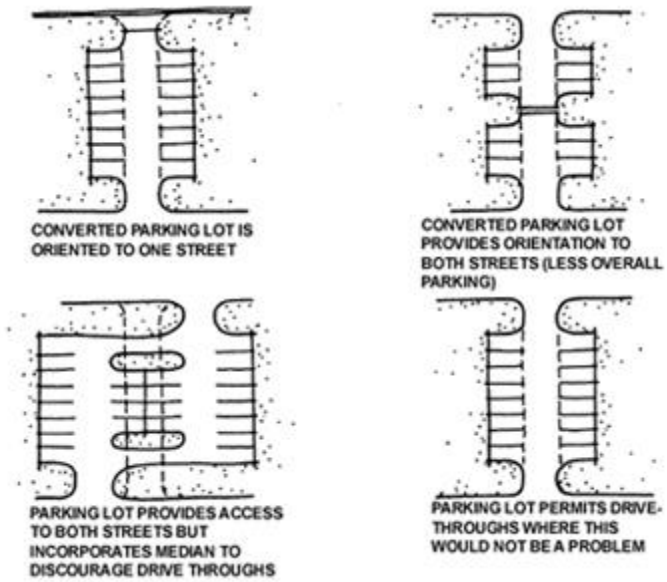
Drop-Off Zones Provide Convenient Access and Accentuate Entrance

A drop-off area provides convenient access to building entrances for persons arriving by vehicle. Facilities such as child development centers, schools, dining facilities, clubs, and buildings of prominence benefit by incorporating a drop-off area into their design. Drop-off areas typically have one-way, counter clockwise circulation systems to accommodate passengers. The travel lane should be wide enough to allow a car to pass when another car is stopped at the entrance to the building. These areas shall be designed to incorporate Department of Defense Force Protection Construction Standards.

2.2.4.8 On-Street Parking

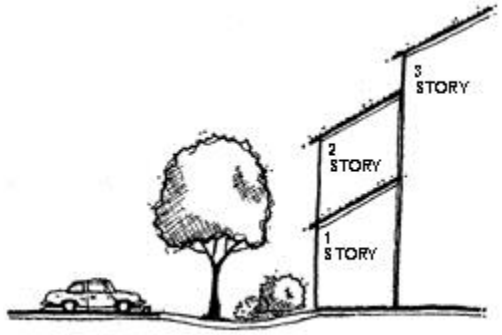
On-street parking is limited to cul-de-sacs in residential areas, tertiary streets, and where infrequent visitor or temporary overflow parking needs.

In areas where severe parking shortages occur, it may be desirable to convert, seldom-used, tertiary streets into parking lots. The accompanying details show several design alternatives.



These Sketches Illustrate Alternatives for Converting Seldom Used Streets to Parking Lots

2.2.4.9 Buffers



Well Maintained Landscape Buffers will Strengthen the "Campus" Atmosphere Theme of Each Development Area

Screen parking lots from other areas by landscaping buffers or by incorporating them into the site in such a way that they are visually hidden from view. Parking lots should also be set back from the buildings they serve. These areas shall be designed to incorporate Department of Defense Force Protection Construction Standards.

2.2.4.10 Existing Trees

When parking lots are to be developed on wooded sites, efforts should be made to preserve mature trees which will provide shade and reduce the visual impact of the lot.

While it is impossible to save every tree, a large number can be retained through careful planning and flexible requirements. Once the most efficient parking pattern is determined, a preliminary layout plan should be developed using a survey of the site showing tree locations. The plan should be revised to preserve as many trees as possible.

If the plan cannot be revised, trees that are located in driveways must be removed. Trees in parking spaces can be saved by eliminating one or more spaces to form an island around them. No equipment storage, compaction, cutting, or filling shall occur within the drip line of a tree.

Tree root systems that have been cut during excavation or compacted from fill dirt will adversely affect the health of the tree. When excavation or fill is required, retaining walls or tree wells should be considered to protect existing trees to be preserved from proposed construction activity.

2.2.5 Landscape

Landscape planting is an important component in maintaining ecosystem integrity. All plantings are not equal. Plantings must consider site specificity and attempt to maintain the "natural" plant community present in the surrounding landscape. Where the natural community has been lost through prior development, landscape plantings should attempt to restore the former natural plant community.

The development of landscape plantings will provide a sense of permanence and regional context for the installation. The plantings should convey distinctive images of Fort Bragg's design theme. Accent plantings designed to promote and enhance the Beaux-Arts principles will provide a cohesiveness throughout the installation while "theme" trees will begin to create images specific to each district. The longleaf pine shall be the primary "theme" tree across the cantonment area.

Tree Lined Streets Creating Vistas are Characteristic of the Old Post Historic District

2.2.5.1 Natural Ecosystem

Trees Such as this Pine Provide Habitats for the Endangered Red-Cockaded Woodpecker

Fort Bragg supports over 100,000 acres of forested land. The forested areas of the installation can be divided into three broad categories: upland pine, upland hardwood, and bottomland hardwood.

While a variety of mixed hardwoods trees exist at Fort Bragg, pine species dominate. Pine comprises approximately 90 percent of the inventory of merchantable timber and Longleaf pine is the primary pine species. Other pine species are loblolly pine, pond pine, and juniper. The longleaf pine/wiregrass ecosystem at Fort Bragg is one of the largest remaining stands of this once widespread ecosystem. This ecosystem supports diverse animal populations and plant communities. The emphasis of ecosystem management should focus on restoring and maintaining biodiversity in "natural" systems, with emphasis on keystone species such as the federally endangered red-cockaded woodpecker. Landscaping should follow the Department of Defense (DoD) Biodiversity Management Strategy (The Keystone Center, 1966). Sustaining natural landscapes is key for sustaining military readiness.

2.2.5.2 Design Objectives

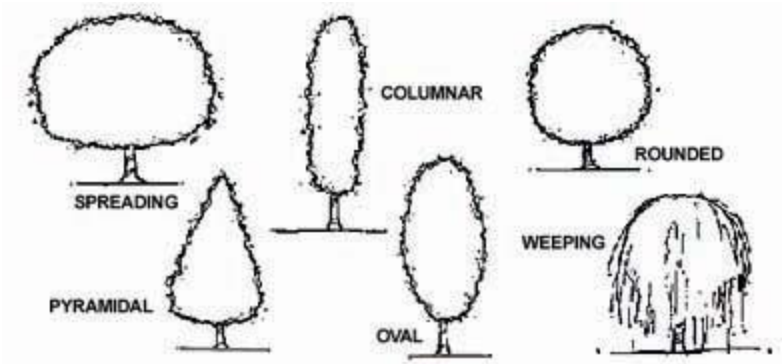
The establishment of design guidelines for a landscape planting program for Fort Bragg is based on four general objectives.

Shade Trees Reduce Heat Build-Up and Glare Generated in Large Parking Areas

- Improvement/enhancement of the installation's visual quality. This can be accomplished with a conscious effort to create a harmonious mix of natural and man-made features, enhance the roadway system, screen objectionable views, and buffer incompatible land uses.
- Improve environmental quality of the installation by utilizing the interrelationships among the built environment, natural processes, and climatic conditions. The use and placement of plant material and the establishment of site parameters in

relation to the surrounding environment conserve energy, create microclimates, purifies air, and controls wind.

- Generate a “theme tree” plant list for each district that will be planted throughout the respective districts to promote unity and a sense of identity. The "theme tree" plant list shall emphasize the longleaf pine as the primary overstory tree and be used in all landscape plans throughout all districts.



Characteristics of Individual "Theme Trees" Help Promote Unity Within Each District

- Establish sustainable plant material by using trees, shrubs, and groundcovers that are native or naturalized to the Fort Bragg area. The use of natives in the proper site conditions is imperative. Native plant material reduces maintenance requirements, preserves water, protects the environment from negative impacts of fertilization, and reduces cost in materials and manpower. Do not plant natives in off-site conditions. (e.g., red maple, tulip (yellow) poplar, and American sycamore in uplands). The planting zone for Fort Bragg is Zone 8a. For additional information about selection and placement of plants, see the North Carolina Urban Tree Evaluation Program website, www.ces.ncsu.edu/fletcher/programs/nursery/ncutep.
- In order to restore or maintain the integrity of the natural longleaf pine ecosystems, more than 50 percent of all canopy trees included on all landscape plans on Fort Bragg will be Longleaf Pine (Pinus palusthis).
- "Do not plant invasive or exotic plant material." For more information on invasive species, see the following links:

  http://www.invasivespecies.gov

  http://tncweeds.ucdavis.edu/links.html

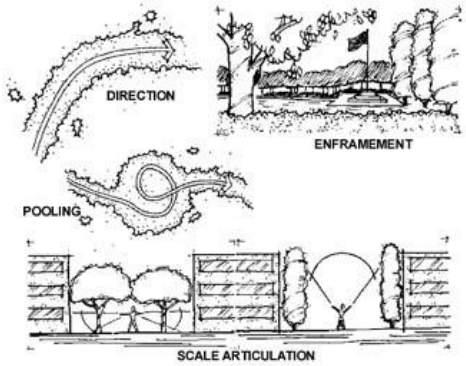
  http://www.nps.gov/plants/alien/factmain.htm

  http://www.natureserve.org/conservation/invasivespecies.jsp
- Follow Fort Bragg's integrated Natural Resources Management Plan (INRMP) Section 9.2 (Forest Management) to promote longleaf pine/wiregrass communities and prevent fire-suppressed habitats.

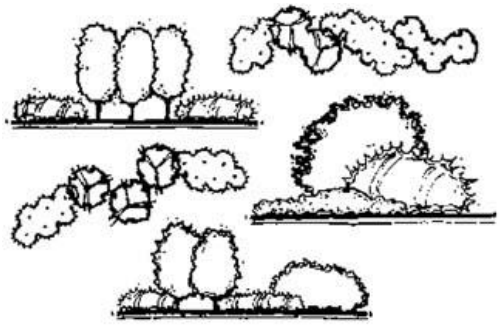
The following landscape design principles should be used to guide the future development and renovation of the Fort Bragg landscape.

- Plant Size - Plant adequate size material to provide immediate effect but balance with the cost and ease of transplanting.
- Plant Spacing - Trees should be arranged in formal patterns or in informal groups located at irregular intervals throughout a site. Group shrubs as an informal mass or a formal hedge. Spacing is determined by the shrub’s mature size. Do not over crowd or allow spacing to form gaps between mature shrubs.
- Aesthetic Balance - Arrange plant groupings to maintain a balance of form and texture. When plantings are grouped in landscapes they become design components that provide:
- Direction - Created by controlling and limiting movement or views to a linear space with relatively consistent width and form of plant massing.

- Pooling - Achieved by creating a larger defined space, or room, where an activity could occur.
- Enframement - Drawing attention to a focal area or an important view.
- Scale Articulation - The ability to change the perceived size of a space by using plant material to divide the space, either horizontally, or vertically in order to reduce the apparent size of the space.
- Drought Tolerance - Select varieties of plant material that are drought tolerant.
- Interest - Select varieties of plant material to insure year-round seasonal interest. Interest is provided by foliage, flowers, and fruits.
- Texture - Choose plant material to provide a variety of textures. Plant type in a grouping should be located to form a progression of textures from small, fine textured plants in the foreground to large coarse textured plants in the background.
- Nuisance Factors - Do not select plant material with fruit over 1/2-inch in diameter for use in airfields, living or parking areas or near ramps.
- Do not include plants with poisonous parts or thorns around family housing, child care centers, and schools.
- Do not plant material with large flowers, large leaves and/or dripping sap around parking areas.
- Avoid selecting plant material with troublesome or aggressive root systems near buildings, pavement, or underground utilities.

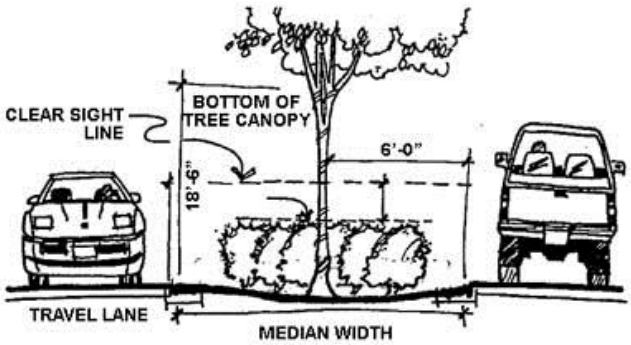


Plant Groupings Provide Direction, Pooling, Enframement and Scale Articulation


Arrange Plant Groupings to Maintain a Balance of Form, Seasonal Interest and Texture

2.2.5.3 Street/Shade Trees

Street trees are an effective aid to visual and spatial orientation. The use of a formal planting scheme on primary roads and a variation of that scheme on secondary roads reinforces the road hierarchy. Street trees also provide shade, scale and a sense of enclosure to the street and its adjacent pedestrian walks.



A Clear Sight Window must be Maintained in All Planted Medians

Specific tree species selection criteria should include not only the visual characteristics of mature height, spread, shape, texture, and mass, but also the soil and light requirements and drought and pollution tolerance.

All street trees must have a minimum 18'-6" vertical clearance to its lowest over-hanging branch when located four feet from a sidewalk. Spacing between trees may vary according to individual species, but will generally be a minimum of 30 feet and placed with concern for street lighting and intersections.

The placement of trees can be used to divide and define open space. They provide shade, shelter and add interest to pedestrian areas such as walks, seating areas, and plazas. All large trees must be located away from buildings to meet DoD Force Protection Construction Standards.

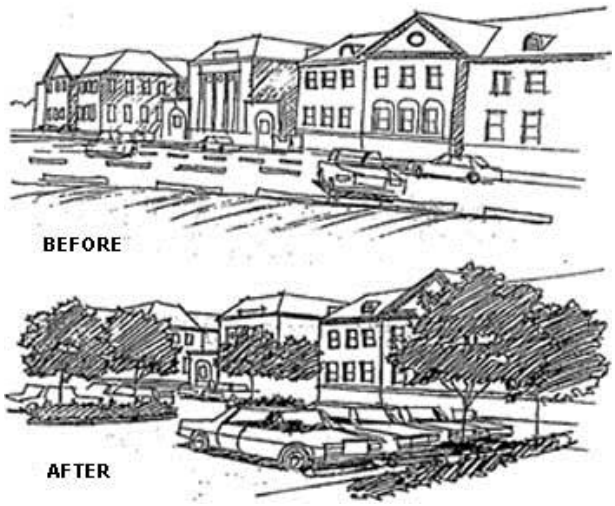
2.2.5.4 Foundation Planting

Foundation planting is used to create a reduction in the scale of structures and visually “anchor” the building to the ground. Foundation landscape treatments should be emphasized in the front, sides, and entrance of the building. Building corners should be enframed with large plant material. Building entrance should be accented with specimen plant material to identify the entry. Landscaping of administration buildings and other primary facilities should be more elaborate to identify their importance.

Plant Material In Recessed Beds is Used to Identify and Accentuate the Main Entrance

Trees planted in proximity to Buildings shall meet DoD Force Protection Construction Standards (www.hnd.usace.army.mil/techinfo/ufc/ufc4-010).

2.2.5.5 Parking Lot Planting



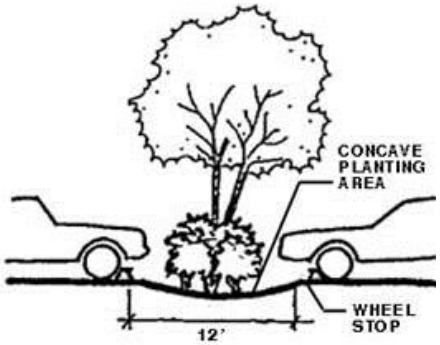
Landscape Plantings Provide Visual and Climatic Relief from Large Expanses of Pavement

Landscape plantings in parking lots provide screening and shade, and help define the space. They provide for the reduction of heat islands and increase the potential for stormwater infiltration. Plant material for parking lots must be selected, located, and arranged properly to achieve these objectives.

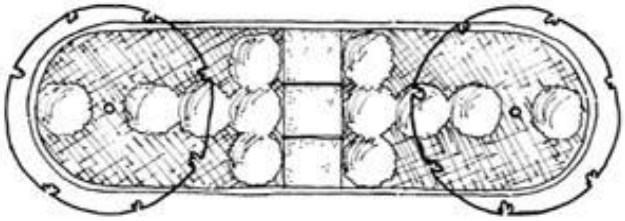
Trees and shrubs provide visual screening within and around parking lots to relieve the negative impact of the broad open surface and parked vehicles. Trees also provide shade to relieve the heat and glare generated by the paved surface and parked vehicles.

Planting islands must be of adequate size for air exchange and water infiltration requirements. A 12-foot minimum width for these islands is recommended. The islands should be designed to Low Impact Development (LID) practices that provide for stormwater retention and filtration. Provide a 24-inch clear area for vehicle bumper overhang. Include wheel stops to define and protect all planting islands.

If pedestrian traffic crosses the planting area, the design should provide for a barrier to direct people around the island or a defined paved walkway through it. Tree species selected should be relatively litter free with minimal sap droppings.

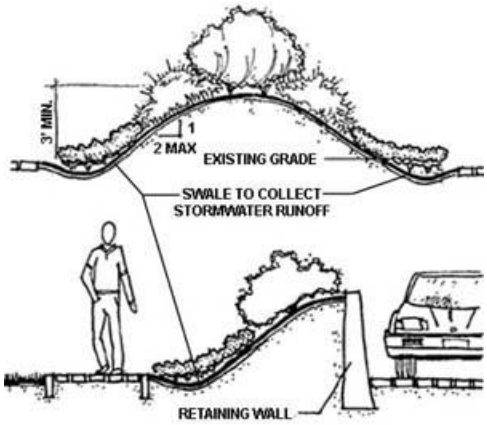


A Minimum of 12' is Recommended for Parking Lot Islands



Plan Showing Typical LID Planting in Recessed Beds With Curb Cuts For Stormwater Retention and Filtration.

2.2.5.6 Screening and Buffering



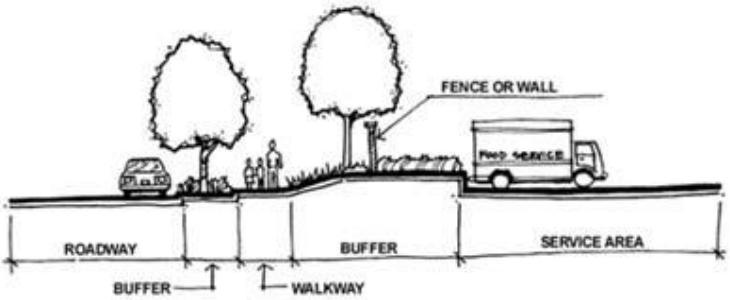
Planted Berms Provide an Effective Means for Screening Undesirable Views

Plant material is very effective when used to screen undesirable views, to visually separate incompatible uses and to create areas of privacy. The use of evergreen plant material is recommended for screening purposes it will provide screening year-round. If deciduous vegetation is used, it should be used in the foreground material or as accents.

Berms and/or architectural screens may be used in addition to required plant material. Berms should be a minimum of three feet high with a maximum slope of 2:1 and planted with ground cover and shrubs. Architectural screens may be used where immediate screening is needed or where the space is inadequate for a berm. Architectural screens should be used together with plant material. The use of architectural screens must be approved by DPW and conform with materials and colors of adjacent structures.

2.2.5.7 Image Planting

An installation's image is formed by the visual impressions at key locations. These locations correspond to the primary visual corridors as described in the visual survey and analysis. These primary visual corridors are the principal paths people use to move about the installation and provide the primary points from which the installation is viewed. Major intersections and major buildings are also ideal locations for high image landscape treatment.



Architectural Screens Used in Combination with Plant Material Create an Immediate and Attractive Buffer

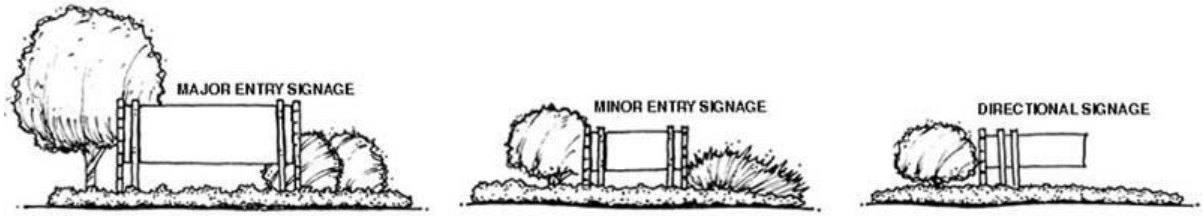
The "theme trees" discussed in Section 2.2.5.2 provide a means for creating specific image identities for individual districts. Trees have distinctive growth habits and shape. Planting a particular tree with its symbolic form consistently within a district will promote unity within that area.

The visual impact and importance of roadway signs can be of enhanced through the selection and placement of trees, shrubs, and groundcover.

2.2.5.8 Pedestrian Control

Plant material should be placed to lead and funnel pedestrians to building entrances, primary corridors, or other pedestrian areas.

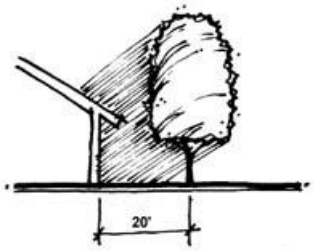
Plant material can be placed along the edges of pedestrian walks to define their edges and to confine traffic within them. “Corner cutting” and “cow paths” quickly form as personnel take the shortest route to their destination. Placement of small trees and shrubs at the intersections of sidewalks will help prevent pedestrian corner cutting.



Landscape Treatment for Identification Signage should Reflect the Relative Importance and Hierarchy of the Facility

2.2.5.9 Climate Control

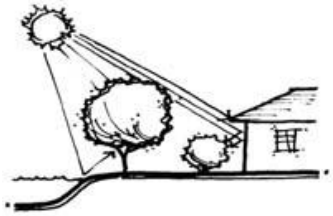
Landscape material can be used in harmony with natural climate conditions to modify and improve the environmental quality of Fort Bragg. This relationship can be applied toward energy conservation, microclimate modification, and wind pattern control.



Deciduous Trees Block Summer Sun but Allow Winter Sun to Penetrate

Sustainable development begins with energy conservation in the site planning phase. Buildings oriented with an east-west long axis minimize heat built-up from sun exposure. Shade trees can be planted on the buildings south and west sides to shade the areas of the building that receive the most sun and reduce the energy needed to cool the building.

Plant material provides areas of reduced summer air temperatures through a cooling effect created by transpiration. Ground surfaces covered by plant material have more stabilized temperatures than those with paved surfaces. Shading of pavement reduces heat absorption of solar radiation.

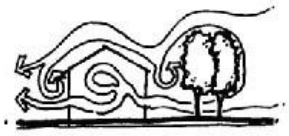


Plant Material can be Effectively Used for Glare Control

Plant material massings can be used to divert the direction and change the velocity of wind. Summer breezes can be directed toward buildings to promote cross ventilation by the use of wind screens and streets oriented in the same direction. Channeling of wind creates a funnel effect that increases wind velocity.

Plant material can be placed in strategic locations near large paved areas, such as parking lots and maintenance areas to reduce the unpleasant effects of glare and reflection.

Plant Material Provides Pedestrian Control and Separation



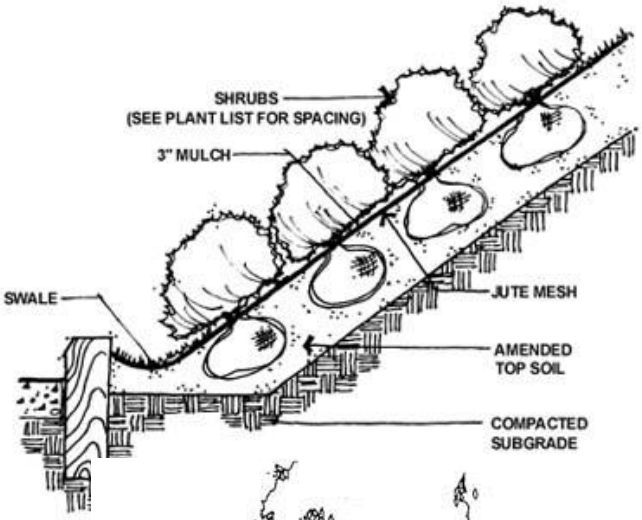
Plant Material can be Utilized to Direct and Channel Breezes

2.2.5.10 Erosion Control

An erosion control plan (ECP) is required for all soil disturbing activities at Fort Bragg. Plans must be submitted and space approved by the Directorate of Public Works Environmental Sustainment Division (DPW-ESD). Where the limits of construction are greater than one acre, the plans approved by DPW-ESD are submitted to the North Carolina Department of Environment and Natural Resources (NCDENR) for final approval. Water is the most significant eroding agent of soil. Water erosion is caused by splash and runoff. Splash erosion is best controlled by ground covers. Runoff or sheet erosion is best controlled by grasses and plants with very fibrous root systems.

All disturbed areas shall be stabilized within 24 hours of disturbance. Until that time, temporary diversion ditches, dikes, silt fences, or filter boxes are suggested to protect the site's surface from wind and water erosion.

Walls are another means of erosion control. Many prefabricated retaining wall systems are available. These walls can be assembled easily as site-specific solutions that are complementary to the surrounding architecture. They are recommended for high-visibility areas.

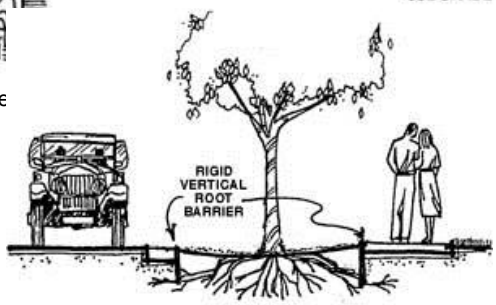


Plant Slope

2.2.5.11 Root Control

Some trees have aggressive root systems that spread laterally and can cause major damage to surrounding asphalt, and concrete surfaces, and curbs. The best deterrent to tree root damage is to select the proper tree for the given planting area.

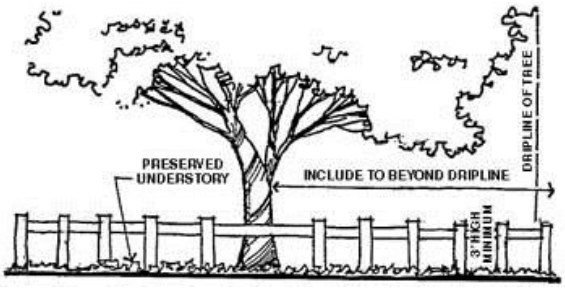
Aggressive root systems can be contained with the introduction of barriers that deflect root growth away from surfaces that might be damaged. There are numerous available products to contain root systems. These products range from tree rings of extruded polyethylene to herbicide impregnated geotextile fabric.



Root Barrier Systems can Prevent the Upheaving and Erosion of Sidewalks

2.2.5.12 Protection and Preservation

Existing urban trees and forests are valuable natural resources and visual assets that should be preserved and enhanced for their functional and aesthetic benefits. Natural areas of a site should be left essentially intact. It is especially important to maintain existing understory plants to provide wildlife habitat and to control erosion and stormwater runoff. Where development such as sidewalks and bike routes cross natural areas, the corridor disturbance should be minimized and existing understory plant material allowed to grow to the path.



Tree Protection Barriers Protect Existing Trees from Construction Damage

At edges between natural and developed areas, maintenance can be reduced by allowing existing vegetation to remain at the edge. Transitional shrubs and trees can be added to enhance these edges. The edges should curve in a natural form rather a straight, linear fashion. Cleared areas should be varied in shape and size to maintain a natural character.

Disturbance of existing vegetation in developed areas should be minimized. Areas of plant material should be selectively preserved and new plantings added to enhance the landscape character and provide benefits discussed in this IDG.

Precaution measures to preserve trees and other vegetation during construction include:

- Install a temporary barrier several feet beyond the drip line of a tree to restrict damage from construction equipment. More than 50 percent of the roots are outside of the drip line.

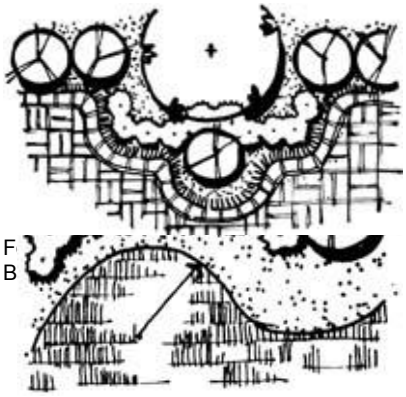
- Maintain natural drainage near individual trees.
- Do not place soil inside the drip line of a tree.
- Where excavation is required, trees can be saved be using raised tree islands that extend to the drip line of the tree.

2.2.5.13 Installation

Trees and shrubs should be planted together in planting beds to create a unified appearance and achieve the desired design impact. Planting beds enhance sustainability by clustering material in defined areas that result in reduced maintenance costs.

Planting beds should be laid out in smooth, curvilinear lines that are natural in shape. Formal areas should be more rectilinear and symmetrical.

The planting beds should be designed to allow for maneuvering of maintenance equipment. A minimum three-inches of mulch should be installed to limit weed growth and help hold water, thereby reducing maintenance requirements.



Free flowing Plan Utilizes Asymmetrical Balance

2.2.5.14 Planting Requirements

The following Landscape Standards, can be used to determine the planting requirements for new projects.

Steetscape Trees: Trees other than existing, shall be planted within planting strips according to one of the following requirements.

- Large shade trees shall be spaced no more than 75 feet apart with a minimum of one tree on plans with street frontage greater than 50 feet.
- Small size ornamental trees shall be spaced no more than 50 feet apart.

Parking Lot Trees: Trees shall be required on all vehicle use areas (VUA) in excess of 5,000 sf in accordance with one of the following requirements.

- One large shade tree for every 5,000 sf of VUA for the first 40,000 sf, plus one large shade tree for every 10,000 sf of VUA over 40,000 sf.
- One small shade tree for every 2,500 sf of VUA for the first 40,000 sf plus one small shade tree for every 5,000 sf of VUA over 40,000 sf.

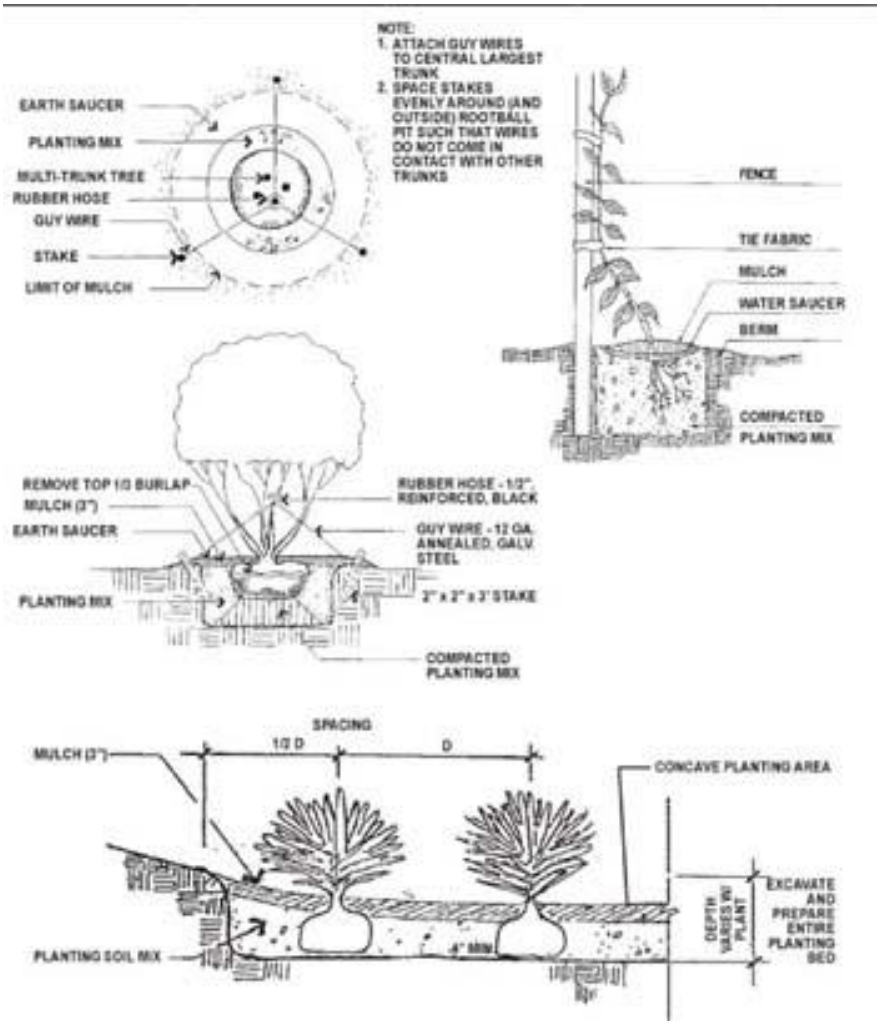
No more than 25 percent of the parking spaces in the VUA shall be located more than 100 feet from the trunk of a required tree. Trees required by streescape requirements may be used to meet the VUA requirements.

Entrance/Foundation Planting: Develop a hierarchy of planting complexity so that lower echelon administrative facilities such as company operations and supply receive simple plantings, battalion and brigade headquarters receive more plantings, and command and higher headquarters receive the most complex planting schemes.

Screening

Screening shall be required along all perimeters when abutting a different land use and around loading/service areas. Screening can be accomplished by one of the following:

- A continuous row of large evergreen shrubs shall be planted a maximum of six feet apart.
- An opaque fence or wall with a minimum height of six feet and maximum height of seven feet. The design and materials of a fence or wall must be presented as part of the site plan approval.
- As a last resort, an earth berm to minimum of six feet to be vegetated with grass, shrubs, or trees.



Typical Landscape Details

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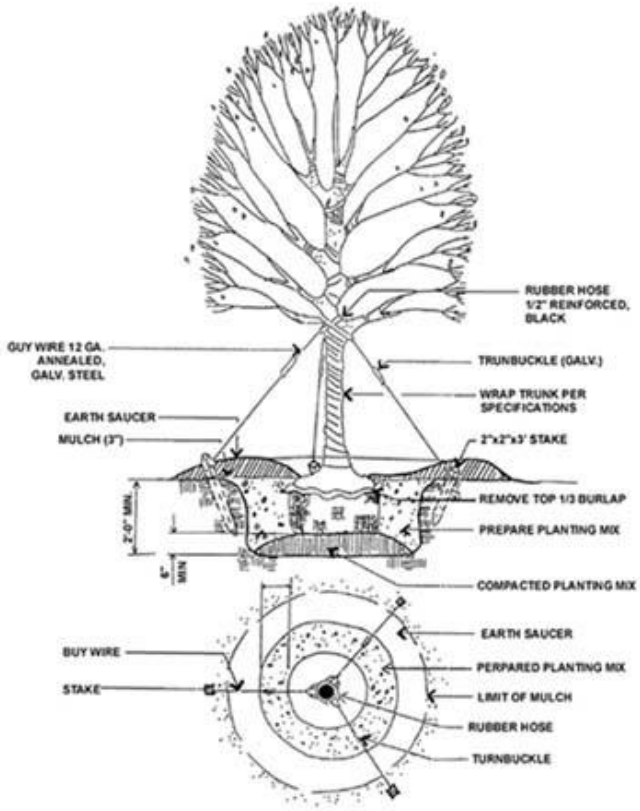

Typical Landscape Detail

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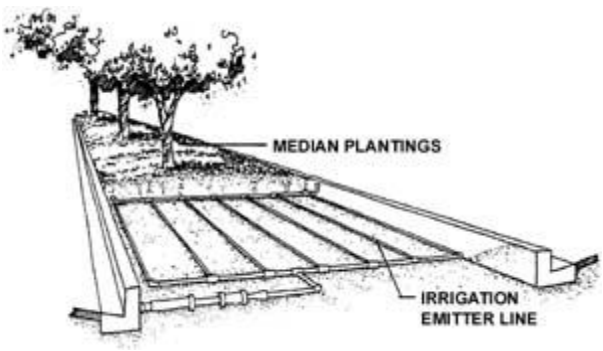
2.2.5.15 Planting Instructions

Newly planted trees, shrubs and ground covers should generally follow the standard planting and staking details shown on this and the following pages. The designer should evaluate the specific site conditions to determine if modifications are needed because of site or soil conditions.

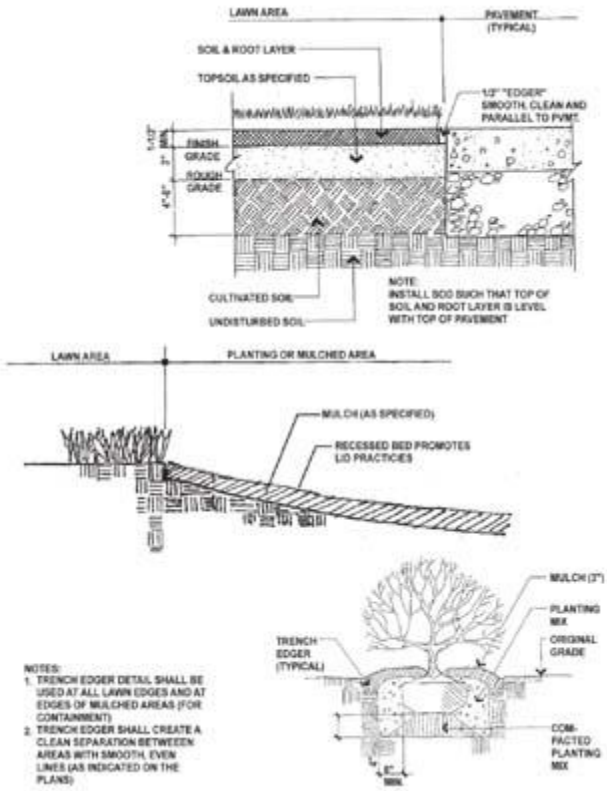
2.2.5.16 Maintenance

The purpose of the maintenance guidelines is to define minimum maintenance standards to promote a uniform, neat and clean appearance throughout Fort Bragg. Established plantings usually require less maintenance as the plant establishment period proceeds. However, each tree, shrub and ground cover is unique, and site conditions may alter the anticipated maintenance schedule. Maintenance requirements are as follows

:



A Drip System is a Cost Effective Means of Providing Irrigation



Typical Landscape Details

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Sustainable Landscape: It is recommended that plant material selection utilize native and naturalized plants. Their use provides a more sustainable landscape environment because they reduce maintenance requirements for watering and fertilizer, thereby reducing costs, manpower, and damage to the environment.

Watering: Native and naturalized plants that are more drought tolerant are recommended to reduce water requirements. When an irrigation system is considered for a project, a low water or drip system should be considered.

The soil should be examined regularly to determine when watering is needed. Plants must be watered immediately if the soil is dry to the touch a few inches under the surface or if the leaves of plants are wilting. The use of water polymer crystals is recommended to increase water holding capacity of the soil.

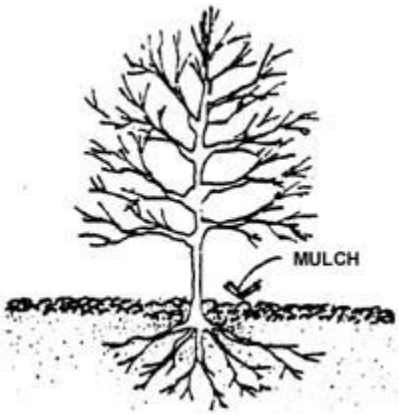
Weed Control and Mulching: The planting bed around the plant material should be kept weed free so that plants will not suffer from the competition of more vigorous weeds for moisture and plant nutrients.

Mulching helps to reduce weed growth and evaporation of soil moisture. Shredded bark mulch or pinestraw should be maintained at a depth of three to six inches. The use of other mulch materials is not recommended. Heavily shaded areas that will not support vegetation should be mulched to provide a neat appearance.

Fertilization: Nitrogen (N), phosphorus (P), and potassium (K) are the three primary chemical elements required by plants. These elements are present in varying amounts in most soils and form the basis for all fertilizers. If plants are surrounded by pavement or growing in a lawn where the leaves are raked and removed,the natural recycling of chemical elements is lost and must be replaced by periodic fertilizing.

The time to begin fertilizing will vary with different plants or growing conditions. Choose application time based upon the season and the timing in the plants life cycle. Apply nitrogen based fertilizer to cool season grasses in late summer and warm season grasses in mid-spring.

The type, amount and frequency of fertilizer application should be determined on the basis of the location (is the site close to a watershed?), condition of the soil, and the size and variety of plants.



Mulching will Help Soil Retain Moisture & Reduce Weed Growth

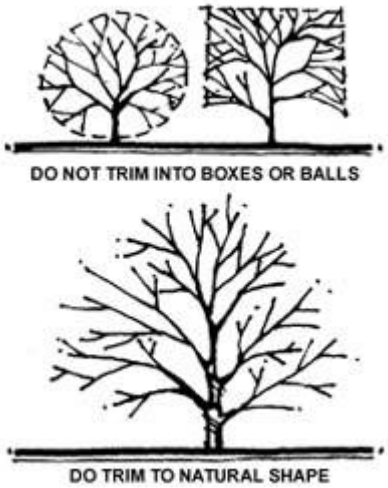
Typically, fertilizers containing a large proportion of phosphorus are desirable because this element contributes most to root growth. Slow-acting fertilizers are preferable to fast-acting or soluble fertilizers that leach away rapidly.

Control of Insects and Diseases: All landscaped materials must be certified by the state that they are pest and disease free by a quality assurance "clearing house" on Fort Bragg.

If insect or disease damage or infestation occurs, remedial measures should be taken at once. Professional help should be obtained to identify the problem and recommend specific treatment. It is sometimes more expensive to control a disease than it is to replace the plant with a similar, healthy plant or with an immune or disease-resistant cultivar. Dead or dying plants shall be removed and replaced as quickly as possible (30 days maximum).

Pruning: Pruning is used to eliminate diseased or damaged growth, to eliminate weak, narrow V-shaped branch forks, to reduce toppling and wind damage by thinning out crowns, to maintain growth within space limitations, to maintain a natural appearance, and to balance crown with roots.

Pruning should enhance the natural growth patterns of trees. It is usually limited to the removal of dead or broken branches and some cutting back to keep trees and shrubs within bounds. Significant pruning should be done under the supervision of an arborisrt.



Trees and Shrubs should be Pruned According to their Natural Growth Pattern

Primary pruning should be done during the dormant season. Damaged trees or those that constitute health hazards should be pruned as needed. Buds on spring blooming shrub are set in the winter, so they should be pruned immediately after flowering.

2.2.5.17 Plant Material

Trees, shrubs, ground covers, vines and turf comprise the palette of elements in planting compositions. The use of a limited plant palette is encouraged in the establishment of a common post-wide image. Because of the scale of most spaces on the post, mass planting of a few species is more appropriate than incorporating a large variety of plantings in small quantities.

High quality plant materials in a well designed settings should be used. They will accomplish more than an extensive and unplanned application of low quality plant material. This may seem obvious, yet the appeal of planting ten small trees is often more compelling than the opportunity to plant three very good medium size trees.

A number of factors must be considered in the choice and placement of plant material. These factors include growth characteristics, water, soil, and light requirements, and characteristics such as color and fragrance. Plants that will produce the desired effect and are capable of thriving with low maintenance under actual site conditions should be used.

The use of indigenous (native or naturalized) is recommended. These species are found thriving at Fort Bragg. Their use results in a more sustainable landscape.

Trees and Shrubs: To assure maximum effectiveness with the lowest maintenance, emphasis should be placed on the use of trees rather than the extensive use of shrubs. Properly selected and placed trees will ultimately be less expensive to maintain than shrubs, have a greater visual impact, and are more sustainable. Simple, effective planting designs can be achieved with trees and lawns and the judicious use of shrubs.

Vines: Vines should be selected and placed carefully becaues many climb by means of tendrils that can damage wood or masonry walls. Maintenance and repair work can be difficult and costly if vines must first be removed. Generally, vines should be restricted to arbors, trellises, and structures other than buildings.

Ground Covers: Low growing ground covers have a variety of functions in the landscape. They are most effectively used in areas that are inaccessible or difficult for mowing equipment to reach. Typical planting applications include steep slopes and parking lot islands. Ground covers are also appropriate in pedestrian spaces adjacent to building entrances and courtyards. The use of ground cover should be encouraged to reduce mowing requirements on post.

Invasive Species: The following plant species are invasive and shall not be planted at Fort Bragg:

- Chinese Tallow (Sapium sebiferum)
- Chinese Privet (Ligustrum sinense)
- Kudzu (Pueraria lobata)
- Korean, Chinese, or Sericea Lespedeza (Lespedeza cuneata)
- Hydrilla (Hydrilla verticillata)
- Alligatorweed (Alternanthea philoxeroides)
- Tree of Heaven (Ailanthus altissima)
- Chinaberry (Melia azedarach)
- Autumn or Russian Olive (Eleagnus umbellate)
- Mimosa (Albizia julibrisson)
- Multiflora Rose (Rosa multiflora)
- Lovegrass (Eragrostis sp.)
- Wisteria (Wisteria sinensis)
- Giant Reed (Arundo donax)

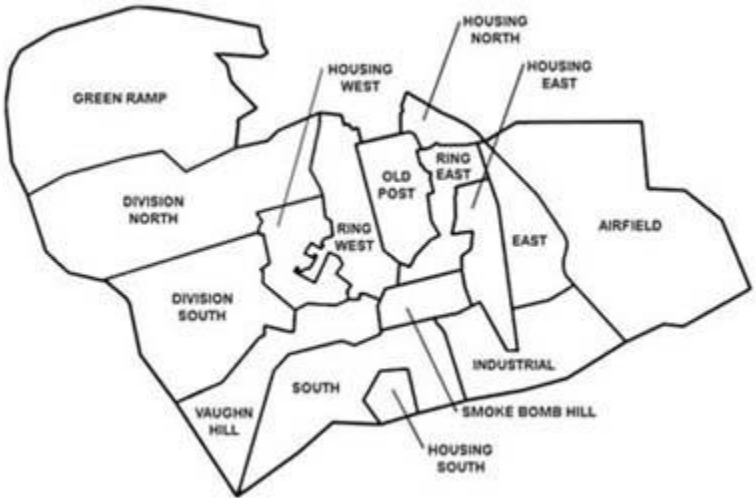
2.2.5.18 Recommended Plant Material for Fort Bragg

For recommended plant materials to be used on Fort Bragg, please go to Chapter 3.2.4 D.

2.2.5.19 District Specific Guidelines

The following are district specific guidelines for the selection and placement of theme trees by district. Only those items which vary from the post-wide standards or are particular to a district are shown. Adhere to post-wide design standards unless otherwise specified as a district specific guideline in this section. When a tree planting project occurs within a district, give special consideration to the theme trees recommended for that district.

Table R



2.2.6 Signage

Signs are used to visually communicate information and are a highly visible feature of the installation. Careful consideration must be given to their appearance and relation to the surroundings. Signs should be an attractive and harmonious part of the visual environment. The creation of a coordinated signage system will enhance Fort Bragg's visual image and improve the efficiency of movement.

Signage Reflects the Importance of the Activity Relative to the Installation

A sign system must communicate information effectively and efficiently. It must present a sequence and hierarchy of information that is logical and responsive to user needs. The system should provide a sense of consistency and continuity to the installation's overall visual image. It must be designed to be adaptable, compatible and integrated into the design of other site features.

The following criteria provides recommendations for the design and location of all signs at Fort Bragg. Signs not in compliance with these guidelines are not permitted unless approved by the DPW.

2.2.6.1 General Provisions

This section regulates all exterior signs and interior signs positioned for exterior observance. Signs should be used only as necessary. Redundant, unreadable, and outdated signs should be moved.

DPW approval is required prior to installing, painting, remodeling, relocating, or expanding any sign. No approval is required to perform normal maintenance and repair of a conforming sign or to change a message on a sign or marquee specifically designed for this purpose.

Other general sign provisions include the following:

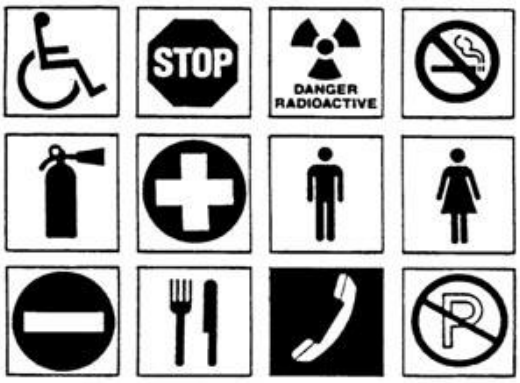
- Public safety signs not exceeding two square feet do not require site approval. Examples include emergency telephone, restroom, and underground utilities.
- Street signs, not located in state rights-of-ways, do not require site approval.
- Signs placed for less than 30 days do not require site approval. These shall be removed by those placing them.
- Signs conforming to previous regulations, but not conforming to this guide, will be removed and replaced.
- Nonconforming signs shall not be enlarged, repaired, reconstructed, changed, including wording or graphics changes, except to comply.
- Signs not specifically outlined in this IDG are not authorized unless approved by the Garrison Commander. Examples include signs identifying S1, S2, S3, S4, classroom, motor pool, etc.

Simplified Signs are Easy to Read

- Signs itemized in this section shall be placed at the appropriate buildings regardless of its real property category, unless specified otherwise.
- No signs shall interfere with or confuse traffic or other aspects of safe driving conditions through use of improper wording, graphics, location, size, shape, or color. No sign shall use the words "Stop", "Go", "Caution", Yield", etc., when such would be confused with traffic signs or devices.

2.2.6.2 Sign Details

The following details shall apply to all signs at Fort Bragg:



Acceptable Symbology Commonly used as Signage Graphics

- All signs will either be pre-manufactured from materials meeting or exceeding the EPA required minimum recycled content or fabricated by DPW. Low quality and "homemade" signs are prohibited.
- Any sign that is mechanically animated (i.e., revolves, rotates, or moves in any way) is prohibited.
- Signs will be brown Federal Specification Color Number 20059 and white (i.e., Park Service colors).
- Locate signs where they are visible and unobstructed.
- Signs will not indicate building numbers, hours of operation, or names of individuals (commander, first sergeant, OIC, manager, etc.).
- Sign wording shall be brief and limited to essential information. Words may be abbreviated if the message remains easily understood.
- Commercial symbols are allowed only on MWR signs.
- Unit Insignias and logos are not allowed on signs.
- Signs generally are not landscaped; however, if ornamental planting occurs in the vicinity of the sign, locate the sign in the planting bed.
- Temporary signs do not require landscaping; changeable signs are not considered temporary.
- Any exposed lighting tubes, strings of lights, spotlights, or any illumination that causes direct glare upon an unrelated building are prohibited.
- Any flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.
- Signs may be lit by remote lamps or backlit where nighttime identification is required such as at clubs, shopping areas, and post entry points.

Caution should be used when Locating Signs to Avoid Obstructed Views

- Internally lit signs must have an opaque message surface displayed at all times, and at no period will views be allowed to the inside of the sign regardless of whether a message is on the sign or not.
- Use of neon is allowed for entertainment/food-type uses. Approval is required by DPW.
- Typically, signs are single-sided if parallel to traffic flow. Signs that cannot be located parallel to the direction of traffic may be located perpendicular to traffic.
- Kiosks, informational signs, and “You Are Here” maps are to be centrally located in “Activity Nodes” as defined by the District Plate graphics.
- For military building signs, quantities are limited to one of each type allowed.
- For MWR Building signs, facilities shall use no more than two of the specified signs.
- Quantities are limited regardless of whether facilities are located on corners, have exposure to multiple roads/drives, or have building entrances visually separated from roads/parking lots.
- All signs, except as mentioned below, use Helvetica.
- Sign Types C, D and E Series use Clarendon medium.
- Traffic signs will follow guidelines in the Federal Highway Administration’s “Standard Alphabets for Highway Signs and Pavement Markings” standards.

Planting Beds can be Utilized to Accentuate Signage

ABCDEFGHIJKLMN
OPQRSTUVWXYZ

Use Helvetica Type Style Unless an Approved Alternative is Noted

ABCDEFGHIJKLMN
OPQRSTUVWXYZ
abcdefghijklmn
opqrstuvwxyz

Clarendon - The Alternative Type Style

2.2.6.3 Sign Mounting and Location

Locate identification signs typically at building entrances and/or other parts of the building visible from the main access street. Building signs should be visible from the main circulation paths to the building (vehicular or pedestrian).

Place building and/or facility identification signs within the first 20 percent of the distance closest to the road between the road and the building. These signs shall be placed so as not to obscure any other identification, information or vehicular regulatory signs.

Signs that cannot be located parallel to the direction of traffic may be located perpendicular to traffic.

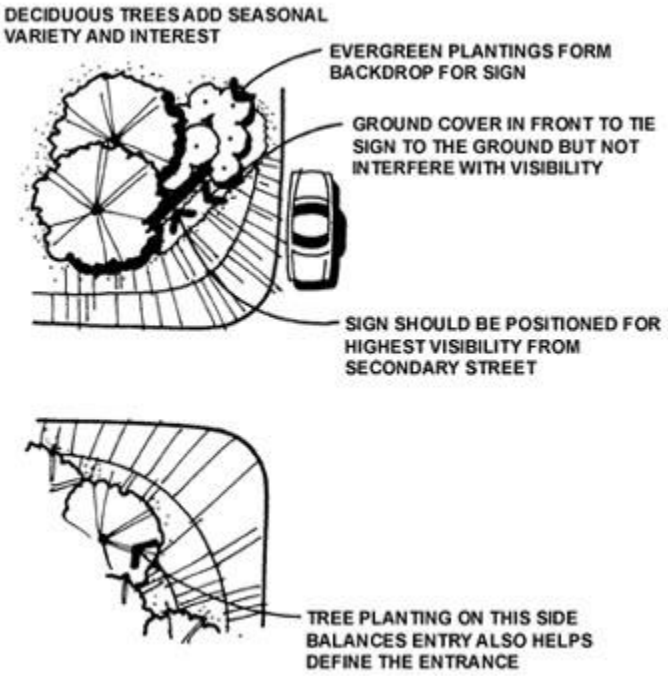
The minimum distance between sign and driveway or intersection should normally be 100 feet. One identification sign for each building is sufficient unless vehicular access occurs on two or more sides of the building.

Provide signs to identify facilities dedicated to or accessible to the handicapped, such as parking spaces, building entrances, and restroom facilities.

Mounting Signs on Buildings

When signs are mounted on buildings, the following requirements shall apply:

- No sign may be mounted on the outside of the door, except small signs (one square foot or less) that indicate required use of an alternate entrance.
- Signs such as “Escort Required” or changeable signs are not permitted.
- No sign may be attached or mounted to roofs and parapets.
- No sign shall be painted or applied directly onto the surface of a building.
- No permanent signs shall obstruct any window, door, fire escape, ladder, or opening intended for light, air, or egress.
- No temporary sign in windows or glass walls is allowed to cover more than 20 percent of the glass area.



Consider Basic Planning and Design Objectives in Sign Placement

- No signs shall interrupt the vertical and horizontal features of the facade.
- No sign may be tacked, posted, painted, or otherwise affixed to site elements such as sheds, trees, or structures.
- No sign may be attached to utility poles except for pole identification or warning.
- Fasten projecting signs directly to the supporting building wall and integrate the frame into the sign. These signs shall intersect at right angles to the building front and shall not extend above the roof line or the parapet wall.
- Signs may not project more than five feet from a wall or two-thirds the width of the sidewalk, whichever is less.
- In no case may signs be closer than 18 inches to the curb line. A minimum clear height of 8 feet 6 inches above the ground is required.

Mounting Multiple Signs

Mount multiple signs on a shared frame when it is necessary to site these signs in the same vicinity. Two Type A Series signs may be stacked vertically on one frame. Three Type A Series may be mounted side by side. Other signs may not ordinarily share a frame unless otherwise described.

2.2.6.4 Sign Descriptions

Type A1, Medium Metal - 36-inch by 30-inch metal panel colored brown with 3/4-inch white border and white reflective upper and lower-case letters. The sign is mounted on two metal "U-channel" posts colored brown (Fed. Std. 595B - #20059)

Type A2, Small Metal - 12-inch by 18-inch metal panel colored brown with 1/2-inch white border and white reflective letters. The sign is mounted on one metal "U-channel" post, horizontally or vertically.

Type A3, Small Metal - 18-inch by 24-inch metal panel colored brown with 1/2-inch white border and white reflective letters. The sign is mounted on one metal "U-channel" post or fence or wall, horizontally or vertically.

Type B, Large Metal Panel - 48, 60, or 72-inch by 36-inch metal panel colored brown (Fed. Std. 595B - #20059) with white ¾-inch border and white reflective upper and lower-case letters. Mount on two pressure treated wooden 4-inch by 4-inch posts.

Type C, Medium Redwood - 2-foot 6-inch by 8-foot 6-inch high-density urethane with 2-inch smooth border and sandblasted raised white reflective centered uppercase and lowercase letters. The sign is mounted on 6-inch by 6-inch pressure treated wooden posts, three on each end.

Type D1, Large Redwood Sign

Type D1, Large Redwood - 6-foot by 19-foot, 6-inch wide high-density urethane with 2-inch smooth border and sandblasted raised white reflective centered upper and lower case letters. The sign is mounted on 6-inch by 6-inch treated wooden posts, three on each end.

Type D2, Large Redwood - 7-foot by 24-foot high-density urethane panel with 3-inch smooth border and sandblasted raised white reflective centered upper and lower case letters. The sign is mounted on ten, 8-inch by 8-inch pressure treated wooden posts, five on each end.

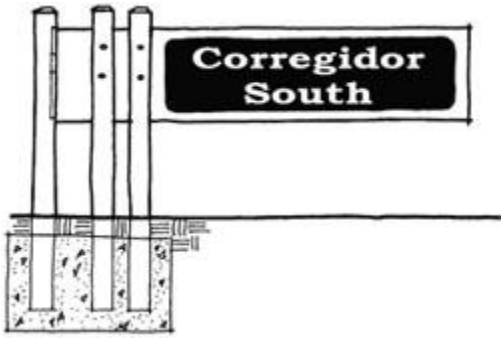
Type D2, Large Redwood

Type E, Family Housing - 2-foot - 6-inch by 9-foot 6-inch high-density urethane panel with 2-inch smooth border and sandblasted, raised, white, reflective, centered, upper and lower case letters. The sign is cantilevered from five, 6-inch by 6-inch pressure treated wooden posts.

Type F1, Building - 28-inch by 8-inch metal panel colored brown with white reflective letters and no border.

Type F2, House Number - 14-inch by 7-inch metal panel colored brown with white reflective letters and no border and mount in vicinity of the front door.

Type G, Chapel Sign - 5-foot by 3-foot-6 inches synthetic panel colored white with black letters. The chapel name panel is one-foot high, white synthetic, with black letters lit internally. The sign is mounted on two 2 ½ -inch square, metal posts colored brown and capped with a finial.



Type E, Family Housing Sign

Type H1, Large Synthetic - 10-foot by 6-foot prefabricated synthetic panel with colors complementary to the district colors within which it is placed. The sign is mounted on a brown 10- or 12-inch diameter pole. The overall sign height is limited to 22 feet. This sign may be affixed to a wall or lit internally.

Type H2, Individual Letter Signs - These are signs which consist of individual letters mounted directly onto a wall exclusive of any sign surface. Total area of the minimum imaginary rectangle or square of vertical and horizontal lines which fully encloses all sign words or message is ten feet by six-feet. Letters shall be professionally manufactured, reflective metal letters. Letter color shall be of high contrast to its mounting background. Faceted or sloped letter surfaces are optional. Letter style may be either Helvetica or Clarendon depending on the district character.

Type H3, School Signs - Variable message board 3-foot by 8-foot with surface mounted text may be used by schools. Sign may be single school color, will be internally lighted and may have a graphic of the school mascot. Mount on red brick base. Top of sign may not be higher than four feet above ground.

Type I, Variable Message Signs - Variable message board 4-foot by 8-foot with internal electronic text and graphics shall be brown (20059) on all sides with white letters and may have a graphic of the proponent. Mount on red brick base. Top of sign may not be higher than seven feet above ground.

2.2.6.5 Sign Categories

Military Building Signs

Any land use not mentioned below will use a sign that most closely matches one mentioned.

See Sign Description (Section 2.2.6.4) for sign type descriptions.

• Battalion-Level Commands	Type B
• Brigade/Group Regiment	Type C
• Company/Battery/Detachment	Type A1
• Corps Headquarters	Type D1
• Business Centers	Type C
• Education Centers and Annexes	Type A1
• "G-Level" Staff Sections	Type A1
• Medical and Health Care Facilities	Type C (except small clinics)
• Offices/Activities Frequented by non-Fort Bragg Personnel (e.g., Defense Reutilization & Marketing Office, Central Receiving, I.D. Card Facility)	Type B
• Special Administration Offices Sections (e.g., Personnel Services Center, Enlisted Records, Officer Records, etc.)	Type A1
• Reenlistment Offices	Type A1
• "Flag-Level" Tenant Units	Type C

Morale/Recreation Building Signs

Any land use not mentioned below will use a sign that most closely matches one mentioned.

See Sign Description (Section 2.2.6.4) for sign type descriptions.

• Arts and Crafts	Type A1
• Auto Craft Shop	Type A1
• Automatic Teller Machine	Type A1
• Bakeries	Type H1, H2
• Banks	Type H1, H2
• Barbershop	Type H1, H2
• Bowling Alley	Type H1, H2
• Car Rental	Type H1, H2
• Car Wash	Type H1, H2
• Chapel	Type G
• Child Care Center	Type C
• Clubs in Permanent Buildings	Type C
• Clubs in Temporary Buildings	Type A1
• Commissary	Type H1, H2
• Gas Station	Type H1, H2
• Guest Quarters	Type E

• Laundromat	Type H1, H2
• Library	Type C
• Movie Theater/Playhouse	Type H1, H2
• Museum	Type C
• Rent-All	Type H1, H2
• Restaurant	Type H1, H2
• Schools	Type H3
• Snack Bar/Shop	Type A1
• Telephone Center	Type A1
• Thrift Shop	Type A1
• Youth Center	Type I

Recreation Signs

• Golf Course	Type C
• Gymnasium/Physical Fitness Center	Type C
• Horse Stable	Type A1
• Motorcycle Track	Type A1
• Parade Field	Type C
• Skating Rink	Type H1, H2
• Sports Field	Type A1
• Stadium	Type A1
• Recreational (All uses not listed)	Type A1

Building Numbers Signs

Use Type F1 for all facilities, temporary and permanent. These signs are required for emergency identification and/or real property management purposes. These also include sports fields, lift stations, shelters, and fuel dispensing buildings.

Excluded from this requirement are family housing units, contractor trailers/buildings, relocatable/portable structures, utilities, fences and transportation systems such as roads, sidewalks, and railroads.

Family Housing Building Numbers

Use Type F1 for all facilities.

Other Signs

- Billboards

  Use billboards at parade fields only. Any other sign that directs attention to a business attraction, or entertainment conducted at a location other than the premises where the sign is located, must be combined with other signs of similar character or type and requires specific site and design approval by DPW.

- Contractor Facilities

  Use Sign Type A1.

- Directional Signs

  Use these signs only for facilities frequented by non-Fort Bragg personnel. Typical examples, include post exchange, commissary, contracting, hospital, information center, and museum.

These are to be located only on major thoroughfares. Use the Federal Highway Administration's "Standard Alphabets for Highway Signs and Pavement Markings" standards.

• Historic Facilities

Upon approval from Cultural Resources historical plaques may be used for any facility properly listed on the State or National Register of Historic Places.

• Memorialized Facilities

Upon approval of the Memorialization Board, special facilities may be identified by a Type C sign.

• Parking Lot Signs

These signs include handicapped, General Officer, Command Sergeant Major, Military Vehicle, Mother with Child, and Visitor spaces. One type A2 for each spaces.

No reserve parking signs, besides those already mentioned, are allowed for any commanding officer, noncommissioned officer, or executive officer.

No "Permit Parking Only" signs are authorized.

Reserved parking signs are permitted for:

1. Company (Troop, Battery) level commanders and 1SGs
2. Battalion (Squadron, Group) level Commanders and CSMs
3. Brigade level Commanders, Deputy Commander and CSMs
4. Flag officers, Deputy and their CSMs

Reserved Parking Signs

Only one installation of the authorized signs allowed.

All signs shall be post mounted. Signs shall be 12 x 18 vertical mounted. Signs shall be aluminum with rounded corners and 1/2" white border – see illustration. Sign face, back and metal post shall be colored/painted Mission Brown Fed Std 20059. Lettering shall be Helvetica medium, upper and lower case, condensed 3" high. No unit names, crests or other graphics are allowed. No additional painting of parking lot appurtenances for unit identification is allowed. Locate potential utilities or install posts by hand digging.

Other Reserved parking spaces:

Handicapped (with logo), Military Vehicle, Mother with Child(with stork), and Visitor spaces. One type A2 sign for each space. Mother with Child and Visitor signs as needed.

"Permit Parking Only" signs are not authorized.

• Portable Signs

These signs are prohibited. Portable is defined as signs designed to be transported from one location to another, with or without wheels or trailer, and typically have a changeable message area.

• Residential Business Signs

These signs are prohibited. Examples include home day-care identification.

• Restricted Area Signs

Use Type A2 when authorized by the Provost Marshal. Sign color will be brown 20059.

• Supplemental Building/Structures Signs

These signs are prohibited. Examples include paint or storage shed and kiosk or shelter identification. Safety/Warning signs specifically associated with a supplemental building/structures are allowed.

- Temporary Signs

  Signs placed for less than 30 days do not require DPW approval.

- Advertisement/Business Announcement

  One sign per location not exceeding 20 square feet. Examples include “Grand Opening”, “Under New Management” and similar announcements. Sign display period limited to 30 days and only once per year per vendor.

- Banner

  Limited to a maximum of 3-foot by 25-foot fabric material.

  Banners mounted on or attached to buildings, structures, and utility poles must have DPW site approval. Sign display period limited to 30 days.

- Construction Signs

  One sign per location not exceeding 32 square feet.

- Official Notices, Fairs, and Special Programs

  Two per building or location and/or two per intersection. Sign display period limited to 30 days.

- Seasonal Displays

Displays not advertising a product, service, or entertainment require no DPW approval and will be treated as temporary signs.

2.2.7 Site Furnishings

Site furnishings include utilitarian outdoor amenities, such as benches, trash receptacles, fences, and bus shelters, as well as symbolic features, such as flagpoles, memorials, and static military equipment displays. Site furnishings should be convenient, comfortable, and safe to use. They should enhance sustainability through the use of recycled materials wherever possible. Consistent use of a visually unified site furnishing system will greatly enhance the installation’s overall visual quality and continuity.

Trash Receptacles are Representative of Recreational Site Furnishings

Post Mini Mall Seat Wall Utilizes a Brick Cap and Stucco Finish to Complement Architectural Facade and Plaza

The site furnishings selected should relate to the visual district in which they are located. All site furnishings are to be compatible with the architectural design theme. Materials, colors, finishes, shapes, and details shall be shared by both site furnishings and buildings. Specific objectives for site furnishings include:

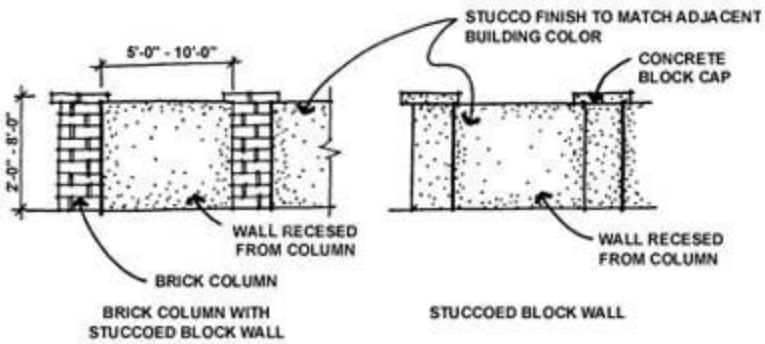
- Site furnishings shall utilize recycled materials whenever possible.
- Remove as soon as possible inappropriate site furnishings which clutter the installation such as unsightly fences, unnecessary signage, nonconforming storage sheds, and miscellaneous equipment.
- Establish a program to replace nonconforming site furnishings with a phasing plan that can be funded.

Free Standing Decks can be Constructed as "Self Help" Projects Utilizing Local Resources, Materials and Labor

- Design site furnishings that are appropriate for their intended use and function. Selected site furnishings, when funding is limited, should have a “self-help” equal which could be constructed for less money.
- Coordinate the design and selection of site furnishings to relate to the installation’s design theme.
- Simplify the alternatives for each type of site furnishings used on the installation.
- Adapt site furnishings to the site so that they do not dominate or clutter the visual character of the installation.

2.2.7.1 Walls and Fences

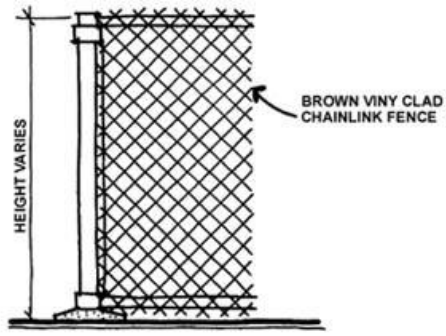
Wood Fence Provides Screen for Re-cycle Containers



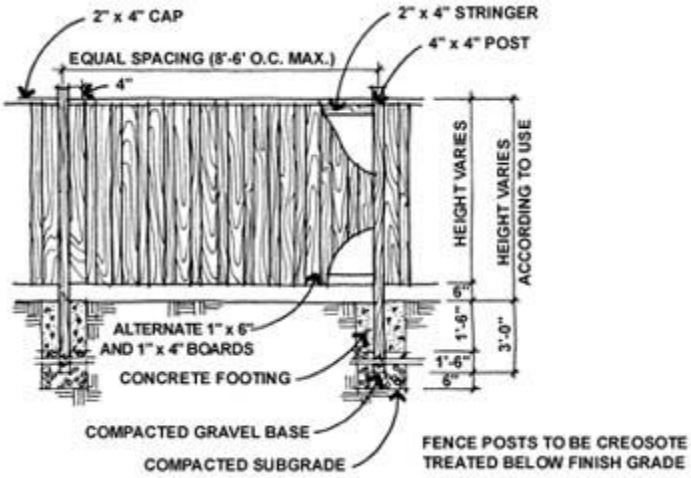
Brick and Stucco Walls should be Compatible with Adjacent Architecture

Brick and stucco walls shall be compatible with their surrounding environment while fulfilling their functions of security and screening. The type of wall shall be determined by its intended function and the visual image within the district. Brick and stucco walls shall be used in high visibility areas. The type and color of brick and the color of stucco shall match or be compatible with adjacent architecture. Coping, accent bands and other materials should also complement adjacent architecture.

Fence materials of wood, PVC, and other recycled materials may be used for privacy screens, pedestrian control and area definition. This type of fence is an attractive alternative Chainlink fences can be found throughout the installation in utility and security applications.Brown vinyl-coated fencing is recommended for use in all high visibility areas. Black mesh fabric is to be used when maximum screening is desired. Three strands of barbed wire across the top of the fence are optional and should be added if required for security measures.

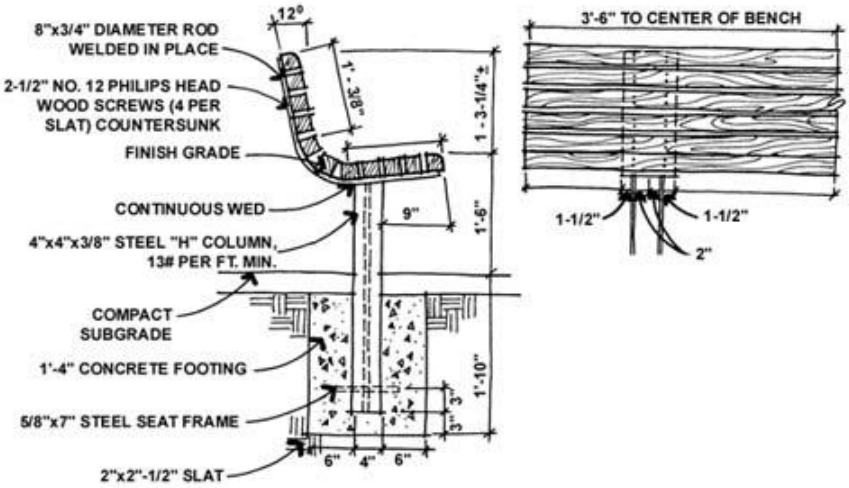


Brown Vinyl Clad Fencing Is Recommended In All Areas of High Visibility



Fences Offer a Variety of Design Options and can be Economically Constructed

2.2.7.2 Seating



Seating should be made Available Where Sitting Outdoors would be a Pleasant Experience or where it is Convenient, such as at a Bus Stop

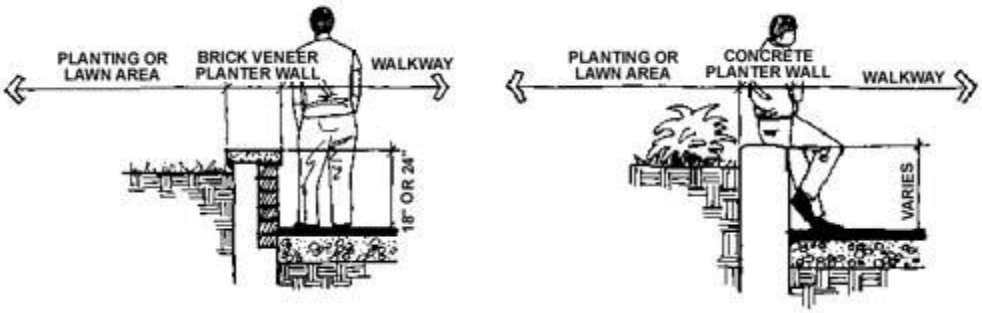
Benches should be installed in close proximity to building entries, plazas, bus shelters, and other areas where people congregate. All seating should be set back at least two feet from pedestrian traffic routes. Where possible, benches or seating surfaces should be incorporated into planters, retaining walls, or

other site structures. A space of five feet should be provided between the front edge of the seat and any stationary obstacle such as a water fountain, trash receptacle or sign post. A space of four feet should be provided at the end of seats to enable strollers and wheelchairs to be parked.

Benches in park like settings should be similar to Victor Stanley, Inc. Unislat 600 Series. The use of recycled material for seat benches in a faux redwood finish is recommended.

Benches in more urban/commercial settings should be similar to Kay Park-Rec Corporation vinyl plastisol bench. This six-foot, faux redwood colored bench which is manufactured from recycled materials can be used with or without a back.

Walls, if designed to appropriate heights, can often be incorporated as a seating area. These walls will ideally be designed to a height of 18 to 24 inches with a minimum one foot wall thickness to allow for comfortable seating. Seating surface should be pitched 1/8-inch per 12 inches to allow surface water to drain back into the planting bed. Seating surface should ideally have a four-inch overhang wall for heel space and to facilitate rising from a seated position. Vegetation near seating walls should not conflict with pedestrians or people seating. In cases where a seat wall incorporates a bench, the bench material should be wood or a recycled material that matches freestanding benches.



Seat Wall Finishes and Veneer Treatment should Complement Adjacent Architecture

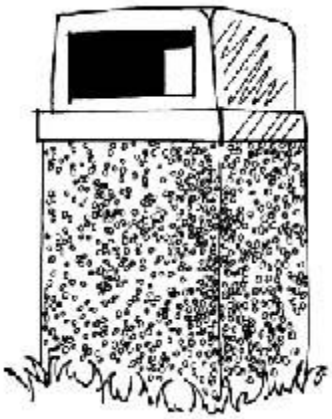
2.2.7.3 Trash Receptacles

Trash receptacles should be combined with other site furnishings and located wherever people congregate, such as areas used for eating or waiting for a bus.

Trash receptacles should be adjacent to paved areas for easy access. They should be the proper size and distribution to provide adequate capacity and avoid over spilling; proper capacity depends on the rate of trash accumulation and the frequency of collection.

At least one receptacle should be located at each building entrance, picnic pavilion, playground, and adjacent to benches and vending machines.

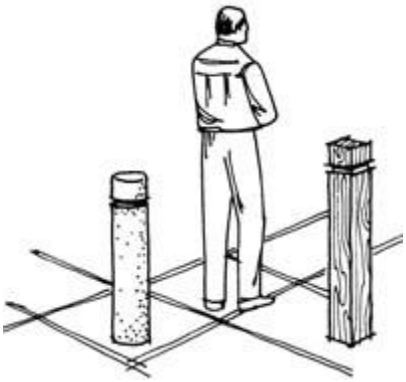
Receptacles shall be similar to Carolina Containers Corporation Model 5000 TLC litter container or Victor Stanley, Inc. Models MPF-324 and H-324. Other manufacturers may be selected, provided design and quality are equal to the recommended product. All trash receptacles should be manufactured from recycled materials.



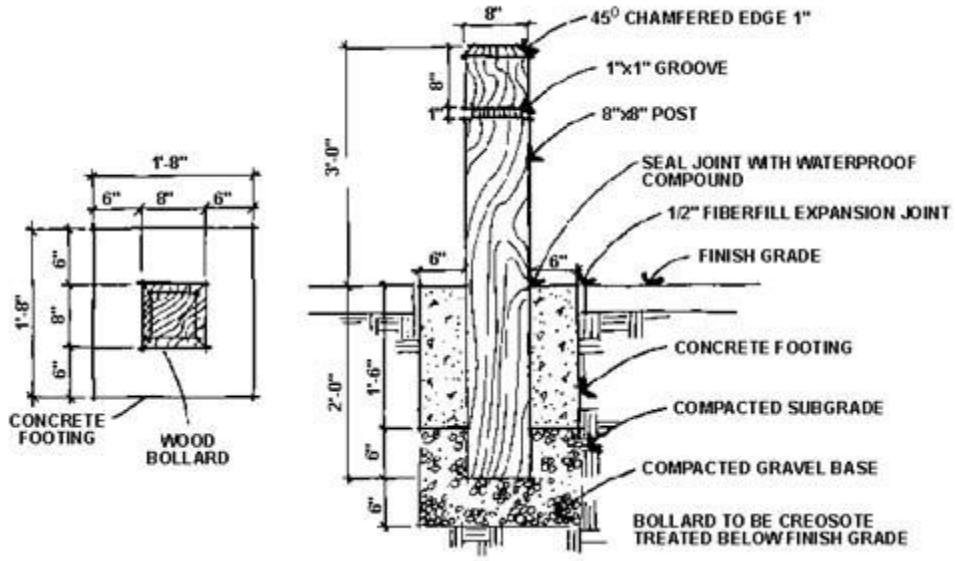
This Concrete, Steel Reinforced Container has No Movable or Rustable Parts and has a Pea Stone Gravel Veneer

Fifty-five (55) gallon drums may be used in industrial and vehicle maintenance areas (nonadministrative areas) provided they are painted brown (Federal Spec Color No. 20059).

2.2.7.4 Bollards



Decorative/Service Bollard - Recreation Area Bollard

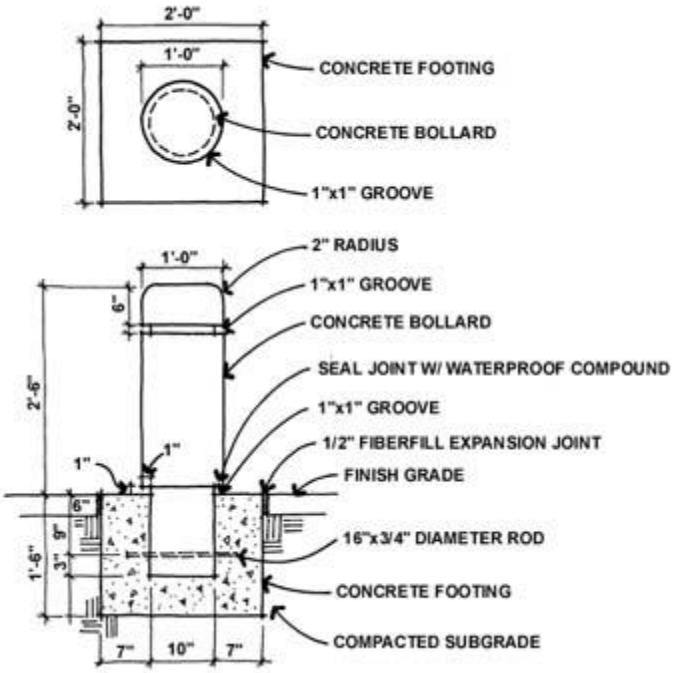


Use Wooden Bollards in Parks, Playgrounds and Other Natural Areas

Bollards can effectively be used to control traffic or separate pedestrians from vehicular traffic, or as decorative elements at an entry, courtyard, or plaza.

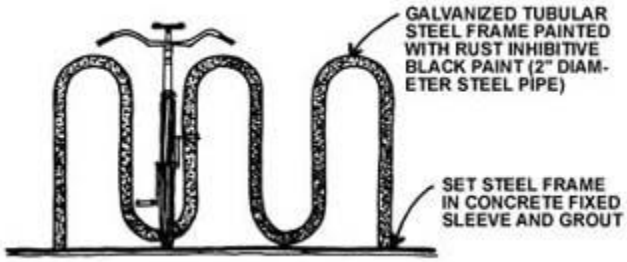
Small chains, ropes and other temporary barriers should be removed or replaced with more permanent bollard solutions.

Use concrete bollards at important arrival zones, such as auto drop-off zones and at any place where conflicts occur between pedestrians and autos. Bollards with removable chains shall be used in situations where vehicular access is required. In park and recreational areas where a more naturalistic effect is desired, the use of a recycled wood bollard is recommended.



Concrete Bollards should be Used in Areas of High Pedestrian/Vehicular Use and Industrial/Service Areas

2.2.7.5 Bike Racks

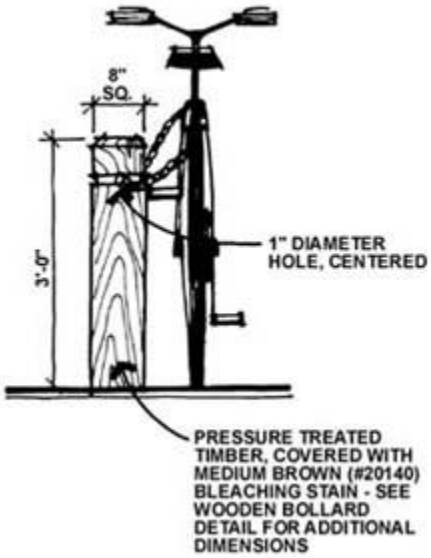


Provide Bicycle Racks in Areas of High People Concentration

Bicycle parking shall be located within 50 feet of major destinations and provide a standardized, secured locking facility mounted in hard surface paving.

Bicycle parking shall be located in parking lots away from traffic but close to the main traffic flow. The parking areas should be visible from a street or building to reduce theft and vandalism.

The recommended standard rack is available from Brandir International, Inc. in stainless steel. Other manufacturers may be selected, provided design and quality are equal to the recommended product.

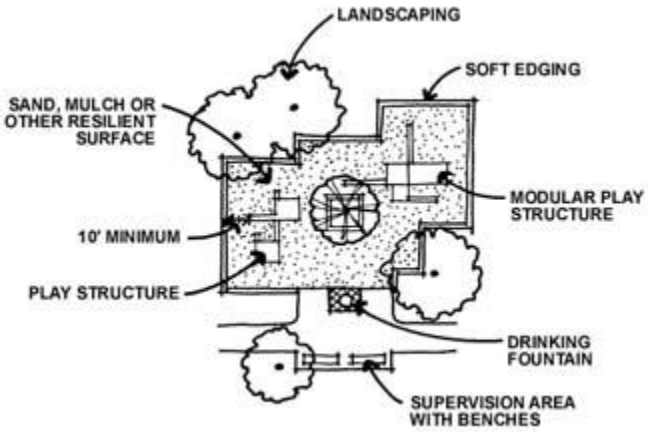


Recycled Wood Bollards can be Adapted to Serve as Bicycle Racks

In natural areas, a recycled wood timber bicycle rack utilizing a recycled wood bollard is recommended.

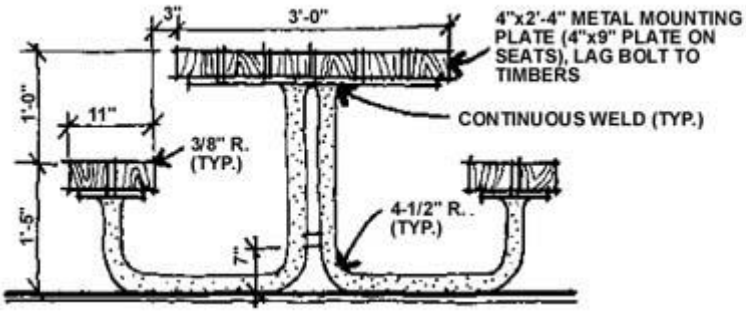
2.2.7.6 Playgrounds

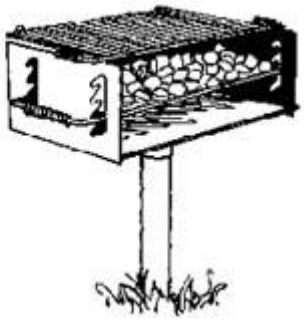
Playgrounds should be located in close proximity to schools, child development centers, parks and other recreational areas. There should be a wide variety of equipment which is designed for child skill development and imaginative play, such as climbing structures, balance beams, wheels and fortresses. Drinking fountains should be provided at each playground. A soft resilient play surface shall be maintained within the play area to prevent serious injury. All areas should be landscaped or existing trees preserved to provide shade and limit heat buildup on play equipment. Landscape materials that have thorns and those that are poisonous are to be avoided around play areas. Seating for adult observation shall also be provided. Recycled materials should be utilized whenever possible.



Design Playgrounds to Accommodate Children of All Ages

2.2.7.7 Picnic Tables And Grills





Place and Anchor All Tables and Grills to a Concrete Pad to Prevent Erosion

Picnic tables and grills shall be located throughout the installation as needed to encourage outdoor dining and socializing. This table can be either freestanding on glides or permanently attached to concrete with anchors.

Provisions should be made for hard-surfaced paved access for persons handicapped in their movement (crutches or canes), wheelchair-dependent persons and persons with strollers or carriages.

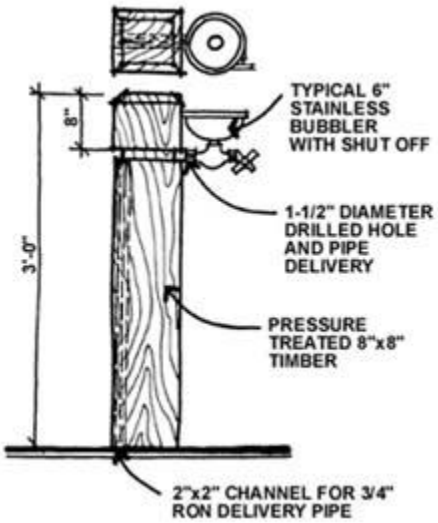
Picnic table should be constructed of recycled materials wherever possible. The recommended picnic table is available from Iron Mountain Force and is Model 238-HGT. The recommended grill is available from Playworld Systems and is Model #1451. Other manufacturers may be selected that utilize recycled materials, provided design and quality are equal to the recommended product.

2.2.7.8 Drinking Fountains

Drinking fountains should be located in paved areas along walkways and plazas, where they are readily accessible. Drinking fountains are especially desirable near playgrounds or outdoor eating areas. Water supply lines must be available. All drinking fountains shall be located on a paved surface at least four feet in diameter and set back at least two feet from the pedestrian traffic routes. Stepping pads for children shall not interfere with the access for adults.

Concrete drinking fountains shall be used in high visibility areas. A pedestal mounted, wheelchair-accessible fountain available from many manufacturers is recommended. Controls shall be hand-operated levers located at the front of the fountain.

An alternate utility fountain is to be used in low visibility and remote areas of housing, industrial, and recreational areas where a natural look is desired.



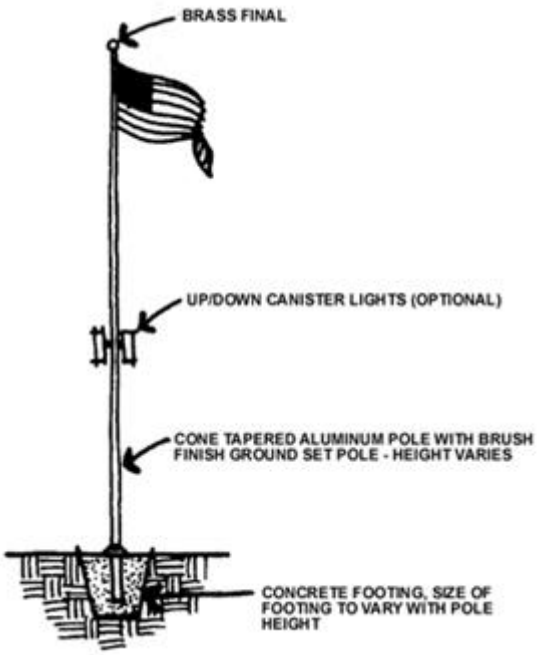
A Fountain Adapted to the Recreational Bollard is Recommended for High Visibility Areas

A Fountain Adapted to the Recreational Bollard is Recommended for Natural Settings

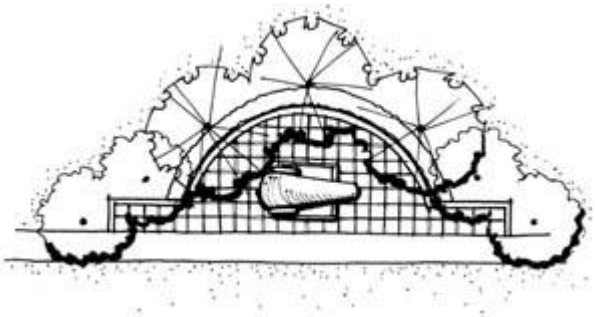
2.2.7.9 Memorial and Flag Displays

Monuments, flagpoles and displays such as military equipment should be carefully designed and prominently located to provide visual focal points for the installation. These site features are important means of expressing the desired image and mission statement for the installation. Informational signing consistent with these design guidelines should be provided to describe the significance of displays and monuments.

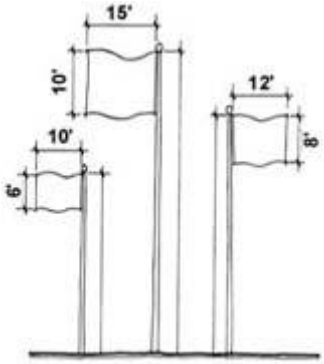
Displays of military equipment shall use standard military paint schemes. The scale of military equipment displays should be appropriate to their location. Paved pads under the display shall be provided to reduce maintenance. Siting and design of monuments/plaques are strictly limited and subject to approval by DPW. Flagpoles shall be tapered aluminum poles and sized according to desired flag size. The height of the pole in relationship to the size of the flag should be a minimum 5:1 ratio and a maximum 7:1 ratio. The number of flagpoles shall correspond to the number of flag types available for display, such as United States, Department of the Army, Unit and Command flags. Each pole shall have a paved surface at its base for use in raising and lowering ceremonies. Flagpoles for training ranges may be wooden. Guidons are small flags that represent a unit. Guidon holders are located at the right side of an entrance. The guidon shall project forward from vertical at a 60 degree angle. They are located at barracks or headquarters facilities.



Flagpoles should be Sited in Prominent Locations and Grouped with Other Site Furnishings such as Benches, Signage and Planting



Military Displays should be Appropriately Designed and Located in a Parklike Setting to Become an Integral Part of the Installation. Displays Limited to Brigade Headquarters or Higher Command.



There should be a Minimum 5:1Ratio Between Height of Pole and Sizeof Flag.

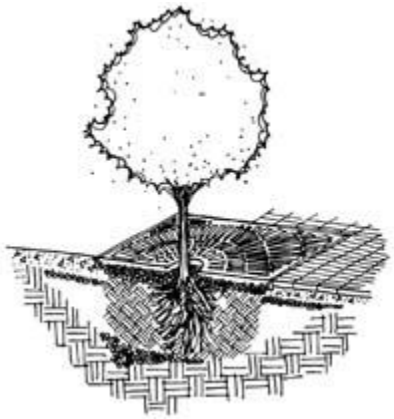
2.2.7.10 Tree Grates

Use anodized aluminum tree grates when installing trees in formal paved areas such as courtyards, entry areas or plazas. Grates allow air and water to pass through them to the root system over a large area without impeding foot traffic.

Sizes may vary from three feet to seven feet depending upon specific project use. Inner grates can be removed as the tree grows.

Alternatives to tree grates, that should be used in less formal locations, include laying brick on sand or installing washed gravel at the base of a tree and removing material as the tree grows. Care should be taken to install brick flat and/or true to conditions around it to minimize tripping.

The recommended tree grates are available from Neenah Foundry Company. Other manufacturers that provide products manufactured from recycled materials may be selected, provided design and quality are equal to the recommended product.



Tree Grates Provide an Attractive Solution for Incorporating Trees in Paved Plazas and Sidewalks

2.2.7.11 Mail Boxes

All mailboxes are to be located near the front door(s) of the unit(s) they serve, along the line of travel from parking areas to the most used building entrances. Types of boxes used must be approved by the U.S. Postmaster General.

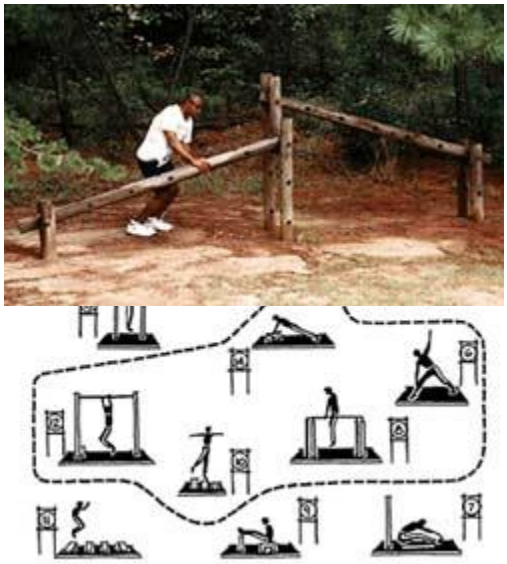
When required, “group” or “gang” mailboxes shall be placed in convenient central locations with other site furnishings such as bus stops, bulletin boards, benches and trash receptacles. Approved types of ground mailboxes shall be bronze anodized aluminum or painted standard medium brown semigloss, 20059, Federal Standard 595-B, and clearly marked “Mail” or “United States Mail”. All such groupings of site furnishings are to be on paved surfaces adjacent to but not encroaching upon sidewalks. These groupings will be landscaped with all materials being compatible with surrounding buildings and materials.

Standard Single Mailbox Located in Close Proximity to Main Entrance

Group Mailboxes should be Located in Convenient Proximity to Main Entrance Location for Mail Delivery

2.2.7.12 Fitness Trails

Physical fitness equipment can be effectively installed as a series of exercise stations spaced along a linear walkway or jogging path. Fort Bragg, with its large land area, provides many ideal locations for the location of these fitness trails. The Greenbelt offers a natural setting and allows for adequate safety setbacks from the roadway.



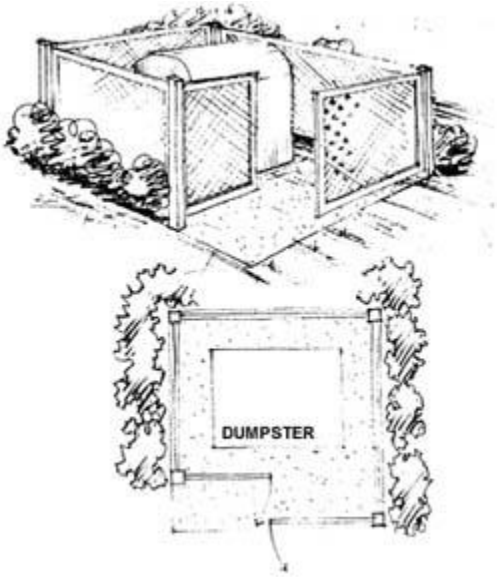
A 20-Station Fitness Trail Provides a Complete Work-Out

2.2.7.13 Dumpster Enclosures

Dumpster enclosures shall be provided around all trash/garbage dumpsters. They shall be located in service corridors away from high visibility areas and primary entry points. Easy access and turning movements for sanitation vehicles plus a 21-foot overhead clearance are required.

Dumpster locations shall conform to Department of Defense Force Protection Construction Standards that require a minimum of 33 feet (10 meters) from a facility. Dumpsters should be made of recycled polyetylene or rubber and be relocatable. They should also be lockable for force protection.

Design of Dumpster Enclosures are Compatible with Adjacent Architecture



Dumpster Enclosures Must Allow for Easy Removal and Replacement of Container to Eliminate Dumpster Being Left Outside Enclosure

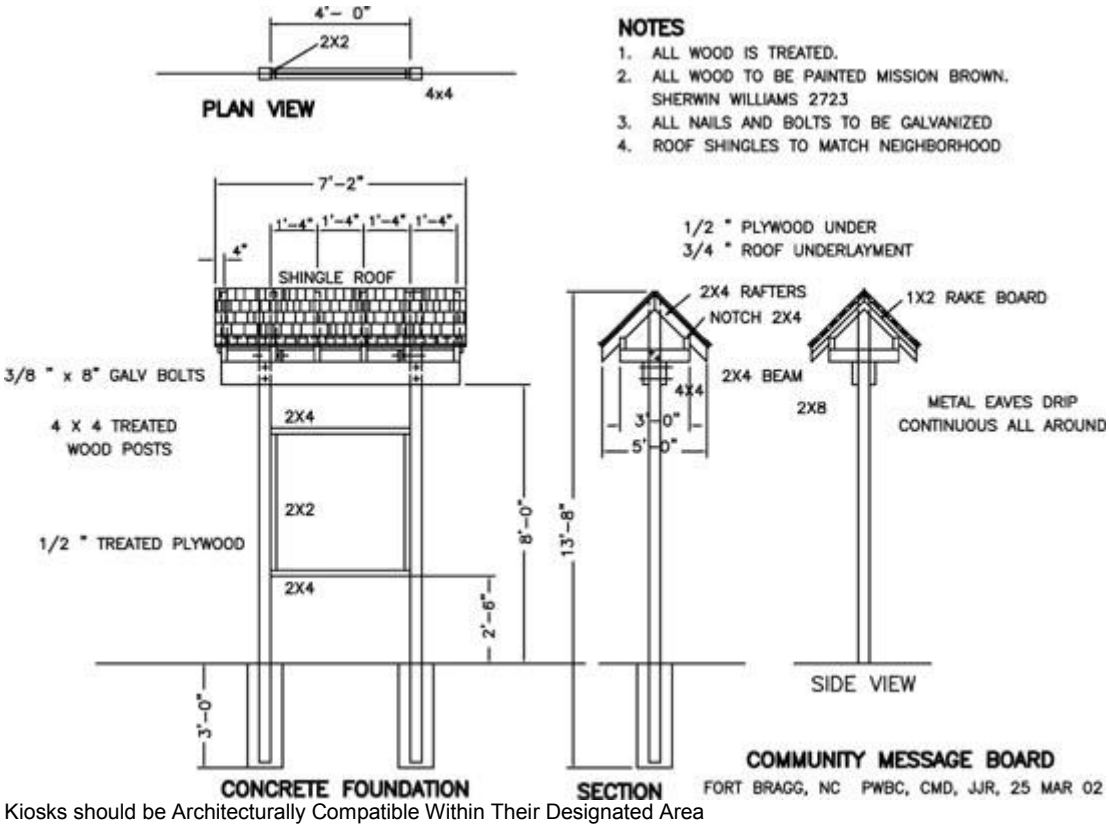
A six-inch concrete pad should be provided for the enclosure, which is a minimum of 12 feet wide by 19 feet deep. Convenience steps should be provided, where necessary, for dumping into high containers. A six-foot high screen, fence or wall to enclose the dumpster should be provided with additional plantings to soften its overall impact. The enclosure design should utilize the same building materials and characteristics as the adjacent buildings.

2.2.7.14 Shelters/Kiosks

Bus shelters will be required and should provide adequate protection from adverse weather conditions and allow clear sight lines to approaching buses. They should be located adjacent to paved sidewalks but are not to impede pedestrian flow. A paved area must be provided outside the shelter for access and overflow as and for those who wish to wait outside the shelter. Additional site furnishings should also be incorporated with the shelter, such as telephone booths, trash receptacles, drinking fountains and kiosks.

Kiosks are pedestrian information centers and should be located in areas of high pedestrian traffic. Their construction should allow for placement of authorized material but must prevent vandalism. Both kiosk and bus shelter design should be harmonious in style and materials to the existing or intended visual character of their designated zone.

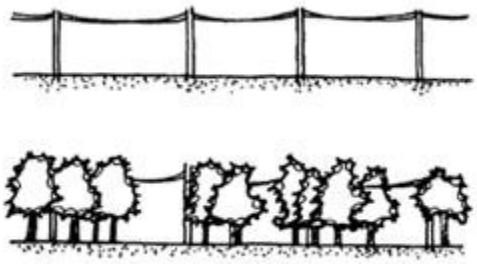
Upon Development of a Regional Transit System, Bus Stops will need to be Incorporated at Major Destination Points



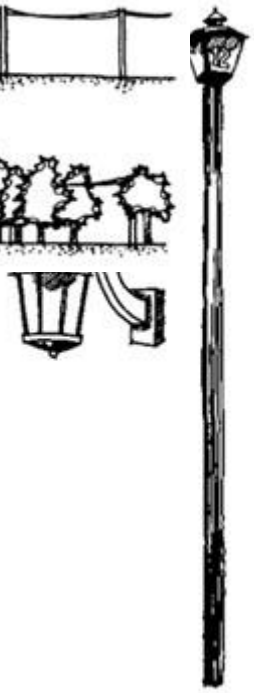
Kiosks should be Architecturally Compatible Within Their Designated Area

2.2.8 Lighting and Utilities

Overhead Utility Lines Detract from the Visual Image of the Post.



Landscaping Softens the Impa Lines



Lighting Fixtures Found Within the Old Post

External lighting and utility structures are important elements that can be used to improve the overall visual character of Fort Bragg.

Utility systems provide basic commodity services (electricity, water and gas); communication (telephone and radio); and wastes (sewage and stormwater runoff). Lighting - for safety, security, and display - is an extension of the electrical utility system and has a great impact on the visual environment of the installation.

The visual appearance of these utility systems can be improved through appropriate location, screening and detailing of utility structures.

The design of utility systems, however, often ignore the aesthetic in favor of the purely functional. Too often, utility lines and structures are located without regard for their visual impact. Function, cost and aesthetics all should be considered in utility locations. This will avoid the common mistake of putting utility connections and structures right next to the front door.

Utility systems (including structural elements) should be located in the least conspicuous spot, away from entrances and major circulation routes. Utility systems should be placed underground or hidden from view wherever feasible.

If planting utility systems under ground is determined to be impractical, in some areas, the siting or aerial utilities must be carefully located in order to improve their visual quality. Two ways to reduce the impact of overhead lines is to align the utilities along minor circulation routes, opposed to the more heavily traveled routes, and to provide landscaping which acts as a backdrop and minimizes the silhouette of utility facilities against the skyline.

2.2.8.1 Objectives

Utilities and lighting systems are necessary functional elements on the installation. The goal of this chapter is to mitigate their often negative visual impact.

Utilities are inherently linear, visually dominant features in the landscape. Their negative visual impact can be eliminated or reduced by:

- Burying utility lines for any new major construction.
- Burying all utility lines in conduit or utility vaults wherever feasible.
- Routing utility lines behind buildings or trees to screen them from view.
- Planting trees and shrubs to screen utilities.
- Designing above ground systems to be as inconspicuous as possible.

Lighting design impacts the visual environment during daylight and nighttime hours. Lighting impact can be improved by:

- Selecting inconspicuous, simply designed fixtures.
- Considering safety, function, and aesthetics when locating lighting fixtures.

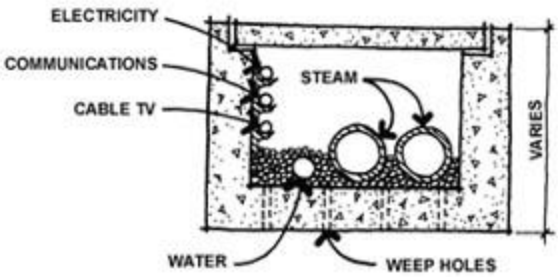
- Selecting sustainable fixtures that are energy efficient, easy to maintain and vandal resistant.

2.2.8.2 Vaults

The ideal solution to the visual clutter caused by utility lines is to bury them out of sight in under-the-sidewalk vaults.

These vaults are made of concrete and designed to carry several utility lines in one easy-to-access location. The lid of each vault doubles as a sidewalk section and can easily be removed for repairs.

Care must be taken to make sure that these sidewalks do not just end in a blank wall or make sudden unexpected jogs or turns. Where a line turns off into a building, the sidewalk/vault should be replaced with an underground duct that would be unnoticeable.

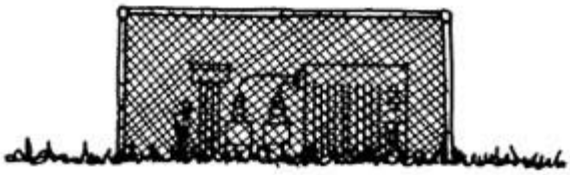


Section Through Vault Showing

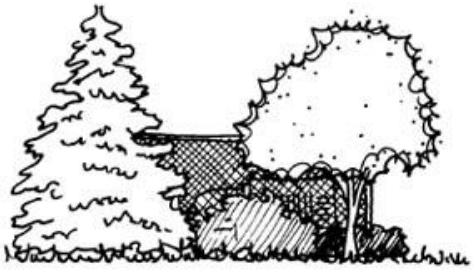
Plan View of Vault/Sidewalk

Utility hookups to buildings should be underground. If this is not feasible, they should enter the building at the least conspicuous location, usually at the rear of the building.

2.2.8.3 Structures



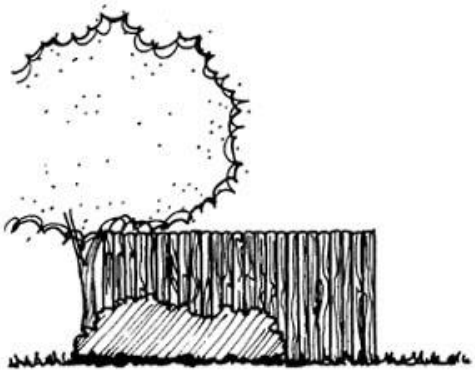
Unscreened Structures are Unsightly and Impact the Visual Quality of the Installation



Vegetative Screens Reduce the Negative Visual Impact of the Utility Structure

Utility structures are objects, such as telephone poles, power stanchions, pump houses, transformer substations, storage tanks, and above ground steam lines. Often the location of these objects can seriously detract from the overall visual appearance of the installation. Careful site planning and screening are necessary to minimize the effect of utility structures. When locating structures near buildings, place them in the least visible spot. This would normally be towards the back of the building where the mass of the building can screen them from view.

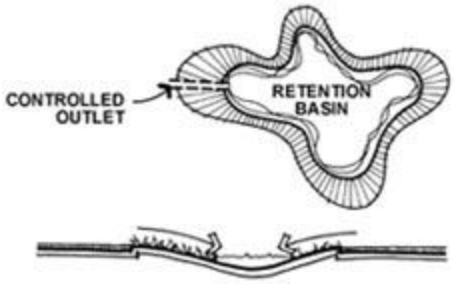
All utility structures should be carefully sited to take advantage of the screening possibilities provided by changes in topography, existing and new vegetation, walls, fences, and camouflaged colorings (dark brown for low objects and light grey for objects usually seen against the sky, such as utility poles) to hide them from view.



Vegetation and Opaque Fences Effectively Eliminate the Negative Impact of Utility Structures

2.2.8.4 Drainage

Stormwater drainage systems should be designed to prevent on-site flooding as well as flooding and siltation downstream. It is recommended that the stormwater system be designed to handle the collection and retention of excess water in retention/detention holding areas to retain or reduce preconstruction drainage runoff rates.

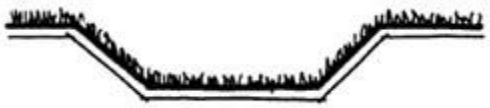


Road Medians may be used for Temporary Storage of Water

The stormwater system should be designed to blend visually and aesthetically into its surroundings. Properly designed, the man-made appearance of the system will generally be undetectable, thus turning a visual liability into an asset.

Retention/detention basins should be designed to appear as natural as possible. The design should not include hard rectangular design, but rather an asymmetrical, curving, natural looking shoreline. Dams or weir structures should be designed and located to blend into the design and appear less artificial. Dry retention basins should have a slope of two percent to prevent puddling, which would drown the grass. Paved channels through dry basins will be avoided.

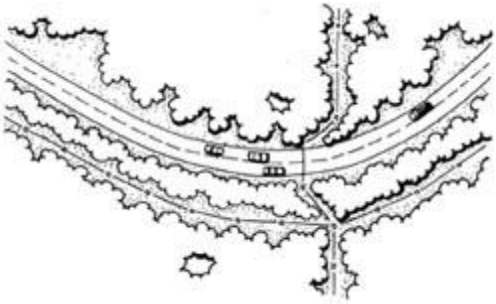
Drainage swales should be designed with a natural looking cross section, following a gently meandering course to avoid the hard line appearance of the typical ditch or concrete sewer. Drainage swales should have a flow line slope of at least one percent to prevent puddling, and side slopes of no more than 3:1 to allow for easy maintenance. The grass in swales should be cut a little longer than normal to reduce water velocity and erosion. Mowing should be avoided when the swale is wet and muddy to avoid creating ruts.



Unnatural Looking Swale

Natural Looking Swale

2.2.8.5 Utility Easements



Jog Easement Across Roadways and use Trees t Hide Utility Lines

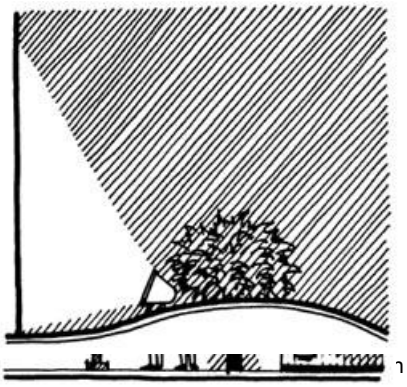
Utility line easements are usually maintained by clear-cutting a swath through the forest. This unpleasant axial view should be hidden. Utility alignments should follow natural contours, similar to a road alignment, and avoid cutting long straight gashes through the forest. They should not be placed along ridge lines, where they are highly visible and difficult to hide. Utility lines should be placed away from major roadways and against a backdrop of trees to reduce the silhouette of poles against the skyline.

Where utility easements cross roadways in wooded areas, the easement should jog to block the view of a clear-cut corridor. Easements should not be totally cleared edge to edge, but along an irregular line to preserve trees and reduce maintenance.

2.2.8.6 Lighting Design

Lighting is a functional requirement of installations which also impacts the visual environment. The proper types of lighting for various locations are shown in the lighting matrix below. Light fixtures should be selected and located to maintain the minimum footcandle requirements for safety and security purposes. Beyond that requirement,aesthetic considerations should take precedence.

All lighting should be located or designed to prevent undesirable spill over into other areas. Spotlights, in particular, should be aimed or screened to prevent glare from blinding motorists and pedestrians. Spotlights should be screened by landscaping or other methods so that they are inconspicuous during the day.



Example of Cutoff, Bollard, Wall Mount and Spot Lighting

Location	FIXTURE					HEIGHT				POLE		SPACED			LAMP				LEVEL			
	Cutoff	Utility	Bollard	Spot	Wall Mount	40' Max.	25' Max.	15' Max.	Varies	Metal	Wood	120' Max.	90' Max.	Varies	H.P. Sodium	Metal Halide	Incandescent	Flourescent	1.0 FC Min.	0.6 FC Min.	0.4 FC Min.	0.2 FC Min.
Large Parking Lots	●					●				●		●			●	○			●			
Small Parking Lots	●						●			●			●		●	○			●			
Industrial Parking Lots	○	●				●				○	●	●			●	○			●			
Highways	○	●				●				●	○	●			●	○				●		
Primary/4 Lane	●					●				●		●			●	○			●			
Secondary/2 Lane	●						●			●		●			●	○				●		
Tertiary/2 Lane / Cul-de-sac	●						●			●		●			●	○					●	
Perimeter/2 Lane	○	●				●				○	●	●			●	○					●	
Sidewalks	○		○					●		●			●		○	●	○			●		
Ramps & Steps	○		○		●				●	●				●	○	●	○	○	●			
Plazas	○		○					●		●				●	○	●	○		●			
Service Doors	○	●			○			●						●	●				●			
Signs & Monuments				●					●					●		●	○	○				
Building Facades	○			●					●					●		●						
Training Areas	○	●							●	○	●			●	●				●			
Storage Areas	○	●							●	○	●			●	●					●		
Service/Maintenance Areas	○	●							●	○	●			●	●					●		
Recreation Areas	○	●							●	○	●			●	●							●
Fence Perimeters	○	●				●				○	●	●			●							●

● Recommended ○ Optional

2.2.8.7 Fixtures

A lighting fixture is the frame or housing for holding the lamp in position and for protecting it from damage. Lighting fixtures are grouped into five general categories:

Cutoff lighting refers to the large shoe box-shaped fixtures placed on tall poles and used to illuminate parking lots. They are designed to cut off light traveling to the top and sides of the fixtures, concentrating it down onto the parking lot. The fixtures reduce the spill over of light into adjacent areas where it is not wanted, for example, housing areas.

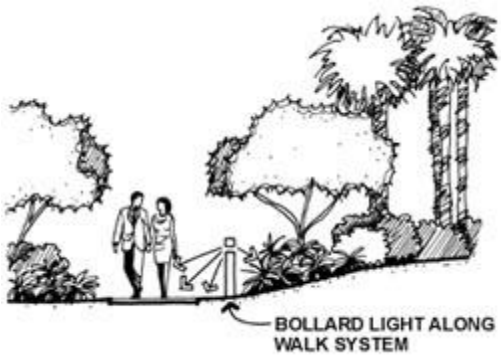
Utility lighting refers to simple, inexpensive fixtures used in industrial areas of low visibility.

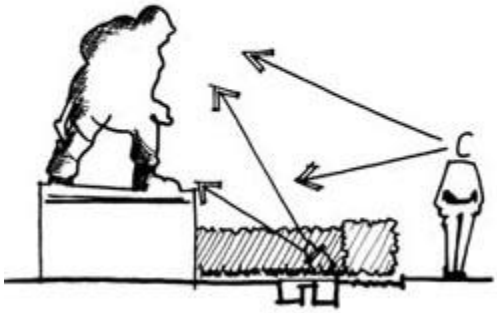
Bollard lighting refers to fixtures that are mounted on or in a short post to illuminate pedestrian areas. They can also be used as physical barriers between pedestrian and vehicular traffic.

Spotlighting refers to high intensity fixtures that concentrate light into a narrow beam and are used to highlight signs or other important objects. Spotlights should be screened by relandscaping or other methods so that they are inconspicuous during the day.

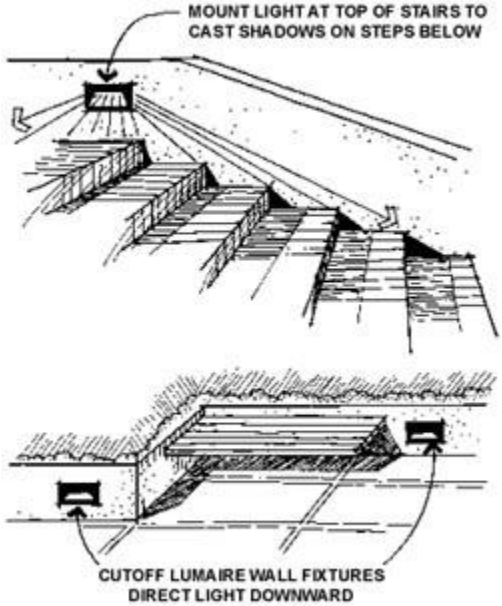
Wall-mounted lighting refers to fixtures attached to the wall of a building or a wall bordering a walkway or stairway.

Light fixtures should be proportional to the intended pole height. Fixtures designed for 40-foot poles should not be placed on 15-foot poles and vice versa. Refer to manufacturer's specifications for proper fixture sizing. Tapered poles are recommended. Straight poles are operational, but straight and tapered poles should not be used together in the same area.





Spotlighting Illuminates and Accentuates Objects of Importance



Wall Mounted Lighting Provides Illumination for Seating Areas and Steps

LOCATION	FIXTURE: Cutoff	Utility	Bollard	Spot	Wall Mount
Large Parking Lots	●				
Small Parking Lots	●				
Industrial Parking Lots	○	●			
Highways	○	●			
Primary / 4 Lane	●				
Secondary / 2 Lane	●				
Tertiary / 2 Lane / Cul-de-sac	●				
Perimeter / 2 Lane	○	●			
Sidewalks	○		○		
Ramps & Steps	○		○		●
Plazas	○		○		
Service Doors	○	●			○
Signs & Monuments				●	
Building Facades	○			●	
Training Areas	○	●			
Storage Areas	○	●			
Service / Maintenance Areas	○	●			
Recreation Areas	○	●			
Fence Perimeters	○	●			

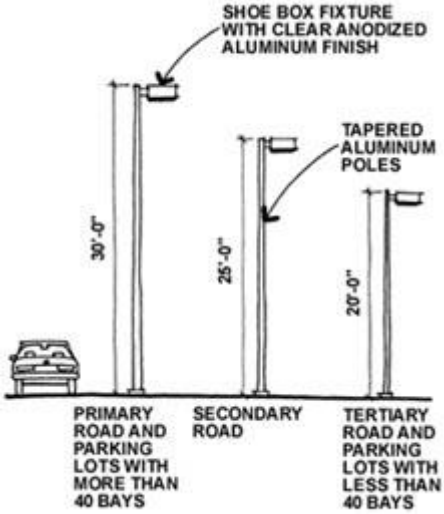
● Recommended ○ Optional

Bollards Provide Low Level Pedestrian Lighting

2.2.8.8 Poles

The recommended light standard is a tapered pole manufactured from recycled materials. Areas such as the Old Post Historic District with existing period light standards may maintain these poles. Light poles should be consistent and provide uniformity throughout the district in which they are located. Height of poles shall be determined by their intended function as shown below:

	Mounting Height (Feet)
Primary Road	30
Secondary Road	25
Service Road	20
Parking Lot	30
Sidewalks	12
Ramps, Steps	Varies
Plazas	12



Pole Height is Determined by its Intended Function

Buildings, Memorials, Signs	Varies
Storage, Service, Maintenance	Varies
Recreation	Varies

2.2.8.9 Lamps

The four types of light sources recommended for the installation are:

High Pressure Sodium (HPS): A lamp that is very efficient and very long-lived. It produces a high lighting level in a pink-to-orange color range. The color produced is unflattering to people and plants and is not recommended for areas where people walk or congregate at night.

Metal Halide: A lamp that is efficient and long-lived. It produces a high lighting level and cool white light. It provides good color rendition and should be used where this is important, such as at building facades, large signs, and monuments.

Incandescent: A lamp that is not efficient or long-lived but produces a warm, white light, flattering to both people and plants. It should be used in pedestrian areas or for illuminating small signs.

Deluxe Cool White Fluorescent: A lamp that is efficient and long-lived. It has the best overall color rendition but its low lighting level restricts it to special applications, such as tube lighting under handrails.

Selection of lamp type should consider energy efficiency to maximize the sustainability of the lighting system. High pressure sodium lighting is recommended for roadways, parking lots, and industrial areas. Metal Halide lamps are recommended for signage and building lighting. Lighting systems should include daylight sensors to preserve energy and enhance suatainability. Lamp types should not be mixed; if an area is currently lit by mercury vapor lamps, high pressure sodium (HPS) should not be introduced in the area unless a complete changeover to HPS lamps is scheduled.

Location	Lamp: H.P. Sodium	Metal Halide	Incandescent	Flourescent
Large Parking Lots	●	○		
Small Parking Lots	●	○		
Industrial Parking Lots	●	○		
Highways	●	○		
Primary / 4 Lane	●	○		
Secondary / 2 Lane	●	○		
Tertiary / 2 Lane / Cul-de-sac	●	○		
Perimeter / 2 Lane	●	○		
Sidewalks	○	●	○	
Ramps & Steps	○	●	○	○
Plazas	○	●	○	
Service Doors	●			
Signs & Monuments		●	○	○
Building Facades		●		
Training Areas	●			
Storage Areas	●			
Service / Maintenance Areas	●			
Recreation Areas	●			
Fence Perimeters	●			

● Recommended ○ Optional

Location	Level: 1.0 FC Min.	0.6 FC Min.	0.4 FC Min.	0.2 FC Min.
Large Parking Lots	●			
Small Parking Lots	●			
Industrial Parking Lots	●			
Highways		●		
Primary / 4 Lane	●			
Secondary / 2 Lane		●		
Tertiary / 2 Lane / Cul-de-sac			●	
Perimeter / 2 Lane			●	
Sidewalks		●		
Ramps & Steps	●			
Plazas	●			
Service Doors	●			
Signs & Monuments				
Building Facades				
Training Areas	●			
Storage Areas		●		
Service / Maintenance Areas		●		
Recreation Areas				●
Fence Perimeters				●

● Recommended ○ Optional

2.2.8.10 Level

Light intensity or level is measured in footcandles (FC). One footcandle is defined as a unit of illumination equivalent to the illumination produced by a source of one candle at a distance of one foot and equal to one lumen incident per square foot. A lighting level of 1.0 FC minimum represents a minimum maintained illumination of one footcandle measured on the ground surface at the point of least illumination.

Building entrances, stairways, ramps, seating areas, and intersections of circulation routes should receive higher levels of illumination. Focal points, important signs, and buildings may need spotlighting.

The selection and placement of lighting should consider the impact of the illumination beyond the area or object intended to be lit. Light spillover to areas where it becomes a nuisance should be minimized by proper selection and placement of light source, type of bulb, and mounting. Lighting can be directed toward the area or object to be lighted, but directed up, down, or sideways to reduce spillover.

2.2.9 Security

Military installations have become targets for terrorism acts, urban violence, demonstrations and various forms of surveillance in recent years. In response to the security threats to military installations and personnel, the Department of Defense has prepared the DOD Force Protection Construction Standards and Guidance (www.hnd.usace.army.mil/techinfo/ufc/ufc4-010-01.pdf). This document sets minimum standards for design that are mandatory for use by all DoD components. Each DoD component may set more stringent force protection construction standards to meet specific threats in their areas of responsibility.

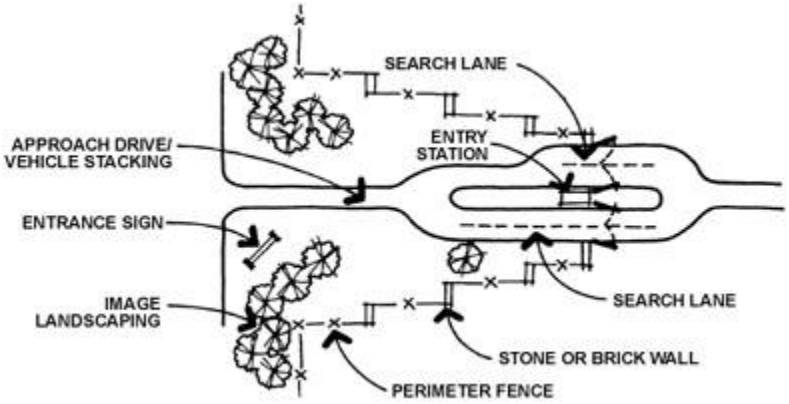
Fort Bragg will utilize the Department of Defense Force Protection Construction and Guidance Standards for all design and development. This document shall be utilized to determine all force protection design requirements.

2.2.9.1 Perimeter/Boundary

The use of a perimeter barrier with controlled points of entry is the most common form of protective design. The barrier can prevent physical or visual access. Ideally, it should prevent both, except in areas of community or dependent activity. The most common form of a barrier is the standard chain link fence, usually with triple-strand barbed wire on top with support arm. The use of electronic detection systems is common, but expensive. The alternatives require manned observation posts or a perimeter patrol road that is used intermittently as the assessed threat changes.

2.2.9.2 Entry Gates

Fort Bragg has entries that are both secured and unsecured. The secured points of entry into the installation are the most sensitive part of the security perimeter. Specialized areas are also the single most important design element in the creation of a sense of arrival for both installation personnel and visitors. Any opening within the perimeter must be designed to effectively review and regulate those persons and vehicles entering and leaving the installation. It is also important that these areas present a positive public image.



Layout Showing Typical Entrance Sequence for Secured Entry Gate

Security requirements vary with the level of threat. A design that provides for all levels of threat is recommended. This design should include concern for its visual impact in order to present positive public image.

It is very important to develop a “good neighbor” relationship with the surrounding local community. The support and approval of the local population is vital in developing the overall security program for the installation.

In areas where there is a high level of public contact with the perimeter fence, efforts should be taken to maintain the visual appearance of the fence barrier. Where space permits, shade trees can be installed along roadways. The use of barb wire and concertina wire should be avoided in these high visual areas and only used when deemed necessary for physical security.

2.2.9.3 Physical Security Equipment & Barriers

2.2.9.3.1 Purpose and Goals

To establish standards for the physical security equipment (PSE) used to protect and secure government assets, particularly security systems such as Intrusion Detection Systems (IDS), Closed Circuit Television, (CCTV), and access control systems. Other areas of standardization addressed by this guide are the use of authorized padlocks to secure government property and equipment and the use of mechanical combination locks to secure Arms, Ammunition, and Explosive (AA&E) arms rooms and facilities. By establishing standards, units and organizations will have the appropriate information and procedures to follow which will assist in purchasing security equipment compatible with present systems installed on Fort Bragg. In order to be monitored at the Fort Bragg Central Monitor Site (CMS) security systems must be compatible with the monitoring system. Standardizing security equipment will reduce the initial cost to the unit and organization, and the repair and maintenance costs.

2.2.9.3.2 Applicability

This guide applies to all units assigned or attached to Ft Bragg, including tenant commanders, other military organizations, agencies and activities located on Ft Bragg.

2.2.9.3.3 Guidelines

2.2.9.3.3.1 Padlocks

Department of Defense (DoD) directive 3224.3 entitled “Physical Security Equipment” (PSE) assignment of responsibility for research, development, testing, evaluation, production, procurement and support”, designates the Department of the Navy as the executive agent for the DoD Locks, Safes, Vaults, Seals, and Container Program.

The Department of the Navy is the DoD proponent for establishing standards for approved locking devices, including padlocks. Therefore, all locks purchased will meet the approved Navy standard. Locks are only delay devices and should never be considered bars to unauthorized entry. Remember, locks can be manipulated by experts or forced open. There are now only two authorized security levels of padlocks to be used as indicated below.

- High security padlock - normally used to secure door(s) to AA&E facilities.

- Low security (secondary) padlock – Used to secure the vast majority of U.S. Army property and equipment requiring a padlock.

2.2.9.3.3.1.1 The following list comprises approved padlocks meeting the security levels required by the DoD.

2.2.9.3.3.1.1.1 High Security Padlock. Two padlocks are currently approved as High Security Padlocks but only one remains in supply channels.

S&G 833, Padlock, Key Operated, High Security, Shrouded Shackle, Mil Spec MIL-P-43607G, NSN 5340-01-217-5068.

S&G 831B, Padlock, Key Operated, High Security, Shrouded Shackle, is still authorized for use but is no longer in the supply inventory.

2.2.9.3.3.1.1.2 Low Security Padlock. The padlocks most commonly associated with the Low Security Padlock are the American Series 200 and 5200 padlocks but other low security padlocks may be used, e.g., Master Brand stamped U.S., so long as they meet the standards outlined in Commercial Item Description A-A-59487A, Padlock, Key Operated. U.S. Army and Ft Bragg standard requires the following:

- Shackle is case hardened steel or brass.
- Shackle is 5/16th inch in diameter.
- Keys must be captive, un-removable, in the cylinder when unlocked
- Double dead-bolt locking.
- Two original manufactures keys (original serial numbers)
- Master key system prohibited.

2.2.9.3.3.2 Combination Locks

There are two authorized groups of combination locks, one to protect classified material and one to protect AA&E.

- Classified material must be protected with combination locks approved under FF-L-2740 standard, currently that is only X-07, X-08 and X-09.

- AA&E must be secured with either a Group 1 or Group 1R mechanical combination locks meeting the design and performance requirements of Underwriters Laboratories Inc. Standard 768. Group 1 locks resist manual manipulation for a period of 20 man hours. Group 1R locks meet all of the requirements of Group 1 locks and also resist radiographic (X-Ray) attacks.

2.2.9.3.3.3 Electronic Locks and Locking Devices

Programmable electronic key card access systems will be installed in all new building construction and major renovation construction projects on the installation. This new army standard is effective 14 Dec 04, the change will be included in the Army Installation Design Standard, Chapter 3.5.11.

2.2.9.3.3.4 Electronic Security Systems (ESS)

Ft Bragg maintains a Central Monitor Site (CMS) utilizing the US Army approved Integrated Commercial Intrusion Detection System (ICIDS). Facilities requiring protection by an Intrusion Detection System (IDS) must have the ICIDS installed by DES in order to be monitored by the CMS. Failure to do so will result in that specific IDS will not be connected to, or monitored by CMS.

- The POC for the facility requiring IDS must contact the Directorate of Emergency Services (DES) to schedule an appointment with the ICIDS Installer, who will then in turn conduct a cost estimate, for the required ICIDS components.

- The cost estimate is then emailed from DES to the POC, who will forward it to their servicing budget office of the facility requiring an ICIDS.

- The requesting units' budget office will then do a MIPR to the DES budget office based upon the cost estimate.

- Once DES accepts the MIPR, the parts are then ordered by DES.

- Once DES receives the parts they will then, based upon priority, schedule with the unit POC to have the system installed.

- Additionally, once the cost estimate is conducted it is the units' responsibility to contact 1112 Signal Bn and place a work order for an ICIDS communication line to be installed from their specific building # to the CMS. Failure by the unit to place the work order and have the line installed will result in the ICIDS system not being activated at the CMS.

According to AR 190-13, paragraph 4-7d (2), "MACOMs shall approve all requests for purchase, issue, lease, or lease renewal of nonstandard physical security equipment (PSE). Commanders below Army MACOM level are specifically prohibited from approving such requests. This includes commercial IDSs, EECSs, and CCTV when they are used for surveillance or assessment purposes."

Under no circumstances will commanders, COE or DPW procure or allow security technologies to be procured or installed without approval from the Directorate of Emergency Services (DES).

NOTE: Security and Intelligence Division is the only authorized ICIDS installer.
Add-ons (for example, adding a zone or camera) to previously approved and existing systems only require coordination with the DPW and approval of the DES.

2.2.9.3.3.5 Closed Circuit Television (CCTV) .

Any CCTV system installed on Ft Bragg that is to be monitored by the CMS must be approved by DES.

2.2.9.3.3.5.1 Request For Non-Army Standard ESSs/CCTV

a. All requests for ESSs will be sent through **DES/SID.** Requests for ESSs will include the following information:

(1) A request for system approval and funding if required.

(2) Cost estimates for purchase and installation if required.

(3) A detailed plan on how the equipment or system will be used and operated.

(4) A statement identifying the basis of submission and justification for the project.

(5) Supporting documentation (for example, copies of PS inspections, surveys, or JSIVAs).

(6) The designated security level of the facility or installation where the equipment will be used or installed.

(7) Justification as to why Army standard ESS cannot meet requirements.

(8) The project POC, telephone number, and e-mail address.

(9) A description of and the desired or recommended source for the equipment.

b. In addition to the information in subparagraph (a) above, the following is required when requesting a new or major upgrade to an existing nonstandard, commercial ESS:

(1) A completed site survey, technical specifications of proposed system and components, and engineer blueprints or drawings to scale of the system (protected area and component locations).

(2) Verification by the Directorate of Resource Management (DRM) that base operations (BASOPS) funds are available or have been programmed to maintain the system. The memorandum will not be forwarded unless BASOPS funds are available or have been programmed.

2.2.9.3.3.6 Individual Building Mass Notification / Personnel Alerting System

The Individual Building Mass Notification System (IBMNS) / Personnel Alerting System (PAS) is a mass notification system with public address and visual alert capabilities. IBMNS/PAS mass notification is the ability to provide real-time information to all building occupants or personnel in the immediate vicinity of the building during emergency situations. MNS is a construction requirement for all new inhabited buildings as outlined in the UFC 4-021-01, par 1-6.1

2.2.9.3.3.6.1 General Requirements (UFC 4-021-01, chap 4)

- UFC COMPLIANCE – IBMNS/PAS must be fully compliant with Unified Facility Criteria UFC 4-021-01. Live voice, pre-recorded messages and visual alerts are required for existing inhabited buildings, primary gathering locations and billeting locations.
- IBMNS/PAS must be capable of interfacing with a Telephone Alerting Systems (TASs), as well as existing fire alarm and public address systems where appropriate and required.
- IBMNS/PAS must be part of an integrated indoor/outdoor solution, controlled by the same control point or points
- IBMNS/PAS must be modular in design, allowing system flexibility and scalability.

2.2.9.3.3.6.2 Equipment Specifications (every building's application and installation will be different and must be sized per the intent of the UFC)

2.2.9.3.3.6.2.1 Remote Terminal Unit (RTU) (activation point)

RTU must be capable of regulating sound output levels individually via remote control point(s), allowing remote optimization of alerts and notifications.

2.2.9.3.3.6.2.1.1 Features

2.2.9.3.3.6.2.1.1.1 Amplifiers

Amplifiers must be hot swappable from front panel for ease of maintenance

2.2.9.3.3.6.2.1.1.2 Communications

RTU must be capable of wireless control within specific frequency in the 132-174 MHZ. Fort Bragg has a dedicated frequency (FOUO) for IBMNS/PAS.

This frequency will be released to contractor upon contract award.

Communications format must include 128-bit encryption for security.

2.2.9.3.3.6.2.1.1.3 Digital Voice Storage (UFC 4-021-01, par 2-2.2.1)

RTU must be capable of storing up to 16 digitally stored messages for a total of 8 minutes of pre-recorded messages.

2.2.9.3.3.6.2.1.1.4. Signal Alerting Formats

RTU must be capable of a mixture of voice & tone signaling, with a minimum of 7 preprogrammed warning tones.

2.2.9.3.3.6.2.1.1.5. Dynamic Over-The-Air Re-Programming

At least 25% of the available signal duration capacity must be reprogrammable from the control point(s), with the ability to resend message multiple times and overwrite with new message as necessary.

2.2.9.3.3.6.2.1.1.6 Programming Software

RTU must be capable of reprogramming with easy-to-use Microsoft Windows- based programming software.

2.2.9.3.3.6.2.1.2 Power Requirements

Input voltage:	120 or 240 VAC +/- 10% 50-60 Hz 1 Phase
Input current:	5A AC, 45A DC Maximum
Battery Input Voltage:	21.5 – 30 VDC (24 VDC Nominal)
Operating Voltage:	24 VDC
Standby Time:	> 3 Days with 5 minute full signal reserve
Continuous Signaling Time:	Minimum of 30 minutes

2.2.9.3.3.6.2.1.3 Controller Requirements

Inputs:	Minimum of 8 remote inputs, 8 sensor inputs and 4 direction sensor inputs
Outputs:	12 Audio outputs per amplifier
Signal Duration:	At least three minutes, with auto reset
Local Microphone Input Impedance:	10 K Ohms
Audio Distortion	< 1% Total Harmonic Distortion

Maximum Load Impedance:	600 Ohms
Audio Output Voltage:	.25 to 2.0 Volts P-P @ 600 Ohms
Audio Input Voltage:	.10 to 2.0 Volts P-P @ 600 Ohms
Contact Closure	Minimum of 500 ms. < 1.0 KOhms
Relay Output:	30 V DC, 15 A

2.2.9.3.3.6.2.1.4 Telecommunications Signal Formats

Digital:	Minimal Shift Keying (MSK)
DTMF:	3 – 12 digits
Remote Activation Inputs:	Minimum of 8

2.2.9.3.3.6.2.1.5 Amplifier Module

Frequency response:	+/- 3 dB 300 – 3000 Hz (Reference 1 KHz)
Output Voltage to Speaker	70 VRms (nominal)
Drivers:	25 VRms (optional)
Input Impedance (per amplifier):	100 K Ohms
Power Output (per amplifier)	Minimum of 400 Watts each

2.2.9.3.3.6.2.1.6 General

Operating Temperature:	-30 to +65 Degrees Celsius
Dimensions (HWD):	32” x 18” x 14” maximum
Enclosure:	NEMA 1 (Lockable)

2.2.9.3.3.6.2.1.7 Monitoring (UFC 4-021-01, par 4-2.1.4)

Two-way wireless diagnostics for monitoring of system, diagnostics must provide

Information on the following (at a minimum):

- AC Power
- Charger Operation
- Battery Voltage
- Activation Current
- Amplifier voltage and current (per amplifier)
- Quiet Test (Inclusive of Speakers and Amplifiers)
- Local Activation

- Intrusion
- Line Supervision

2.2.9.3.3.6.2.2 Peripherals (speakers, strobe lights, etc)

2.2.9.3.3.6.2.2.1 Power Requirements

Peripherals must be powered by the RTU, not locally at peripheral device. Power distribution must be low voltage, plenum rated class II wiring.

2.2.9.3.3.6.2.3 Speakers (UFC 4-021-01, par 2-3.1.2)

Speaker volume must be locally adjustable with taps or hidden volume controls not readily accessible to building inhabitants (system volume must also be remotely optimized via software at control point(s). Speaker locations and placement will be in such a manner as to provide intelligible instruction.

Acceptable speakers include:

Model	Wattage	Output in dB(C) @ 10'	TYPE
AM-50	2	87	Un-amplified, wall mounted
AM-300	15	110	Un-amplified reentrant tumpet, wall mounted
AM-302	30	114	Un-amplified reentrant trumpet, wall mounted
50GC	2	88	Amplified w/gain control, wall mounted
300GC	15	110	Amplified reentrant trumpet w/gain control, wall mounted
302GC	30	114	Amplified reentrant trumpet w/gain control, wall mounted
RCS6XT72	.25 – 8	94	8" Ceiling mounted, tap capable
CELL10T	1.25 – 10	85	Directional Wall Mounted, tap capable
CELLBD10T	2.5 – 20	85	Bidirectional wall mounted, tap capable
LIS8+XT72	.25 – 8	86	Lay-in Ceiling tile (P) speaker tap capable
PCB6T72	.25 – 5	84	Low profile surface mount, tap capable
PH10	10	92	Amplified horn, wall mounted
PH20	20	95	Amplified horn, wall mounted
PH30	30	97	Amplified horn, wall mounted

2.2.9.3.3.6.2.4 Strobe Lights (Optional) (UFC 4-021-01, par 4-2.1.1)

Strobe lights should meet the intent of the UFC. The domes will be (**AMBER**) in color, mounted to the ceiling on the interior side or the interior wall. The strobe lights are intended to get the building occupants attention to listen to further verbal instructions. IBMNS/PAS strobes are not intended to evacuate the building. Strobe lights need to be distinct and different from Fire Protection Systems strobes when possible.

Acceptable strobes include:

Model	Peak Candlepower		Type
LP3 (A,G,R,C,B) ECP@ 51.5	175,000	2.2 joules	Drop ceiling, low-profile 65-95 FR per min.
FB24STHI-024C	1,000,000		Supervised hearing (ADA) impaired strobe

2.2.9.3.3.6.3.0 Installation Guidelines (every building's application and installation will be different and must be sized per the intent of the UFC)

2.2.9.3.3.6.3.1 RTU Location & Power Requirements

RTU should be centrally located on the ground floor of building.

RTU should be located in a controlled (locked) space inside a NEMA 1 enclosure

RTU must have a dedicated 120 VAC 20A circuit with separate breaker.

2.2.9.3.3.6.3.2 Peripheral Quantities and Placement

Peripheral alerting devices should of sufficient quantities and placement to supply adequate sound (speakers) and visual (strobes) indoor coverage to: Corridors, Hallways, Primary Gathering locations, Conference Rooms, Large Admin Areas, Large Work Areas (Hangers, Warehouses)

2.2.9.3.3.6.3.2.1 Indoor Sound Coverage (UFC 4-021-01, par 2-3.1.2)

Speakers will provide intelligible (NFPA 72) instruction and measured in accordance with International Electrochemical Commission (IEC 60849)

Consideration for placement and speaker type must be given to:

Building size and usage

Ambient noise levels

Utilize higher output speakers (15, 30, or 100 Watts) to overcome high ambient noise

Building Construction:

Block Walls vs. Drywall Partition

Block walls attenuate sound more than drywall partitions

Slab on Deck vs. Metal/Wood Joist Floors

Floor penetrations are required to distribute speaker and strobe wiring floor-to-floor.

Wood Framed vs. Block & Brick

One exterior wall penetration required for each RTU for coaxial cable to antenna mounted on exterior wall.

Drop Ceiling vs. Sheetrock Ceilings

For “drop” tile ceilings, use “Lay In” Speakers

Drop ceilings allow use of plenum rated class II wiring without conduits

2.2.9.3.3.6.3.2.2 Visual Coverage (UFC 4-021-01, par 4-2.1.1)

Utilize 1 strobe light approx every 60 feet, and 1 strobe light at each RTU location. The RTU should be start point for strobe placement taking into consideration ADA personnel for location placement, candlepower, joules and ECP. Placement in Hallways and Corridor coverage should suffice unless large office areas break rooms, and conference rooms exist.

2.2.9.3.3.6.3.3 Interface To Existing Systems (UFC 4-021-01, par 2-4.1.2)

2.2.9.3.3.6.3.3.1 Public Address Systems (UFC 4-021-01, par 2-4.1.2)

Limit interface to existing systems that have been recently installed as recently as 5 years or less. PA system must meet or exceed required specifications.

Do not interface to existing PA systems that are not always on.

As a general rule, try to avoid interfacing existing PA systems unless absolutely required.

2.2.9.3.3.6.3.3.2 Fire Alarm Panels (UFC 4-021-01, par 4-2.1.6)

IBMNS/PAS will interface with existing fire alarm panels; the interface will temporarily deactivate the building fire alarm system’s audible notification appliances. The UFC authorizes this deviation from the NFPA 72

2.2.9.3.3.7 Access Control

An access-control system must be established and maintained to preclude unauthorized entry. Effective access-control procedures prevent the introduction of harmful devices, materiel, and components. Personal recognition contributes to a more effective access control system. This system can control the flow of personnel

entering and exiting a complex. Included in these systems are:

- Coded devices such as mechanical or electronic keypads or combination

locks.

- Credential devices such as magnetic-strip, smart cards or proximity card readers.

- Biometric devices such as fingerprint readers or retina scanners.

2.2.9.3.3.8 Protective Barriers

Protective barriers are used to define the physical limits of an installation, activity, or area. Barriers restrict, channel, and impede access. There are only three colors for barriers – Safety Yellow, Natural Concrete and Mission Brown. The barriers should focus on providing assets with an acceptable level of protection against a threat. Two major categories of protective barriers are:

- Natural Protective Barriers – mountains, cliffs, ditches, water obstacles or other terrain features that are difficult to traverse.

- Structural Protective Barriers – Man made devices such as fences, walls, floors, roofs, grills signs, bollards or jersey barriers.

2.2.9.3.3.8.1 Fencing

There are numerous types, configurations, and construction materials used for fences, however there are only **three** types of fencing authorized for protecting permanent limited and exclusion areas on Ft Bragg, they are: chain link, wire, and barbed tape or concertina. Additionally, the specific type of fencing to be used will be determined by site selection, protection level required and geographical location within the installation. Any deviation to the fence by type or construction standard must receive prior approval from DES and DPW. The fence construction must be in accordance with the IDG Section 2.2.7.1.

Chain Link

Chain link fence (including gates) must be constructed of 6-foot material, excluding the top guard. Fence heights for conventional arms and ammunition security must be 6 feet for standard chain link wire mesh fencing. Chain link fencing must be constructed of 9-gauge or heavier wire. They must be galvanized with mesh openings not larger that 2 inches per side and have twisted or barbed selvages at the top and the bottom. It must reach within 2 inches of hard ground pavement. On soft ground, it must reach below the surface deep enough to compensate for shifting soil or sand.

Barbed Wire

Barbed wire is twisted, double strand, 13.5 gauge wire, with four point barbs spaced and equal distance apart. Fencing should be no less than 6 feet high and must be affixed firmly to posts not more than 6 feet apart. The distance between strands should not exceed 6 inches, and at least one wire should be interlaced vertically and midway between posts. The ends must be staggered or fastened together, and the base wire must be picketed to the ground.

Barbed Tape or Concertina

A barbed-taped obstacle (BTO) is fabricated from 0.025-inch stainless steel and is available in 24-, 30-, 40-, and 60-inch-diameter coils. The barbs shall have a minimum length of 1.2 inches, and the barb cluster's width shall be 1.21 inches.

Barbed-Tape Concertina

Barbed-tape concertina (standard concertina barbed tape) is a commercially manufactured wire coil of high-strength-steel barbed wire that is clipped together at intervals to form a cylinder. When opened, it is 50 feet long and 3 feet in diameter. When used as the perimeter barrier for a restricted area, the concertina must be laid between poles with one roll on top of another or in a pyramid arrangement (with a minimum of three rolls).

- Reinforced barbed-tape concertina - consists of a single strand of spring steel

wire and a single strand of barbed tape. The sections between barbs of the barbed tape are securely clinched around the wire. Each coil is about 37 ½ inches in diameter and consists of 55 spiral turns connected by steel clips to form a cylindrical diamond pattern when extended to a coil length of 50 feet. One end turn is fitted with four bundling wires for securing the coil when closed and each end turn is fitted with two steel carrying loops.

2.2.9.3.3.9 Vehicle / Perimeter Barriers

Before determining if a vehicle barrier is required a risk analysis must be conducted IAW TM 5-853-1, Security Engineering Project Development and DA Pam 190-51, Risk Analysis for Army Property. Results of this analysis will determine the type of vehicle bomb threat, stationary or moving vehicle. The next decision is to place active or passive barriers. **No barriers will be purchased, used or installed without prior approval of the Security & Intelligence Division, Directorate of Emergency Services.**

Once the level of threat is determined per above guidance the choice of barrier(s) must be determined, that determination will be based upon site location, protection level required, location and geographical surroundings within the installation. Perimeter barriers are generally fixed barriers placed around the entire perimeter of a standoff zone and are called passive. Barriers placed at entry control points to control access are called active barriers.

Common applications include chain-link fences, hedges made of low bushes, and high (over 8 inches) curbs. Barriers capable of stopping moving vehicles include chain-link fences reinforced with cable, reinforced concrete “Jersey barriers”, pipe bollards, planters, ditches, and berms. When barriers such as the Jersey barriers and planters are used to stop moving vehicles, they must be anchored into the ground to be effective. The cables in the reinforced fence also have to be anchored into the ground or partially buried. Spaces between barriers should be no greater than 4 feet. Figure 3-4 shows common perimeter barriers for stationary or moving vehicle bombs. Refer also to TM 5-853-1.

The need to determine the type of barrier is necessary because the type of barrier to be used to protect against a moving vehicle bomb differs from the barrier used for a stationary vehicle bomb. The barrier used for a stationary vehicle bomb does not have to stop a vehicle’s motion. Barriers for the moving vehicle bomb need to stop the vehicle’s motion so there is minimum penetration of the protected area; they must be much more substantial.

Stationary vehicle bomb. Barriers for this tactic only define the boundary of the standoff zone and do not provide physical resistance to stop vehicles. As the goal of the aggressor is to position a stationary vehicle bomb without detection or suspicion the purpose of the barrier is only to make it difficult to enter the standoff zone without being noticed. Examples of this type of barrier, also know as passive, are 8 to 12 inch high curbs, low berms, shallow ditches, trees or shrubs spaced at approximately 4 feet on center, and fences.

Moving vehicle bomb. Barriers for this tactic may also define the boundary of the standoff zone but they must provide the physical resistance to stop vehicles. As goal of the aggressor is to drive a bomb

laden vehicle into the protected asset there is no concern with detection after the barrier has been breached. The minimum standard for protection against a moving vehicle bomb is it must resist a 4500 lb vehicle traveling at 30 mph. Remember, this is only a minimum as the risk analysis may indicate the need for a more resistant barrier.

2.2.9.3.3.9.1 Vehicle Barrier Types

Concrete filled bollards. Bollards will be constructed of steel pipe measuring 8" in diameter with ½" thickness, 7' in length with 4' buried in concrete and spaced 4 feet on center. The bollard must be painted in accordance with the IDG Section 2.2.7.4, or covered by a sheath.

2.2.9.3.3.9.2 Aircraft Cable without fencing

Will be constructed of 3 each ¾ inch in diameter zinc coated, rolled steel cable, with anchor posts concreted into the ground at a minimum of 12 feet on center.

2.2.9.3.3.9.3 Aircraft Cable with fencing

The cable will be attached to the fence by anchor clips those clips will be spaced apart six times in length the diameter of the cable this is to ensure the cable from unraveling or losing tension. If the cable is to act as a barrier for moving vehicles the cable must be anchored into the ground at both ends at about 200-foot intervals (see TM 5-853-1)

2.2.9.3.3.9.4 Jersey Barrier

8 to 10 feet in length (2,400 and 4,000 lbs respectively), 32 inches in overall height, 24 inch wide base extending upward at least 2 inches, reinforced with #6 bars, 2 inches in length, 3 inches on center. The top of the barrier will be at least 6 inches in thickness. The Jersey Barrier must be anchored to concrete to prevent the barrier from moving if hit by a vehicle.

2.2.9.3.3.10 Active Barriers

Active barriers range in a multitude of different shapes, sizes and configurations. All active barriers will be evaluated in accordance with TM 5-853-1 using the applicable threat severity level and level of protection required with the installation location.

No barriers will be purchased, used, or installed without prior approval of the Security & Intelligence Division, Directorate of Emergency Services.

Active barriers will be placed at all openings in perimeters where vehicles traffic needs to enter or exit. They will be mission brown with yellow markings, when yellow cross arms are used the diagonal stripes will be mission brown as well. These barriers must be able to be raised and lowered or moved aside if necessary. For protection against a moving vehicle containing a bomb, the barriers are heavy structures and have many construction and operational considerations associated with them. These barriers may stop vehicles weighing up to 15,000 pounds and traveling 50 miles per hour. They commonly cost tens of thousands of dollars (refer to TM 5-853-1).

2.2.9.3.4.0 Weapons Racks / Containers

All locally fabricated weapons racks or modified racks must be certified by the local engineer (Tank and Automotive Command (TACOM)) representative and must be secured as follows:

- Racks/containers must be locked with approved secondary locks.

- Containers banded, locked or sealed in away to prevent removal of weapons.

- Screws, bolts, etc, used in assembling containers, lockers, or cabinets secured to prevent removal.

- Racks/containers that weigh less than 500 pounds (empty) fastened to walls or floors or are chained together in groups totaling more than 500 pounds empty.

2.2.9.3.4.1 Risk Analysis

All draft 1391's must come through Directorate of Emergency Services (DES), for approval of all concepts, prior to start of construction. Once the 1391 is received by DES, a Risk Analysis will be completed and returned to the assigned Master Planner.

2.2.9.3.4.2 Work Orders

DPW will conduct an Antiterrorism Review of all DA Form 4283, DPW will then forward appropriate 4283 to SID for review. Once SID receives the 4283, it will be logged and assigned to a Physical Security Inspector who will ensure that it is in compliance with existing Department of the Army Regulations for Physical Security Equipment and comply with standards, policies and procedures governing the procurement and the installation of security related equipment. The work order will be stamped with concur/non concur and forwarded back to DPW for disposition. A copy of the request will be maintained in the physical security files.

2.3 Water

All new plans for development at Fort Bragg will be reviewed and rated for compliance with LEED. Therefore, LEED requirements are included as a part of this design guide. Of particular concern for future development is the second major LEED category - Water Efficiency.

The availability and quality of potable and non-potable water in the future is a primary issue in planning for future development at installations. LEED lists three sustainable design concerns for the protection of water supply. The three categories, their intent and requirements are listed below. Refer to the LEED-NC Reference Guide for the details on technology, and strategies for their implementation. Design can achieve one point each for including the following:

2.3.1 Water Efficient Landscaping (Total Possible Points = 2)

Limit or eliminate the use of potable water for landscape irrigation by one of the following:

- Reduce potable water consumption for irrigation by 50% from a calculated mid-summer baseline case. Reductions shall be attributed to any combination of the following items:

    - Plant species factor

    - Irrigation efficiency

    - Use of captured rainwater

- Use of recycled wastewater

- Use of water treated and conveyed by a public agency specifically for non-potable uses (1 Point).

- Achieve WE Credit 1.1 and :
  - Use only captured rainwater, recycled wastewater, recycled graywater, or water treated and conveyed by a public agency specifically for non-potable uses for irrigation. OR
  - Install landscaping that does not require permanent irrigation systems. Temporary irrigation systems used for plant establishment are allowed only if removed within one year of installation (1 Point).

2.3.2 Innovative Wastewater Technology (Total Possible Points = 1)

Reduce generation of wastewater and potable water demand, while increasing local aquifer recharge. One point can be achieved by including the following:

- OPTION 1 – Reduce potable water use for building sewage conveyance by 50% through the use of water-conserving fixtures (water closets, urinals) or non-potable water [captured rainwater, recycled graywater, and on-site or municipally treated wastewater). OR
- OPTION 2 – Treat 50% of wastewater on-site to tertiary standards. Treated water must be infiltrated or used on-site. Reduce the use of potable water for building sewage conveyance by a minimum of 50 percent, OR, treat 100 percent of wastewater on site to tertiary standards (1 Point).

2.3.3 Water Use Reduction (Total Possible Points = 1)

Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems. One point can be achieved for the following:

Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the building): water closets, urinals, lavatory faucets, showers and kitchen sinks (1 Point).

2.4 Energy (Download Energy Program)

Energy management is one of the sustainability goals adopted by Fort Bragg. At Fort Bragg, all new design for development will be reviewed and rated for compliance with LEED. Therefore, LEED requirements are included as a part of this design guide. Of particular concern is the third major section of LEED - Energy and Atmosphere.

The intent of this chapter of the Installation Design Guide for a Sustainable Fort Bragg is to highlight and define the concern for energy as a sustainable resource.

There are six categories defined in LEED for Energy and Atmosphere. Three of the categories are prerequisites and are required for all development. The Energy and Atmosphere categories are as follows.

2.4.1 Fundamental Commissioning of the Building Energy Systems (Mandatory)

It is required that fundamental building elements and systems are designed, installed and calibrated to operate as intended. All of the following fundamental best management practice commissioning procedures must be implemented. The following commissioning process activities shall be completed by the commissioning team, in accordance with the LEED-NC Reference Guide.

1. Designate an individual as the Commissioning Authority (CxA) to lead, review and oversee the completion of the commissioning process activities.
    a. The CxA shall have documented commissioning authority experience in at least two building projects.
    b. The individual serving as the CxA shall be independent of the project's design and construction management, though they may be employees of the firms providing those services. The CxA may be a qualified employee or consultant of the Owner.
    c. The CxA shall report results, findings and recommendations directly to the Owner.
    d. For projects smaller than 50,000 square feet, the CxA may include qualified persons on the design or construction teams who have the required experience.
2. The Owner shall document the Owner's Project Requirements (OPR). The design team shall develop the Basis of Design (BOD). The CxA shall review these documents for clarity and completeness. The Owner and design team shall be responsible for updates to their respective documents.
3. Develop and incorporate commissioning requirements into the construction documents.
4. Develop and implement a commissioning plan.
5. Verify the installation and performance of the systems to be commissioned.
6. Complete a summary commissioning report.

2.4.2 Minimum Energy Performance (Mandatory)

Design the building project to comply with both –

- The mandatory provision (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) of ASHRAE/IESNA Standard 90.1-2004 (without amendments), and
- The prescriptive requirements (Sections 5.5, 6.5, 7.5 and 9.5) or performance requirements (Section 11) of ASHRAE/IESNA Standard 90.1-2004 (without amendments).

2.4.3 Fundamental Refrigerant Management (Mandatory)

Zero use of CFC-based refrigerants in new base building HVAC&R systems. When reusing existing building HVAC equipment, complete a comprehensive CFC phase-out conversion prior to project completion. Phase-out plans extending beyond the project completion date will be considered on their merits.

2.4.4 Optimize Energy Performance (Total Possible Points = 10)

The intent is to achieve increasing levels of energy performance above the prerequisite standard to reduce environmental impacts associated with excessive energy use. The requirement is to reduce the building performance rating per ASHRAE/IESNA Standard 90.1-2004 (without amendments) compared to the baseline, as demonstrated by a whole building simulation using the Building Performance Rating Method in Appendix G of the Standard.

One point will be awarded for every reduction in design energy use of 2.5 percent for both new and existing facilities for a maximum score of 20 points. Regulated energy components include HVAC systems, building envelope, service hot water systems, lighting and other regulated systems as defined by ASHRAE.

2.4.5 Enhanced Refrigerant Management (Total Possible Points = 1)

Do not use refrigerants (1 Point).

2.4.6 Measurement and Verification (Total Possible Points = 1)

Develop and implement a Measurement & Verification (M&V) Plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2), or Option B: Energy Conservation Measure Isolation, as specified in the International Performance Measurement & Verification Protocol (IPMVP) Volume III: Concepts and Options for

Determining Energy Savings in New Construction, April, 2003. The M&V period shall cover a period of no less than one year of post-construction occupancy (1 Point).

2.5 Architecture

The architectural character of the buildings and structures at Fort Bragg play a major role in setting design directions. The post design theme seeks to create a consistent architectural environment. Dominant characteristics of buildings include roof types, overhangs, columns, detailed trim, and other appurtenances. These elements, when properly applied, will unify new construction, additions, and renovations with the desired architectural styles that presently exist at Fort Bragg.

The development of new campus communities is a relatively homogenous process that lends itself easily to design of common or unifying architecture. The renovation and transformation of an existing building community is a more complicated challenge.

Planning for the use of architectural elements that provide a common and unifying appearance will aid in the renovation of a building community. Careful review of existing site plans may produce opportunities to transform, enhance or reinforce the community campus theme.

2.5.1 Sustainable Architecture

All new buildings, additions, and renovations will be reviewed and rated for compliance with LEED criteria. Therefore, LEED requirements are included as a part of this design guide. Of particular concern for Architecture will be the fourth section of LEED - Materials and Resources.

LEED lists six Materials and Resources categories to be included in building design, and the intent for each, together with the requirement and technologies/strategies for meeting the requirement. The six categories and their intent are listed below. Refer to the LEED-NC Reference Guide for the details on requirements, technology, and strategies.

2.5.1.1 Storage and Collection of Recyclables (Mandatory)

Provide an easily accessible area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.

2.5.1.2 Construction Waste Management (Total Possible Points = 1)

Recycle and/or salvage at least 50% of non-hazardous construction and demolition. Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or commingled. Excavated soil and land-clearing debris does not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout (1 Point).

2.5.1.3 Resource Reuse (Total Possible Points = 1)

Use salvaged, refurbished or reused materials such that the sum of these materials constitutes at least 5%, based on cost, of the total value of materials on the project.

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. Only include materials permanently installed in the project.

Furniture may be included, providing it is included consistently in MR Credits 3-7 (1 Point).

2.5.1.4 Recycled Content (Total Possible Points = 1)

Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.

The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7 (1 Point).

2.5.1.5 Regional Materials (Total Possible Points = 1)

Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost) of the total materials value. If only a fraction of a product or material is extracted, harvested or recovered, as well as manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7 (1 Point).

2.5.1.6 Certified Wood (Total Possible Points = 1)

Use a minimum of 50% of wood-based materials and products, which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood building components. These components include, but are not limited to, structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes.

Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7 (1 Point).

2.5.2 Sustainable Design Objectives

The following objectives are all elements of sustainable design:

- Adapt building designs to natural site conditions.
- Design buildings in clusters to preserve land and reduce the cost of construction and maintenance.
- Develop an architectural style that results in the blending of new and old structures.
- Combine multiple activities in one building to reduce the number of buildings required and more efficiently utilize installation land area.
- Design multiple use facilities with the capability to quickly change interior layouts to accommodate changing requirements.
- Ensure that DoD Force Protection Construction Standards are incorporated (www.hqafcee.brooks.af.mil/dc/DCD/Arch/enlisteddormitories/pdf/11_Section_K.pdf).
- Use indigenous construction materials and practices that require low energy to produce and transport and may be recycled at the end of their usefulness. Fort Bragg defines local purchases as those within a 500 mile radius.
- Locate windows to allow for natural light and, ventilation.
- Preserve historic buildings and plan for renovation and reuse as defined in ICRMP.

2.5.3 Architectural Character

Architectural character is the defining element that establishes the identity of a community. In order to create or reinforce an identity, it is necessary to review an established set of general design concepts.

These concepts include massing, form, scale, fenestration, rhythm, and climatic conditions.

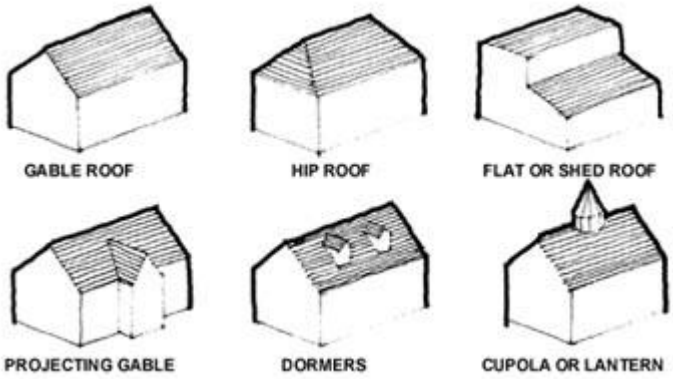
- **Massing** - The massing of a building refers to its overall bulk or volume of space. The size and proportion of the exterior envelope and elevations of a new building must be compatible with adjacent structures. A massive facility will fit better in an existing area of smaller facilities if its mass is divided into smaller elements.

  A Buildings' Character is Influenced by its Massing and Composition

  The height of a new building should be determined partially by the height of its neighbors. High-rise buildings should not be built directly adjacent to lower-rise buildings without a transitional element. A transitional element can be provided by increased spatial interval, a gradual increase in the building height, or the incorporation of horizontal human scale features.

  The massing of the forms that comprise a building influence the character of the building. A symmetrical composition will result in a very formal appearance appropriate to some administrative buildings. An asymmetrical composition is applicable to most other buildings on post.

- **Form** - The shape and proportion of a building's elevation
  and roof are basic form-giving characteristics that are important in relating a new building to its setting. In general, a rectilinear form sited with its long axis extending northeast to southwest is the most energy efficient form and orientation.

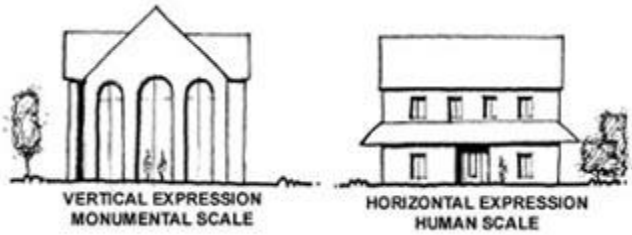
  Roof Styles Within Each District should be Complementary Metal Roofs are Discouraged and only Allowed by Exception and Approval of PDPWE

  Predominant roof forms at Fort Bragg include gable and flat roofs. Secondary roof forms include projecting gables, dormers, and folded plate roofs as seen on the older schools.

- **Scale** - The proportions and character of a building's facade determine whether it has a monumental or a human scale. A building with a predominantly vertical expression tends to be monumental.

  This is characteristic of much of the barracks housing, the hospital, and the USA JFK Special Warfare Center and School, the headquarters buildings, and other high ranking buildings.

Buildings that are more horizontal, and broken into smaller “building blocks” by their mass and scale, tend to relate more to a human scale and are appropriate for most other structures on post.



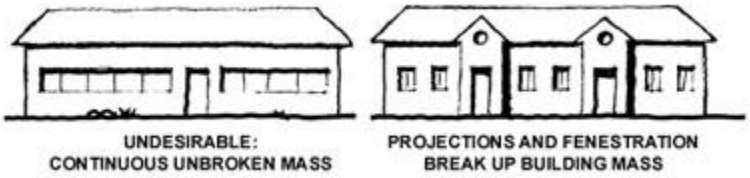
Scale is Determined by Facade Proportions and Character

Architectural elements can be used to reduce the perceived size of large building surfaces. Deep roof overhangs will make large roof surfaces and high walls seem smaller. Projections, recesses and individual (residential-type) window openings, will reduce the visual length of long walls.

Projecting porches will also decrease the apparent size of a building. The porch roof provides a transitional element to interrupt the mass of a large surface. These elements also help to emphasize building entrances and to reduce the impact of a large building to a human scale.

. **Fenestration** - Windows, doors, roof design, eaves, and other design details found on building facades are defined as fenestration. Building fenestration include the design details that provide interest and articulation to a building. These design details provide building scale and relieve building mass.

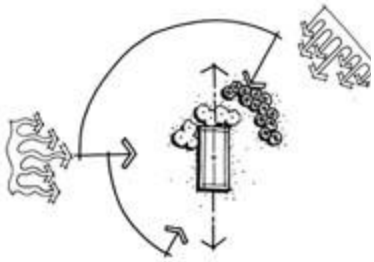
Fenestration should be designed to be compatible with existing adjacent buildings to enhance the visual appeal of the installation. All fenestration (window size, placement, window and glazing, doorway, shutters, trim, etc.) shall be similarly sized and proportioned to create a homogeneous impression. Large, blank visible walls are discouraged.



Fenestration and Detailing Provide Scale and Relief

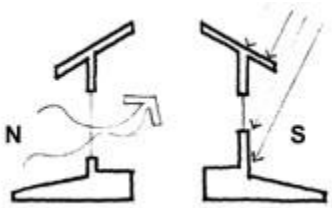
- **Rhythm** - The rhythm and proportion of openings in a building facade also contribute to the building’s character. The visual patterns of solids and voids that are created by structural expression, fenestration, and shadow lines, must be recognized and used as a design tool to help relate buildings into compatible groups, and to integrate new buildings into existing groups. Sequences of building masses and open spaces between buildings also contribute to the pattern of rhythm that may be uniform or varied, as well as horizontal or vertical in accent.

- **Climatic Conditions** - Sustainable buildings should be oriented to reduce solar heat gain as much as possible. This
can be partially achieved by siting the building with its long axis extending northwest to southwest . Reduction of solar gain is most important on the south and west facing walls that the sun impacts from late morning until late afternoon. Roof overhangs or porches on south and west exposures should be designed to shade windows in summer, but allow penetration by the lower winter sun.



Control of Solar Heat Gain is Optimized by
Proper Building Orientation

Residential Scale Openings for Most Other
Buildings



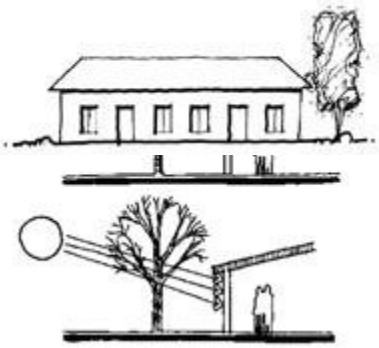
North Facade Captures Indirect Light with
Large Windows/South Facade Utilizes Roof
Overhangs and Small Windows to Control
Intense Direct Heat and Light

- The amount of glass on the facades facing south and west should be limited. Concentrating glass areas on the east facade, which receives morning sunlight, and the north, which receives no direct but ample indirect sunlight, will control solar heat gain while admitting natural light. The use of natural light to illuminate building interiors enhances sustainability by reducing energy consumption.

  Windows shall consist of insulated glass systems to further reduce energy use by reducing mechanical heating and cooling loads.

  Barracks and other facilities where people live shall have windows that are operable. Retail facilities and other buildings that include large window areas should face north of east. In addition reducing direct solar heat gain, this will minimize glare when exiting these buildings.

  Deciduous trees help to shade the summer sun, but will admit light and heat when they have lost their leaves during the winter. They should be considered, especially at the east, south, and west facades.



Deciduous Trees Provide Shade from Summer Sun While Allowing Heat Gain During Winter Months

2.5.4 Historic Preservation

Preserving integrity of historic buildings encompasses aspects of design, maintenance, and repair. The replacement of deteriorated building elements, or the rehabilitation and adaptive reuse of an entire building can significantly affect the architectural character and appearance of both a building and its surrounding district. Therefore, these changes must be done in a manner that is sensitive to the architectural design of the building.

The National Park Service has developed the Secretary of the Interior's Standards for preservation, rehabilitation, restoration, and reconstruction projects. The Standards address issues as diverse as building materials, building elements, building interiors, building site, setting (district/neighborhood), and special considerations, such as additions, energy conservation, handicapped accessibility, and fire/life safety.

The Secretary of the Interior Standards serve as a guide to all staff members working with historic buildings and structures. These standards provide guidance for maintenance, repair, alteration and demolition of historic structures. For more information concerning these standards or their applicability, contact the CRP at 396-6680.

The Secretary of the Interior's guidelines on historic preservation include the following:

- A property will be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces, and spatial relationships. Where a treatment and use

have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.

- The historic character of a property will be retained and preserved. The replacement of intact or repairable historic materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
- Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate, and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.
- Changes to a property that have acquired historic significance in their own right will be retained and preserved.
- Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
- The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color, and texture.
- Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
- New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
- New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

2.5.5 Entrances

Examples of Architectural Alternatives Incorporating Entry Features

The Tolson Youth Center Includes a Prominent Entrance

A defined entrance is essential for any building regardless of function or importance. A defined entrance creates an obvious entry point that is an integral architectural element of the building.

The entrance should be in a prominent location on the building exterior and should be oriented toward important public spaces, such as a courtyard, front lawn or street.

Entrances may be grouped formally into three categories: flush, projected, and recessed.

Flush entrances maintain the continuity of a wall's surface and can be, if desired, deliberately obscured. Projected entrances announce their function and provide shelter. Recessed entrances also provide shelter and carry forward a portion of exterior space into the interior of the building.

Major entrances shall be designed to be accessible to the handicapped and meet Americans with Disabilities Act (ADA) requirements (www.access-board.gov/adaag/html/adaag.htm).

2.5.6 Renovations and Additions

The architectural character of proposed additions or renovations should be compatible with the existing structure as well as adjacent buildings within the district. Additions and renovations within or adjacent to the Old Post Historic District must adhere to the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 67) and procedures outlined in the ICRMP.

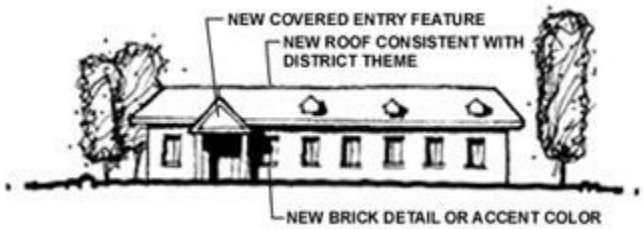
As with the design of a new building, the principles of scale, form, materials, and colors should be maintained. Additions should avoid cosmetic application of stylistic elements to imitate a certain style. Design of additions must take into account functional requirements, budget restrictions, construction techniques, and the design quality of the existing building.

Renovation of existing buildings in all districts except the Old Post Historic District, provides the opportunity to update buildings to conform to the district's overall architectural character. Items that should be considered during renovation are the replacement of dated building materials, the installment of architectural elements such as fenestration, and detailing, and the construction of pitched roofs on existing flat roofs.

Awnings, when applicable, shall not be unit colors. Awnings shall be color compatible with building, roof, and fascia and may display color compatible letters, but may not include unit insignias.

Exterior utility elements such as mechanical areas, dumpsters, and storage sheds should be either removed, screened or integrated into the buildings' overall design theme.

Material and colors used in renovation projects shall comply with the recommendation for the district in which the building is located.



Renovations Provide Opportunity to Create Architectural Unity within Each District

Architectural Additions should be Compatible with Existing Architecture

2.5.7 Colors and Materials

Color schemes and building materials are critical design elements in creating a compatible visual environment for Fort Bragg. A palette of coordinated and complementary exterior building colors should be established for use throughout the installation districts.

A cluttered application of a number of different materials on a facade should be avoided. Materials should be used consistently on all building facades. Materials should be selected based upon the appropriateness to the building type and prevailing architectural design and character of each individual district. Durable materials must be used within the first few feet of metal buildings to resist pedestrian, vehicular and grounds maintenance activities.

Color Schemes and Building Materials should be Compatible within Each District

Table S identifies the predominant architectural colors and materials by district. The corresponding five digit number refers to the paint colors found in Federal Color Standard 595B. The table identifies the predominant architectural materials and colors by district and serves as a starting point for consistency in future development and renovation throughout the post. Deviations from the established materials will be inconsistent with the IDG and will compromise the intended design image for the Post. Requests for deviations from the established standards must be presented to the Architectural Review Board for approval. Architects are encouraged to use the basic palette of colors provided in Table S in an imaginative effort to provide quality and varied architecture while establishing compatibility with existing structures.

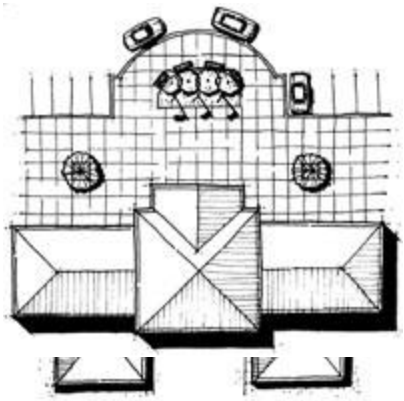
Table T, "MILCON TRFP Architectural Colors & Materials," is a simplified color and material table that expresses the overall character of Ft Bragg. Reflect existing and planned architecture with these colors and materials. Use Table T for MILCON Transformation RFP projects only. For all other projects, use Table S.

2.5.8 Plazas and Courtyards

outdoor meetings. Courtyards will provide the opportunity for adjacent building spaces to expand outside (such as cafeteria functions).

To successfully create an outdoor space Outdoor plazas and courtyards should relate to pedestrian and vehicular circulation while providing visual interest and functional spaces.

Outdoor pedestrian spaces are often desirable in areas where a large amount of people work, live or play. When these spaces are enclosed or partially enclosed by buildings, they can provide an attractive and relaxing contrast to the activities and facilities around them. A plaza can serve as an entrance space to a building or group of buildings. A courtyard, usually surrounded on all sides, provides a usable, outdoor room.



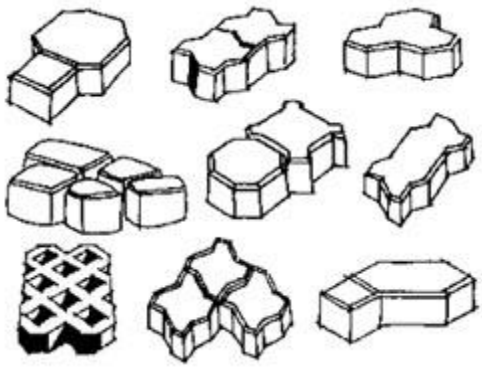
Courtyards Provide Opportunity for Indoor Activities to Expand Outdoors

Plazas should be located at principal entry points to buildings to allow people to rest, wait, gather during break periods, or hold which functions well, several design elements and options must be considered, including:

- **Building/Space Relationship** - Design plazas in conjunction with renovated or newly constructed buildings. The design must be integrated with adjacent buildings through the use of compatible scale and form. The structures and space relate in a functional and visually compatible manner.
- **Orientation** - A plaza may focus primarily inward or outward. An inwardly focused plaza creates a sense of visual containment, while an outwardly focused plaza directs or frames views beyond

the plaza boundaries. The functional requirements of the space will often determine its orientation.

- **Color and Texture** - Construction materials should be aesthetically compatible with materials used in adjacent buildings. A wide variety of paving options are available for use. Concrete pavers in many colors, shapes, and sizes can be incorporated into the design of outdoor plazas and courtyards. As a rule of thumb, the fewer types of materials used, the more visually successful the results.
- **Scale** - The scale of a plaza should be based upon the projected number of users and carrying capacity of the land. Unjustified, large expanses of decorative and well-appointed pavement have a negative impact upon the building and site microclimate.
- **Spatial Articulation** -This may be accomplished through careful design of the ground plane (paving, groundcover), middle plane (walls, trees, shrubs), and overhead plane (tree canopy, trellis). To ensure maximum use, outdoor plazas and courtyards should be located and designed to maximize human comfort. The following guidelines should be considered for the design of each outdoor space:



Pavers are Available, Manufacture from Recycled, Material In a Variety of Colors, Shapes and Sizes

  - Minimize summer afternoon sun exposure by providing a shading device or trees.
  - Maximize solar exposure in winter through the use of deciduous trees.
  - Provide shelters or overhangs for rain protection.
  - Provide wind deflection in exposed locations with plant material and walls.
  - Provide visual screening from any unsightly neighboring uses.
  - Orient seating toward natural areas, water and skyline vistas.
  - Locate adjacent to or in connection with existing green space areas.
  - Include facilities for outdoor eating and outdoor vending.
  - Co-locate public transit stops near plazas and courtyards, at appropriate locations.
  - Design outdoor furniture such as integral parts of the plaza. Too much or too little furniture produces a cluttered or empty appearance.

2.5.9 Equipment and Service Areas

Locate mechanical equipment and service areas based on UFC requirements. These areas include but are not limited to: loading docks, exterior storage areas, dumpsters, mechanical equipment, HVAC equipment, transformers, fans, and cooling towers.

Primary treatment required for mechanical equipment and service areas must be programmed initially during the design of the building. Such unsightly elements should be clustered into a service core area that is located away from public view. These service cores should be screened by the building itself and supplemented by secondary treatments based on UFC requirements.

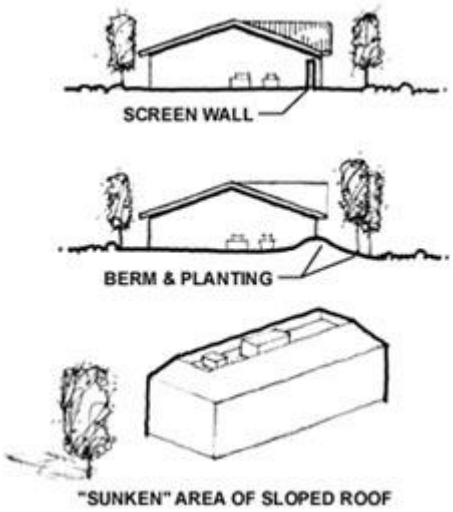
Secondary, or remedial, treatment of existing buildings should be accomplished with screening elements including walls, fences, berms and landscape plantings - all of which are described in other chapters of these guidelines.

Mount rooftop mechanical equipment on buildings with sloped roofs where there is a “sunken” area behind the roof, so the roof itself acts as a screen. This method may apply to new construction or to the addition of a sloped roof to an existing flat-roofed building. Rooftop antennas and satellite dishes are not allowed on barracks.

Vent mechanical equipment located in the building interior without disrupting the architectural design, particularly on the most visual facades. Mechanical rooms may have “window” openings that are within the scale and rhythm of other windows, but are enclosed by louvers or screens rather than glass. Access to the mechanical room shall be from the exterior only.

2.5.10 Security

The DoD Force Protection Construction Standards and Guidance Regulations



Screen Mechanical Equipment from Public View

(www.afcee.brooks.af.mil/dc/dcd/arch/enlisteddorimitories/pdf/11_section_k.pdf) must be complied with for all development at Fort Bragg.

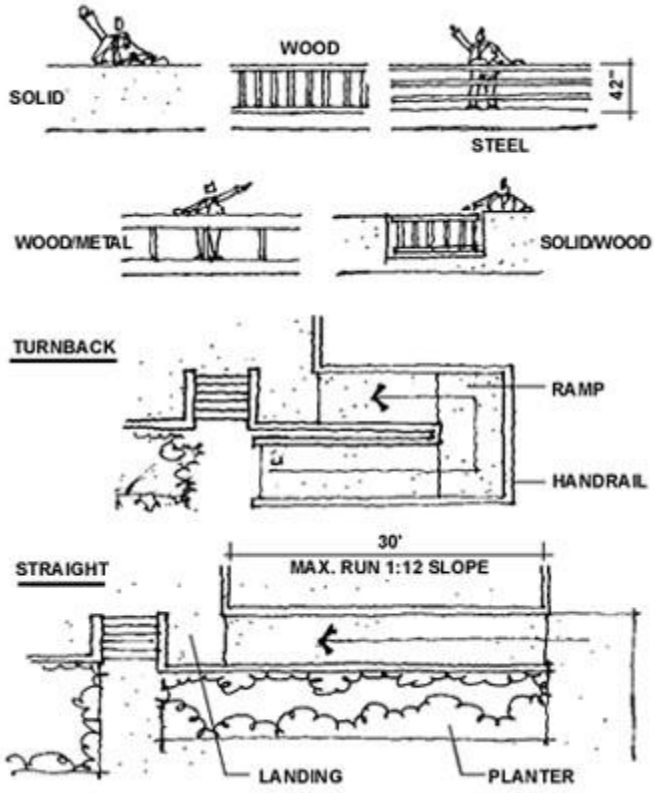
Additional general design considerations include:

- Minimize the number of exterior openings at or below grade, and protect openings against unauthorized entry.
- Provide sufficient space in entry areas for security personnel, sign-in desks, credential readers, personnel identification equipment, and detection equipment.
- Protect all utilities and control panels from unauthorized access and interruption.
- Design elevators, stairways, and automated locking mechanisms so that security is not compromised during emergency evacuations.

2.5.11 Handicap Ramps

Handicap ramps should complement and not disrupt the integrity of the original architecture. They should be designed as an integral part of the building and not appear as a "tacked-on" solution to meet the ADA requirement. Ramps shall meet Americans with Disabilities Act (ADA) requirements (www.access-board.gov/adaag/html/adaag.htm). They should also include the following:

- Finish colors, materials and textures will match the finished architecture.
- Ramp layout should follow existing pedestrian circulation patterns if possible.
- Ramp placement should not interrupt existing on site drainage patterns.
- Ramp design should complement existing architectural character.

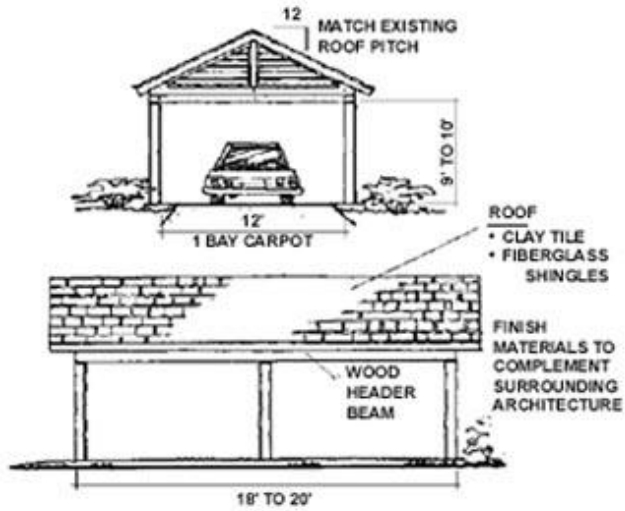


Handrail Types and Alternative Layouts for Handicap Ramps

2.5.12 Carports

Carports provide a functional necessity to post residential dwellings. The following guidelines will help ensure the proper design and visual compatibility of a carport structure.

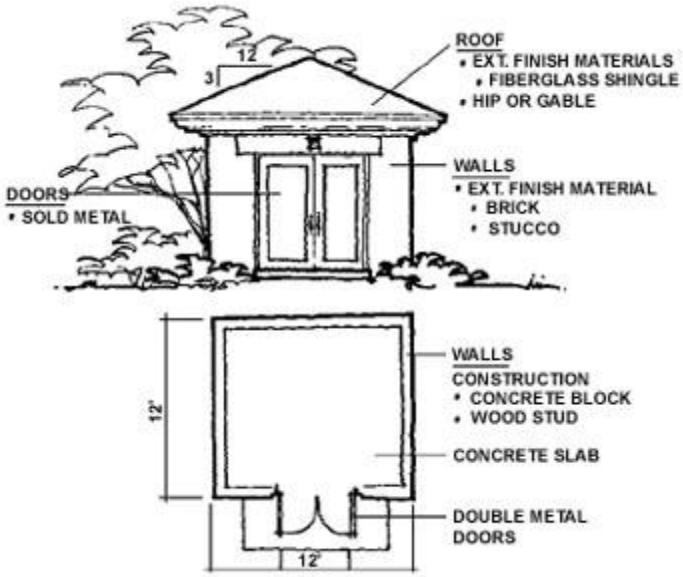
- Use recycled materials wherever feasible, but finish to match the existing built environment (walls, roof).
- A carports scale should never rise above or extend beyond the front or back walls of the existing structure.
- Carports should be located adjacent to, or attached to existing structures.
- A circulation path to and from building should be provided that is finished with a nonslip texture.
- Carport placement should not interfere with pre-existing site drainage patterns.
- Carport placement should not interfere with existing views.



Carport - Front and Side Elevations

2.5.13 Storage Shelters

Temporary metal buildings provide much of the storage requirements at Fort Bragg. In most cases they are unattractive and out of character with existing architecture. These metal storage facilities are discouraged. The following guidelines are to be implemented in the design and installation of storage buildings:

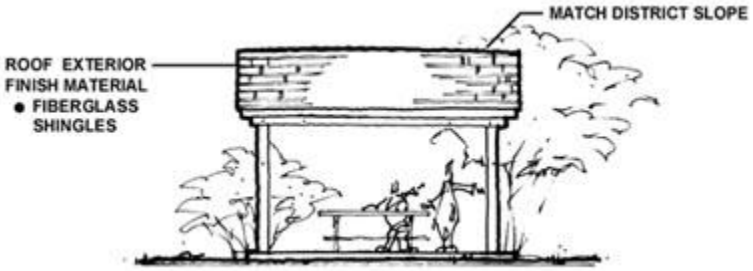


Storage Shed - Elevation and Plan View

- Avoid portable metal and wood storage structures or containers. When mission essential and no permanent alternatives exist, portable metal and wood storage structures are permitted, but will be sited only in industrial areas and maintenance shop compound areas. Connection of utilities to portable structures/containers is not permitted.
- Use recycled materials wherever feasible, but finish to match existing built materials on site (wall, roof).
- Roof slope and finish shall match existing roofs in the area.
- Building location shall not interfere with site views.
- Provide positive drainage away from the building.
- A nonslip finished path, to and from the building, should be provided.
- Building location shall comply with force protection setback requirements.

2.5.14 Picnic Shelters

There are many fine examples of picnic shelters currently located at Fort Bragg. Future shelter construction should be simple and utilize sustainable building materials that are readily available from local sources. Picnic shelter design and installation should include the following:



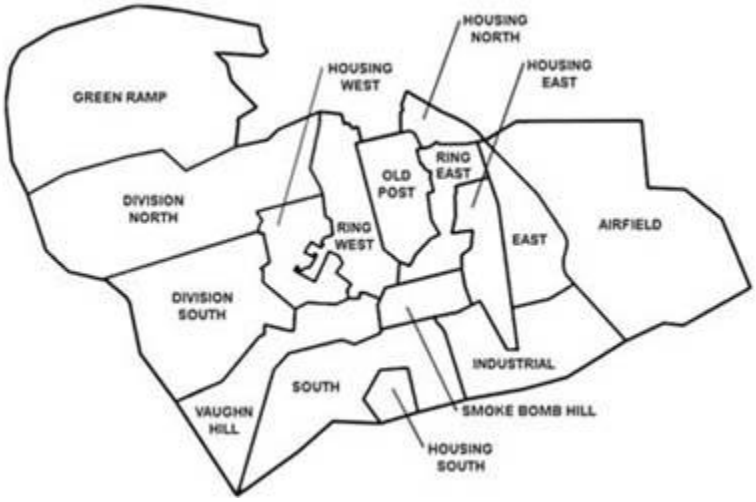
Picnic Shelter - Front and Side Elevations

- Recycled plastic wood products should be used when in contact with soil and wet areas. Structural members are available for this type of construction.
- Finish materials should be made of recycled content products.
- Natural earth tone colors should be used to complement existing surroundings.
- Building area should provide drainage away from picnic shelter.

2.5.15 District Specific Guidelines

The guidelines found in Table S and Table T are shown in examples below.

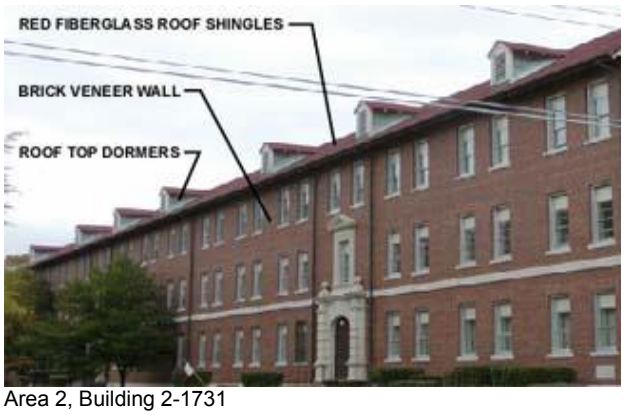
The architectural image of Fort Bragg continues to evolve from a rich building history. Each of the 11 District's architectural development is reflective of the corresponding contemporary building trends of the time. The character of each district is summarized on the following sheets.



2.5.15.1 Old Post Historic District (OPHD)

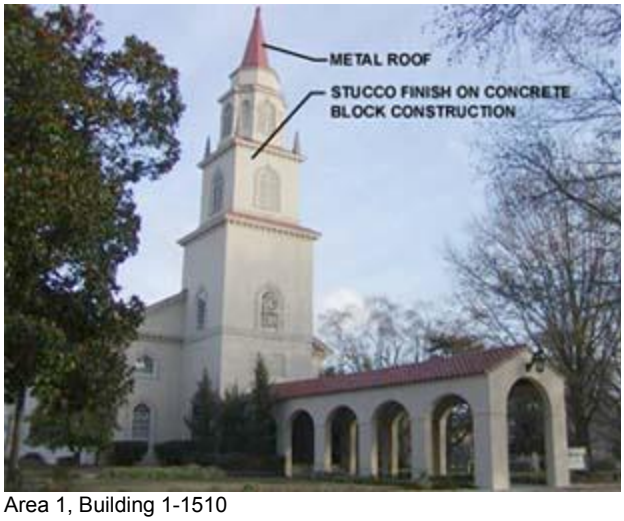
The Old Post Historic District is the administrative center of Fort Bragg which includes the XVIII Airborne Corps Headquarters. Old Post, in its architecture and site planning, represents the traditional core of Fort Bragg. Old Post is reflective of Beaux-Arts design principles such as symmetry, axis, and preserved green spaces. The district represents an architectural design vernacular strong in the use of Georgian Revival and Spanish Eclectic style architecture. Visually, it is a compact district composed of many different functions including administrative, family housing, community, commercial, warehousing, and recreational facilities.

The Old Post Historic District was determined eligible for listing on the National Register of Historic Places in 2001. It is eligible for military history, community planning and development, architecture, and landscape architecture. As an eligible historic district it is subject to the protection afforded by the National Historic Preservation Act of 1966 as amended. This act ensures that all Federal Agencies including the Department of the Army and Fort Bragg will consider historic properties and districts in their day to day activities as well as mission-essential activities. With this in mind, Fort Bragg has developed a handbook entitled, Fort Bragg Old Post Historic District Design Guidelines to provide guidance for the appropriate treatment of the buildings, sites, structures, and landscapes within the historic district. Click to view the Fort Bragg Old Post Historic District Design Guidelines. For additional information, guidance and to ensure compliance with the National Historic Preservation Act please contact the Fort Bragg Cultural Resources Management Program within the Environmental Division of DPW at 396-6680. **Please note that any work involving a historic building or landscape must be approved by the Cultural Resources Management Program prior to approval of funding**.



Area 2, Building 2-1731

Area 1, Building 1-1326



Area 1, Building 1-1510

Area 1, Building 1-3358

2.5.15.2 Ring District

The Ring District, which includes both community and commercial facilities, primarily functions as a community service corridor. The architecture is predominantly modern in style but is finished and appointed with details and materials similar to the Old Post Historic District. Recent development including schools, child development centers, and the new hospital embrace this style and present a more unified and cohesive installation image.

Area 8, Building 8-1213

Area 4, Womack Army Medical Center

Area 4, Building 4-3331

2.5.15.3 Division District

The Division District represents two distinct architectural sections. The north section consists of 1940's World War II vintage wood buildings, arranged in a traditional grid pattern.

The southern section is populated by modern postwar 1950's architecture. Buildings in this section are constructed of concrete systems with minimal architectural features and simple rectangular building forms. This form of design and construction was a quick and economical solution to an immediate need. Fort Bragg is currently replacing all of the 1950's barracks. The new barracks are red brick or a combination of red brick and stucco, gable roofs with concrete tile, and grey tinted glass windows.

Area C, Faith Barracks

Area C, Faith Barracks Dining Facility

2.5.15.4 Green Ramp District

The Green Ramp District includes airfield operations (Pope AFB), supply and storage, and a water treatment plant. The historic water treatment plant is constructed of more traditional building components found in the Old Post Historic District. The Green Ramp District is also the historic site of a Revolutionary War stream crossing in 1781. This district is the site of the large Arrival/Departure Airfield Control Group (A/DACG) Facility that supports Fort Bragg's mission as a Power Projection Platform.

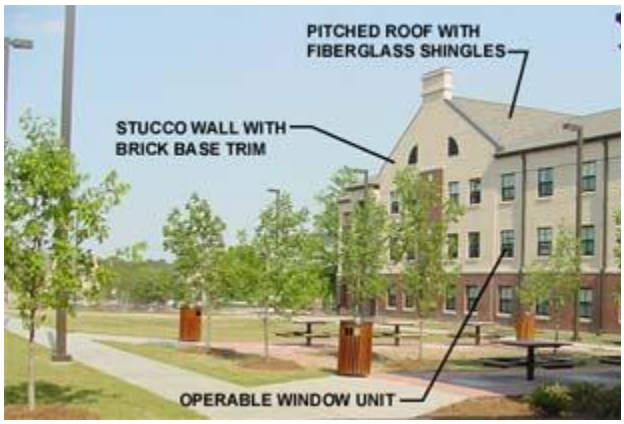
Area W, A/DACG Staging Complex

2.5.15.5 Vaughn Hill District

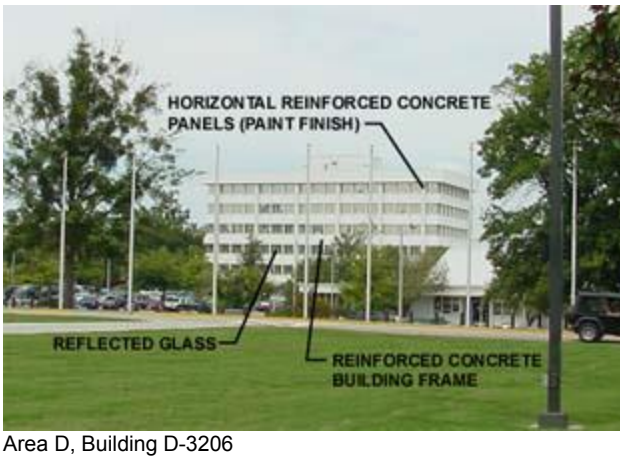
The Vaughn Hill District consists primarily of mid-rise buildings with materials and construction techniques representative of the 1960's. Building materials range from brick to reinforced concrete with colors ranging from warm earth tones to bright modern white finishes.

Area D, Building D-3915

Area D, Building D-3004



Area D, Renovated Rolling Pin Barracks

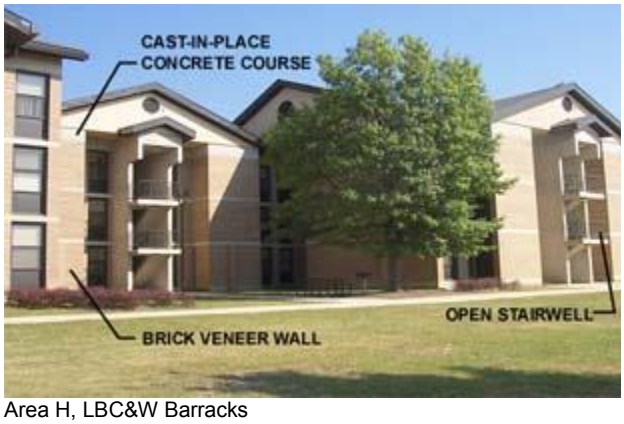


Area D, Building D-3206

2.5.15.6 Smoke Bomb Hill District

The Smoke Bomb Hill District has a variety of building types from small scale single story to larger scale multi-story. Building types range from soldier barracks to administration facilities.

Exterior finishes include concrete with brick accent panels. The overall color palette consists of predominantly grey-brown earthtones.



Area H, LBC&W Barracks

Area H, Building H-2639

2.5.15.7 South District

The South District is presently undergoing a contemporary renovation with the replacement of existing World War II barracks. New design and construction includes both barracks and administration facilities. Throughout this district, existing community facilities help to support this present ongoing transformation. Building materials include brick exterior finishes with shed roofs.

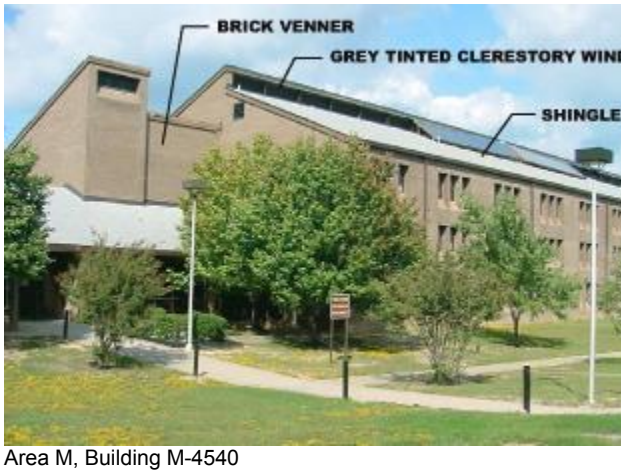
Area E, Building E-4025

Area E, Building E-1930

2.5.15.8 East District

The East District consists of contemporary multi-story structures which house both barracks and administration facilities. Brick is the exterior finish material used on these buildings.

Industrial buildings located throughout the motor pool make up the balance of this district. The motor pool buildings are pre-engineered metal construction.



Area M, Building M-4540

Area M, Lawrence Joel Health and Dental Clinic

2.5.15.9 Airfield District

The Airfield District architectural image presents a simplistic clustering of aircraft operations and maintenance buildings aligning central pedestrian and vehicular circulation corridors. The buildings within the district are pre-engineered metal construction, with the exception of some concrete block buildings that house airfield administration. The paint color adopted in the Airfield District consists of a monochromatic beige, which is used throughout Fort Bragg.

Area P, Building P-1959

Area P, Building P-3962

2.5.15.10 Industrial District

The Industrial District consists of massive scale, industrial-style architecture. Building materials consist of metal and concrete block with clerestory glass inserts. Large garage doors assist in the delivery and transport of much needed supplies throughout the post. The color used in this district is the common beige color appearing throughout Fort Bragg. The consistency in the use of a monochromatic paint scheme helps to unify the overall industrial image.

Area Y, Building Y-4804

2.5.15.11 Housing District

The Housing District consists of both single family and multi-family dwellings. Family units range from one to two story configurations. Materials throughout the Housing District include brick, stucco, and horizontal aluminum siding. Building colors consist of natural earthtone values. A significant contribution to the overall image is the consistent use of gable roof configurations and brick exteriors. This brings cohesiveness to the district image and provides a sense of continuity with the architecture found throughout the Housing District.

Area B, Cherbourg Family Housing

Area 2, Bastogne Gables Historic Family Housing

2.6 Interior Architecture and Environment

The design and quality of building interiors should serve the needs of the occupants and their various activities. The interior must be safe, comfortable, and appropriately appointed to reflect the purpose of the organization in the Fort Bragg hierarchy. The interior design criteria for buildings at Fort Bragg is outlined in the following paragraphs.

2.6.1 Sustainable Interiors

All new buildings, additions, and renovations will be reviewed and rated for compliance with LEED. Indoor Environmental Quality (IEQ) is a primary LEED concern and a primary concern of this design guideline. LEED includes two requirements and 12 credits for interior improvements that can be used to achieve up to 12 points.

LEED lists the Indoor Environmental Quality categories to be included in building design and construction, and the intent of each, together with the requirement and technologies/strategies for meeting the requirement. The categories and intent are listed below. Refer to LEED (http://www.usgbc.org/leed/nc) for the additional information on requirements, technology, and strategies to be used in design and implementation.

2.6.1.1 Minimum Indoor Air Quality (IAQ) Performance (Mandatory)

Meet the minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality. Mechanical ventilation systems shall be designed using the Ventilation Rate Procedure of the applicable local code, whichever is more stringent. Naturally ventilated buildings shall comply with ASHRAE 62.1-2004, paragraph 5.1.

2.6.1.2 Environmental Tobacco Smoke (ETS) Control (Mandatory)

Prohibit smoking in the building. Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.

2.6.1.3 Increase Ventilation (Total Possible Points = 1)

FOR MECHANICALLY VENTILATED SPACES

- Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004 as determined by Indoor Environmental Quality Prerequisite 1.

FOR NATURALLY VENTILATED SPACES

- Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon Trust Good Practice Guide 237 [1998]. Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 1.18 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural ventilation in non-domestic buildings. AND
- Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10: 2005, Natural ventilation in non-domestic buildings. OR
- Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2004 Chapter 6, for at least 90% of occupied spaces. (1 Point)

2.6.1.4 Construction IAQ Management Plan (Total Possible Points = 1)

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows:

- During construction meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.
- Protect stored on-site or installed absorptive materials from moisture damage.
- If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grille, as determined by ASHRAE 52.2-1999, Replace all filtration media immediately prior to occupancy. (1 Point)

2.6.1.5 Low-Emitting Materials (Total Possible Points = 4)

The intent is to reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort. One point each can be achieved by including the following:

- Adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District Rule #1168 by, AND Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000 (1 Point).

- Paints and coatings must meet or exceed the VOC and chemical component limits of Green Seal requirements AND/OR South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004 (1 Point).
- All carpet installed in the building interior shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program. All carpet adhesive shall meet the requirements of EQ Credit 4.1: VOC limit of 50 g/L (1 Point).
- Composite wood and agrifiber products used on the interior of the building (defined as inside of the weatherproofing system) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins (1 Point).

2.6.1.6 Indoor Chemical and Pollutant Source Control (Total Possible Points = 1)

Design to minimize and control pollutant entry into buildings and later cross-contamination of regularly occupied areas:

- Employ permanent entryway systems at least six feet long in the primary direction of travel to capture dirt and particulates from entering the building at all entryways that are directly connected to the outdoors. Acceptable entryway systems include permanently installed grates, grilles, or slotted systems that allow for cleaning underneath. Roll-out mates are only acceptable when maintained on a weekly basis by a contracted service organization. Qualifying entryways are those that serve as regular entry points for building users.
- Where hazardous gases or chemicals may be present or used (including garages, housekeeping/laundry areas and copying/printing rooms), exhaust each space sufficiently to create negative pressure with respect to adjacent spaces with the doors to the room closed. For each of these spaces, provide self-closing doors and deck to deck partitions or a hard lid ceiling. The exhaust rate shall be at least 0.50 cfm/sf, with no air re-circulation. The pressure differential with the surrounding spaces shall be at least 5 Pa (0.02 inches of water gauge) on average and 1 Pa (0.004 inches of water) at a minimum when the doors to the rooms are closed.
- In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media prior to occupancy that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better. Filtration should be applied to process both return and outside air that is to be delivered as supply air.

The intent is to avoid exposure of building occupants to potentially hazardous chemicals that adversely impact air quality. One point can be achieved by including permanent entryway systems (grills, grates, etc.) to capture dirt, particulates, etc. from entering the building at all high volume entryways, Provide areas with structural deck to deck partitions with separate outside exhausting, no air recirculation and negative pressure where chemical use occurs (including housekeeping areas and copying/print rooms), Provide drains plumbed for appropriate disposal of liquid waste in spaces where water and chemical concentrate mixing occurs.

2.6.1.7 Controllability of Systems (Total Possible Points = 2)

The intent is to provide a high level of individual occupant control of thermal, ventilation, and lighting systems to support optimum health, productivity, and comfort conditions. One point each can be achieved by including the following:

- Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences. AND Provide lighting system controllability for all shared multi-occupant spaces to enable lighting adjustment that meets group needs and preferences (1 Point).
- Provide controls for each individual for airflow, temperature, and lighting for 50 percent of the non-perimeter, regularly occupied areas. Conditions for thermal comfort are described in ASHRAE Standard 55-2004 to include the primary factors of air temperature, radiant temperature, air speed and humidity. Comfort system control, for the purposes of this credit, is

defined as the provision of control over at least one of these primary factors in the occupant's local environment (1 Point).

2.6.1.8 Thermal Comfort (Total Possible Points = 2)

The intent is to provide for a thermally comfortable environment that supports the productive and healthy performance of the building occupants. One point each can be achieved by the following:

- Design HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy. Demonstrate design compliance in accordance with the Section 6.1.1 Documentation (1 Point).
- Agree to implement a thermal comfort survey of building occupants within a period of six to 18 months after occupancy. This survey should collect anonymous responses about thermal comfort in the building including an assessment of overall satisfaction with thermal performance and identification of thermal comfort-related problems. Agree to develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort in the building. This plan should include measurement of relevant environmental variables in problem areas in accordance with ASHRAE Standard 55-2004 (1 Point).

2.6.1.9 Daylight and Views (Total Possible Points = 1)

The intent is to provide a connection between indoor spaces and the outdoor environment through the introduction of sunlight and views into the occupied areas of the building. One point can be achieved by the following:

- Achieve a minimum Daylight Factor of two percent (excluding all direct sunlight penetration) in 75 percent of all regularly occupied areas (1 Point).

2.6.2 Interior Design Guidance

The interior design criteria for 11 types of buildings have been identified, and are provided on the following pages.

2.6.2.1 Corps Headquarters

Corps Headquarters is an extremely significant Fort Bragg building. Command operations in this building are important and should be clearly conveyed by the design of the interior. This high level of importance should be demonstrated by the use of a clear procession of quality materials, moving from the lobby to the inner sanctum of the Command Group office suite.

The interior should include durable, upgrade traditional materials, finishes, lighting, and furniture in all spaces. The most elegant appointments should be reserved for the Command Group Office Suite.

The public spaces of the Corps Headquarters should reflect a level of pride, history, and accolades of the Corps. The lighting should be directional and dramatic in these public areas to emphasize the displays.

A neutral color scheme should be employed throughout the building interior with traditional and historically appropriate accent colors used in upholstery fabric, window treatments, and artwork.

Directional signage should be discreet and blend with the interior. As with all furniture used for a specific function, task furniture should be ergonomic in design.

Traditional Furniture in a Command Group Reception Area

Lighting should be Ambient and Directional to Enhance Interior

Traditional Window Treatments Compliment Elegant Seating Area.

- Procession of Materials Signaling Importance of Spaces
- Public vs Private
- Upgraded Traditional Interior
- Corps Pride Displayed in All Public Spaces
- Neutral Color Scheme
- Historically Appropriate Accent Colors
- Highest Level of Importance

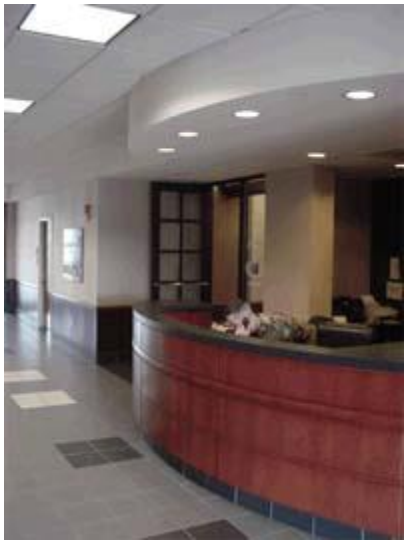
Corridor Floor should be Durable and Slip Resistant

2.6.2.2 Brigade Headquarters

Brigade offices are located in the Brigade Headquarters Building, and function as the command center for the brigade.

The Brigade Headquarters Building interior should include the level of respect required for a headquarters building. Beginning with the entrance lobby, clear and precise signals need to be relayed to the visitor. Visual signaling could be a reception desk for monitoring lobby activity, directive signage, and exhibits showcasing the brigade's accomplishments.

The interior should employ one primary color scheme throughout the building, with accent colors used to highlight different areas or objects such as lobby wall behind reception desk, signage, and artwork.



Lobby Reception Desks should be Located Appropriately to Effectively Monitor Lobby Activity

Brigade Awards and Trophies should be Prominently Displayed in Public Areas

The main color scheme should be neutral to allow for the possibility of changing accent colors. Standardized fluorescent lighting should be used with different fixtures to accent areas or objects.

Materials used in the interior need to be durable and low maintenance, with upgraded finishes used in the lobby, main conference room, and commander's office suite. Furniture should be comfortable, durable, and ergonomically matched to the user's task.

The Brigade Headquarters Building is vital in the Fort Bragg mission. The interior should support and add to the brigade's important role in this mission.

- Visual Signaling in Entrance Lobby
- Monitor Lobby Activity
- Directive Signage
- Brigade Pride
- One Main Neutral Interior Color Scheme
- Accent Colors Highlight Areas and Objects
- Fluorescent Lighting with Accent Fixtures
- Durable Finishes Upgraded in Prominent Spaces
- Comfortable and Ergonomic Task Furniture
- Atmosphere of Respect

2.6.2.3 Battalion Headquarters

The Battalion Headquarters Building is the hub of all activities for the battalion. It includes offices, conference rooms, and support staff areas, as well as a lobby and visitor reception area.

The lobby should have a formality appropriate to the importance of the battalion within the Corps organization. Durable materials should be used throughout the building, with an upgraded quality finish in the public lobby , main conference room, and commander's offices. Unit pride should be prominently displayed in highly visible locations. Battalion flags and awards can be displayed in cabinets in the lobby, battalion history story boards in corridors, and other important battalion objects showcased in the office areas. The interior color scheme should be neutral with the battalion's colors used as accents to highlight important and prominent spaces. Lighting should further enhance the interior design scheme. Direct lighting can be used to highlight signage, artwork, and display cases; as well as differentiate public and private areas. Fluorescent lighting should be used for efficiency, but different light fixtures should be used to accommodate the variety of building functions. As with all buildings with offices and work spaces, it is important to use ergonomically designed furniture that matches the furniture's function with the user's tasks.

Lobby Reception Desks Need Visual Contact with Entrance Door

Upgraded Quality, Construction, and Accents such as Planters can be Used in Public Space

Battalion Pride should be Displayed with Group Histories and Objects

The Battalion Headquarters is important in the hierarchy of Fort Bragg . The interior of the building should reflect and enhance this importance.

- Formality to Public Spaces
- Durable Finishes and Materials
- Display of Battalion Pride
- Neutral Color Scheme with Battalion's Colors as Accents
- Fluorescent Lighting to Accommodate Building Functions
- Ergonomic Furniture
- Building Interior to Reflect Battalion's Importance at Fort Bragg

2.6.2.4 Company Operations

The Company Operations Building functions as the central office, workplace, and meeting area for the company. One main interior design theme should be developed for all Company Operations buildings allowing for variations to be reflected in company specific features. The entry point for visitors should include an area for company flags, emblems, and awards. Signage needs to be clear and concise to avoid confusion. A neutral color scheme should be used throughout the building with accent colors highlighting the various company functions. Materials and finishes need to be durable and easy to clean. Fluorescent lighting should be used with variation in the fixture type for different applications. Furniture should be ergonomic in design for comfort and efficiency in this work environment. Certain tasks may require specifically designed furniture.

Provide Places for Camaraderie

The Company Operations Building is the main point of contact for the company's soldiers. The interior should support and reflect the building's varied functions.

Meeting Places are an Important Function of Company Operations

- One Main Interior Design Scheme Allowing for Variation
- Prominent Display of Company Flags and Awards
- Clear and Concise Signage
- Durable Finishes/Materials
- Fluorescent Lighting Fixtures Selected for Specific Use
- Ergonomic Furniture Designed for Work Task

2.6.2.5 Barracks

Barracks are designed to house the Fort Bragg unaccompanied soldier. The interior should be warm and comforting to provide the residents a feeling of home. Colors are to be light and neutral, enabling the resident to add personal belongings while maintaining a cohesive interior.

Durable finish materials are required for the interior to withstand the daily living activities and to last for several rotations of occupancy. The interior furnishings and materials should be easy to maintain and to be refinished. An uncluttered interior should be created by the use of contemporary and minimal light fixtures cabinetry, and furniture. Stain resistant upholstery, color coordinated with the building interior, should be used in all spaces.

Accent Colors can be Used in Floor Patterns

Private Rooms Should have Lower Light Levels and Neutral Colors

Contemporary Light Fixtures Provide an Uncluttered Appearance

Durable Materials sh
Living Areas

Lower light levels and neutral colors should be provided in the private rooms for a more residential and peaceful atmosphere. Common activity areas should include brighter lighting and colors.

Unit pride is important to the morale of the soldiers at Fort Bragg, and should be displayed in the barracks common activity areas. An area for display of banners, flags, award, etc. should be included. Since the unit residents frequently change, displays of unit pride should be limited to non-permanent objects and not interior finishes and materials.

It is vital to Fort Bragg for the soldier to have a place away from home that feels like home. Achieving this feeling is the primary goal of the interior design.

- Warm and Comforting Interior
- Light and Neutral Colors
- Durable Finish Materials
- Modern Style Light Fixtures
- Modern Style Cabinetry
- Nonpermanent Display of Unit Pride
- Home Away from Home

2.6.2.6 Dining Facility

The Dining Facility serves a variety of functions in the soldier's daily life that directly impact the interior design of the facility. The primary function is to provide daily meals. The facility is also a gathering place for camaraderie among soldiers. I it is a place to post information, and serves as a forum for meetings.

Serving Area should be Well Lit and have Easily Maintained Materials

The interior atmosphere should feel light and airy. A neutral color scheme should dominate with bright and vivid accent colors used in the display of unit flags, artwork, seating, and accent floor tiles. Unit pride should be proudly displayed with flags, banners, and wall decorations for the various units served by the facility. All materials should be durable, easily cleaned, and maintained. Floors must be slip resistant to provide a high level of safety. The interior design scheme should also clearly indicate the separation between the serving lines and eating areas. This separation can be achieved through a change of lighting, flooring patterns, artwork, and wall accent colors.

Signage should be clear and easily readable, sized for viewing from the serving line. Because of its proximity to the food being served, menu signage should be changeable and easily cleaned and maintained. Natural lighting should be used as much as possible with fluorescent lighting housed in a contemporary style fixture. The eating area should include ceiling fans that could include lighting.

Unit Pride can be Displayed with Flags
Adding Color to the Neutral Interior

Light Fixtures and Ceiling Fan Locations
Should be Properly Placed

The Dining Facility is a unique building serving a variety of functions in the lines of soldiers at Fort Bragg, It is important that this variety of functions is supported by and informs the interior design.

- Light and Airy Interior Atmosphere
- Neutral Color Scheme
- Bright and Vivid Accent Colors
- Lively Display of Unit Pride Flags and Banners
- Cleanliness and Safety
- Clear Indication of Serving Lines vs Eating Areas

2.6.2.7 Soldier Community Center

Important buildings in the lives of soldiers at Fort Bragg are those that provide after hours services and social activities. The Soldier Community Center is a hub of such activity. The Community Center includes a laundry room, TV lounge, cooking and eating areas, and game room. These different spaces need to be addressed in an overall interior design scheme. This scheme should be thematic, such as “southwestern, prairie, or coastal influence” and allow for variations adding distinction to the various activity areas. An entrance lobby should provide a reception desk. A large lounge should be centrally located to provide an eating area, a place for group meetings, and impromptu gatherings. The game room should be durable and designed with a sports oriented theme. And the laundry room should be bright and easily maintained materials to withstand water and detergents.

Kitchen Areas Should have Durable Materials and Stain Resistant Upholstery

Group Meeting Areas are a Central Activity Space in the Soldier Community Center

Laundry Room Surfaces should be Impervious to Liquids and Solvents

Game Activities are a in the Center

All of the spaces in the Community Center should be durable. Carpet should be solution dyed, upholstery should use stain resistant synthetic fibers, and flooring should be slip resistant and impervious to liquids. As with all Fort Bragg interiors, fluorescent lighting should be installed for maximum efficiency to respond to specific tasks. For example, in a lounge, table lamps can be used to provide a residential atmosphere.

The Soldier Community Center adds a positive component to the life of the Fort Bragg soldier. The interior must allow for a variety of activities important in the soldier's life.

- One Dominant Interior Scheme
- Variety of Spaces
- Durable Interior
- Finish Specifications Correspond to Activity
- Lighting Designed for Specific Task
- Hub of After Hours Activity

2.6.2.8 Transient Quarters

The Transient Quarters provides temporary lodging for accompanied soldiers visiting Fort Bragg. The interior should provide a place of comfort and rest. Upgraded traditional materials should be used in the public spaces and private rooms. The accent colors should reinforce a feeling of comfort. The lobby should be elegantly appointed with upgraded materials, upholstery, furniture, and lighting. A well designed information desk with neatly placed signage and pamphlets should be in close visual proximity to the lobby. The design of the lobby should set the theme for lounges and the private rooms. Materials should be durable and easy to maintain. Safety is vital, and the interior must comply with all required fire codes. Corridors should be lit with indirect fluorescent sconce lights to provide a more peaceful level of light. Table lamps should be used in the private rooms, lounges, and the lobby, to add a warm feeling to the residential scale interior. Clear, concise signage must be employed throughout the interior.

Information Desk should be Neat and Uncluttered

Lobby Seating should be Comfortable and Inviting

Sleeping Areas should have Lower Light Levels

Guest Rooms have Elegantly Appointed Interiors with Traditional Furniture

Waiting Areas can ha
Atmosphere

The Transient Quarters provides the visitor temporary lodging, and a place for comfort and rest. Most importantly, the Transient Quarters provides a first impression of Fort Bragg. The goal of the interior is to satisfy and exceed the visitor's expectations.

- Convey Stature of Fort Bragg
- Provide Place of Comfort and Rest
- Elegantly Appointed Interior
- Positive First Impression
- Interior Theme Used Throughout Spaces
- Upgraded Materials with Residential Feel
- Compliance with Safety Codes
- Clear Directive Signage
- Exceed Visitor's Expectations

2.6.2.9 Community Support

Good morale is important for the Fort Bragg soldier. Maintaining this morale is vital to the Army mission. Community Support Buildings provide recreation for soldiers and families. These buildings provide gathering places for young dependents and restaurants for military camaraderie. This unique and important role must be conveyed by the building interior. Each interior should respond and coordinate with the building activity. All of the Community Support interiors should use a neutral color scheme with accent colors that reflect the nature of individual activity spaces within the building. For example, a Youth Center should have a bright and cheerful interior with extremely durable and easily maintained finishes. Bright and cheerful accent colors should be used in the floor patterns, accent walls, and upholstery. Eating facility should have a thematic concept with subdued tones. Finishes and furnishings should be very durable.

A Strong Interior Scheme can Dominate a Space

Restaurants should have Warm and Cozy Spaces

Accent Colors can be used in Ceramic Tile Patterns

- Variety of Uses
- Interior should Compliment Building Function
- Durable and Easily Maintained Finishes
- Neutral Color Scheme
- Coordinate Accent Colors with Design Scheme
- Design Lighting for Specific Tasks
- Interiors to Improve Fort Bragg Morale and Camaraderie

2.6.2.10 Child Development Center

This building type serves a limited, but important sector of the Fort Bragg population; the children and their parents. It is vital that the interior responds to specific child oriented requirements. First and foremost, the interior should use products that ensure safety. The flooring material should be slip resistant even when wet and the children's furniture should be tip resistant. The interior should be durable and easily maintained. Finishes, materials, and furniture need to withstand the daily rigors of active children. Third, the interior needs to be bright and cheerful. A neutral color scheme should be used with bright, vivid accent colors used in the floor patterns, to highlight walls, light fixtures, and other features. Last, the interior should convey a warm and nurturing environment. Seating should be comfortable and classroom cabinetry and furniture should be appropriately sized for children. The lighting should be selected to contribute to the interior. The fluorescent lighting should be bright in work and play areas.

Artificial Plants add "Life" to Interior

The Child Development Center serves a specific segment of the Fort Bragg population: the children and their parents. While away from their parents, the children need to be in a safe, nurturing, and fun environment.

Use Durable Furniture with Stain Resistant Upholstery in Child Development Center

- Child Oriented Interior
- Safe Environment

- Durable and Easily Maintained Environment
- Bright and Cheerful
- Warm and Nurturing
- Fluorescent Lighting
- Serving a Specific Population

2.6.2.11 Installation Support

This hybrid building has several functions that impact the interior design. The building is the office of the architects, engineers, and designers that manage design and construction projects on Fort Bragg. The building is the repository for contract documents for those projects, and the studio where smaller sized projects are designed. The building requires large shop and materials storage areas for building maintenance.

The offices should be designed with upgraded durable materials, furniture, and lighting in the public spaces and senior level offices. Civilians frequently visit those buildings, so the interior should provide a positive impression. The entrance lobby should have a corporate feel with a reception desk and seating.

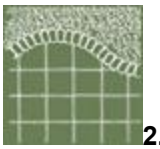
The color scheme should be neutral with accent colors introduced in the lobby and throughout the interior. Clear directive signage is important for departments, offices, and support rooms. Standard fluorescent lighting should be used for efficiency, with indirect sconce lighting in the corridors and directional lighting to brighten corridor intersections.

Correct furniture needs to be used with specific tasks for both ergonomics and comfort. Computer workstations require different chairs than project manager desks or conference rooms. The proper coordination of task and furnishings enhances the workplace and contributes to efficiency and morale.

The Installation Support building serves the architects, engineers, and designers of building projects at Fort Bragg. This implies that the interior should have an atmosphere similar to a civilian corporate workplace.

- Offices and Workplace
- Provide Civilian Visitors with Positive First Impression
- Upgraded Durable Materials, Furniture, and Lighting
- Neutral Color Scheme with Somber Accent Colors
- Indirect Fluorescent Sconce Lights in Corridor
- Ergonomic Furniture for Specific Task

Atmosphere of Civilian Corporate Workplace



2.7 Facility Turnover Delivery Process

The design and construction of a facility should be implemented in a manner that will meet the needs of the activities that will utilize the facility. In the ever changing military context, buildings should be designed to meet the needs of the users, but also to be flexible enough to be rearranged spatially for users that may not have been considered in design and construction.

The facility delivery process is one of the sustainability goals that is included in LEED-EB (Existing Buildings). Since all new design for development will be reviewed and rated for compliance with LEED-NC, concerns for facility delivery are included in this Installation Design Guide for a Sustainable Fort Bragg.

LEED-EB requirements that should be met to achieve a LEED-EB rating of Certified are included below. LEED-EB includes points to be earned in each of the six major categories of LEED.

2.7.1 Under Construction (Total Possible Points =)

2.8 Operation and Sustainment

Operation and sustainment is one of the sustainability goals adopted by Fort Bragg. The intent of the goal is to provide development that meets current mission requirements in providing facilities that are efficient to operate and maintain, safe and desirable for the work force, optimize the infrastructure, and are responsive to change.

A long term goal for Fort Bragg is to review and rate for compliance with LEED-EB twenty-five percent of the total square footage of all existing buildings. Therefore, LEED-EB requirements are included as a part of this design guide. The concerns for reinforcement of the current mission through the design, construction, and operation of an existing facility are included in LEED-EB. The Operation and Maintenance categories are as follows:

2.8.1 Under Construction (Total Points Possible = 1)

2.9 Extended Functional Life and Adaptation

The sustainability goal of Extended Functional Life and Adaptation Energy has been adopted by Fort Bragg. The intent of this goal is to provide for facilities today that will be usable for future missions.

A long term goal at Fort Bragg is to review and rate for compliance with LEED-EB twenty-five percent of the total square footage of all existing buildings. Therefore, LEED-EB requirements have been incorporated into the Fort Bragg IDG to promote sustainability at Fort Bragg and achieve a LEED-EB Certified level.

The categories for points in LEED-EB are as follows:

2.9.1 Under Construction (Total Possible Points =)

3.1 Introduction

There are two types of construction at Fort Bragg: MILCON covered by the **Transformation RFP** (TRFP) and MILCON as well as OMA (operations and maintenance) projects currently not covered by the TRFP. MILCON TRFP projects include barracks (UEPH), dining facilities, divisional/brigade headquarters, and motor pools.

Sections 3.1, 3.2 and 3.3 apply to MILCON and OMA projects not covered by the TRFP. For these projects, Sections 3.1, 3.2 and 3.3 are requirements and must be incorporated into design and construction that occurs on the installation. Design and construction for these projects is implemented through the use of the U.S. Army Corps of Engineers Unified Facilities Guide Specifications (UFGS). Fort Bragg has adopted additional specifications and guidelines that apply only to this installation and do not appear in the UFGS. Table S provides the architectural colors and materials that must be used in each district of the Installation.

The Fort Bragg specifications and guidelines found in 3.2 and 3.3 must be incorporated into design and construction that occurs on the installation for non-MILCON TRFP projects. These specifications and guidelines supersede those in Chapters I and II of the Installation Design Guide for a Sustainable Fort

Bragg and are listed according to the UFGS Division category that they support. The specification writer must be cognizant of the Fort Bragg specific requirements, and include them when specifications are prepared for Fort Bragg.

Section 3.4 applies only to MILCON TRFP projects. All other sections of Chapter 3 are to be considered as advisory only for MILCON TRFP projects. Table T provides the colors and materials for the MILCON TRFP projects.

3.1.1 Documentation Requirements

List of subjects covered:

- **CADD document production** coordinated with standards
- **Design submittals** and review of project drawings and specifications
- **Bid document** dissemination for contracting
- **Construction submittals** and drawing changes
- **As-built drawing** production accuracy
- **Mapping, Utilities** and location of projects

3.1.1.1 CADD Document Production

CADD conventions – Tri Service Standards shall be followed except as noted.

a. All drawings shall have a sheet index. The index shall enumerate the plate number of the sheet, the title of the sheet, the sequence number of the sheet, and the design file corresponding to the sheet.
b. Minimal patterning and pocheing shall be used. Maximum file size shall be 1 MB without approval.
c. MicroStation Version 7 or newer shall be used by all government agencies, units, subcontractors, private AE firms and AE contractors. No other CAD format will be accepted.
d. Text shall be no smaller than 1/8" when printed at full size or 1/16" when printed at smaller size. Fonts will be limited to Font 1 (working) and Font 42 (Block Outline).
e. PDF files shall be completely readable when viewed in the digital format especially when in zoom in mode.
f. All plans shall comply with Savannah District CADD conventions, seed files and instructions.
g. Drawing compositions require that in all cases the border sheet will be attached as a reference file and not imbedded in any plate. The border sheet will be assigned the logical name 'border' in lower case.
h. In the case of floor plans or utilities overlaying floor plans, a single reference file shall be attached depicting the floor plan. Appropriate symbology will be utilized so that the drawing is clear and completely legible when plotted in 'black and white' at full scale and half size.

3.1.1.2 Design Submittals

Design submittals shall be submitted electronically and in hard copy in the following format:

a. a. All specifications and reports should be submitted in format readable by either Adobe Acrobat or Microsoft Office software. Fonts shall be Times New Roman, 12 point). This includes the LEED rating forms, Design Analysis, specifications, narratives, charrette reports, value engineering reports, etc. 4 hard copies shall be submitted. When submitting in pdf, the pdf will be accompanied by the source files used to generate the pdf.
b. b. All drawings will be prepared to conform to ANSI 'D' size (22"x34"). Plans will be submitted in Microstation dgn format and accompanied by cal files suitable for reading in standard reader software such as MaxView. Cal files will be named the same as their corresponding dgn file with the dgn extension replaced with '.cal'. The Designer will also submit 2 half-size hard copies. Small sized prints shall be nominal 11" x 17". The plans will be accessible in a .maxFR file that will include all design plates and an index page.

100% design submittal shall consist of original digital files (.dgn and .doc) plus the Electronic Bid Set.

3.1.1.3 Electronic Bid Sets

Bid sets shall be MicroStation dgn files converted to CALS files. Specifications shall be in Word converted to Adobe. The successful bidder will receive both dgn file and Word documents.

3.1.1.4 Construction Submittals

The Design Agency shall require the construction contractor to make submittals in digital format -- Microstation dgn and Microsoft Word. This will apply to all submittals except material colors and finishes. Other SDE requirements shall be complied with.

3.1.1.5 As-built Drawings (Buildings)

Design agency shall edit specifications requiring the Contractor to furnish as-builts accurately reflecting changes during construction. Contractor shall be required to furnish original digital files

a. The map will clearly show all utilities and clearly indicate those installed with a trace wire and/or cathodic protection.
b. The map will clearly indicate connections with existing utilities and clearly depict utility connections with structures.
c. Accompanying the request for acceptance of final construction, the construction contractor shall accompany the request with as-built documents including design files representing the resume of construction and operation/warranty documents of all equipment. No DD Form 1354 shall be finalized without as-built documents.

3.1.1.6 Mapping and Utilities

Plans shall be prepared according to the following specifications.

Special Requirements for Site Work (Design and As-Built Preparation):

a. A single map of the entire site shall be prepared indicating the existing site conditions and required demolitions.
b. A single map indicating proposed utilities and other constructions to include the footprint of structures, paving (including curbing), sidewalks, and other relevant planimetric features.
c. The map will be registered to the North Carolina State Plane Coordinate System – Zone 3200 – NAD83 -- U.S. Survey Feet. Elevation units will be MSL GRS80 U.S. Survey Feet.
d. Due north on the map will be as viewed from the bottom of the map. Rotation and translation of coordinate systems will not be allowed nor will orientation to Magnetic North. The Microstation view may be rotated for plotting purposes but the orientation of the map must be geographically correct when selecting 'top view' in Microstation.
e. The map will contain a labeled coordinate grid with spacing appropriate to the map extents. For instance, a map scale of 1"=30’ will have coordinates labeled at 100’ intervals north/south and east/west.
f. All utilities on the map will be clearly labeled as to size and material. Where utilities are to be enclosed in conduits or duct work, a section of the duct will be shown clearly indicating the dimensions and material of the duct, the contents of the duct such as wire size and type of conductor, whether conductor is primary or neutral, number of conductors, hot water supply or return, pipe size, insulation type and thickness, etc.

The map will show the invert and rim elevation of all manholes as well as the invert of each pipe joining a manhole and the invert and character of all outfalls.

3.2 Special Fort Bragg Considerations - Guide Specifications

3.2.1 Environmental Considerations

(UFGS Division 01- GENERAL REQUIREMENTS)

A. Compliance with The National Environmental Policy Act: Design will not proceed beyond concept without NEPA documentation as required by AR-415-15, Army Military Construction Program Development and Executions and AR 200-2, Environmental Effects for Army Actions. The Fort Bragg Environmental Officer's telephone number is (910) 396-6680/8988.

B. Project Siting – Coordination with Master Planning, Natural Resource Division (NRD), ESO, and ECB must be performed to ensure the project is not sited in an endangered species habitat, installation green belt, or a Solid Waste Management Unit (SWMU).

C. Tree Management

1. For protection of trees that are not to be disturbed during construction, tree protection will be installed prior to clearing and grubbing and shall remain throughout the life of the project.
2. A tree removal plan is required for all projects at Fort Bragg and cannot be combined with any other plan (i.e. grading or demolition plan). The tree removal plan must be submitted to NRD and the ESO by the PM for approval with the concept design submittal. The 35 percent design submittal will be used to evaluate environmental approval. Approval/disapproval will be provided to the Fort Bragg PM. The tree removal plan must show all tree removal for the project, including utilities and erosion control removal. The tree removal plan must include the following notes:
    a. Only the trees specified on this sheet can be removed by the contractor.
    b. All trees indicated to be removed will be marked by the contractor and approved by the Contracting Officer before removal.
    c. Trees marked for removal (clearing limits) must be identified by species and have their diameter breast height (dbh) on map. If information is not on the map then the tree removal plan information must be summarized digitally in a file in Microsoft Word or in Microsoft Excel spreadsheet that is given to the Fort Bragg (DPW) Project Manager.
    d. Approval for pine tree removal is dependent upon the location of the project. As many trees as possible must be saved. No pine trees may be removed without approval by NRD at 396-2867.
3. Standing trees are real property and remain the property of the Government. Disposal of merchantable timber or other real property components by burning, burying or natural decay may be accomplished only after a formal determination that sale of such items is not feasible. The designer shall mark on the project site all clearing limits and tree removal for all design submittals from 35 percent to final design submittal.
4. Any timber or land-clearing debris from a site must be evaluated for economic feasibility of on-site mulching and re-use in final landscape plan. Where economically feasible, this must be done on-site.
5. Any timber or land-clearing debris from a site that is transported to the Fort Bragg landfill will be transported and delivered in a condition appropriate for mulching at this site (i.e. not mixed with other debris and dirt.) In addition, all waste transported to the landfill must be done with loads covered and in compliance with DOT standards. These segregation and transportation requirements must be taken into consideration when conducting economic analysis above.

D. Erosion Control

1. An Erosion Control Plan (ECP) is required for all land-disturbing projects at Fort Bragg. The installation Soil Conservationist reviews all plans for compliance.
2. For land-disturbing projects that are greater than one acre, the ECP must be submitted to the state of NC for approval. The ECP must be submitted to ESO for approval and to ensure that it is in compliance with Fort Bragg's Storm Water Permit prior to submission to the State. Once the plan has been approved and signed by Fort Bragg, the designer shall submit the fee and three copies of the Fort Bragg signed copy to the State of North Carolina.
3. The ECP shall:
    a. Include design calculations, drawings, and specifications as necessary to comply with the North Carolina Erosion and Sediment Planning and Design Manual;
    b. Address all storm water discharges to the run of the creek in which it is being directed;
    c. Use the 25-Year Storm Event for all Design calculations;
    d. Design for zero storm water discharge on all projects whenever possible (this includes discharge to existing storm water systems).
4. The design agency will be responsible for evaluating all on-site and off –site erosion control measures that will effect the approval of the ECP by the ESO or the State of North Carolina before submittal of the concept design. The design agency will inform the appropriate Project Manager (i.e. Savannah District, Ft. Bragg or other) of any existing erosion control problems and suggest a possible solution. The Project Manager will inform the DPW of any solution not included in the scope. The documentation will include a statement of the erosion control problem, a solution to the problem, and a cost estimate to correct the problem.
5. The design agency must evaluate the impact of the project on the existing watershed into which it drains.

E. Soil Management

1. Design must include the conservation of all topsoil within project limits. Conservation may include removal and stockpile (with appropriate erosion control measures) for final use in landscaping.
2. Design must include a soil disposal minimization program to minimize soil removal and maximize re-use of soil on site. This requirement is driven by the excessive amounts of soil historically brought to the Fort Bragg landfill for disposal – volumes exceeding the ability to stockpile or use as daily cover. Estimated amounts of excess soil (and the soil type) must be included in the Environmental Plan and identified to the Project Manager. The Project Manager must notify DPW CMD of the estimated amount. An appropriate stockpile or re-use location will be identified within Fort Bragg. The design and cost estimations must include transportation of the excess soil to locations within 20 miles of the construction site.
3. The North Carolina Department of Environment and Natural Resources has issued a policy for construction projects. If contamination is discovered during excavation for footings, utilities, or other intrusive activities, the policy is as follows:
    a. Soil excavated on a DOD installation during a construction project may be placed back into the excavation from which it came, even if the soil is contaminated. In order to prevent direct contact exposure to the contaminated soil, however, the top 12 inches of the excavation must be backfilled with uncontaminated fill material, concrete, or asphalt.
    b. Contaminated soil remaining after backfilling the excavation (excess contaminated soil) must be treated as contaminated soil and disposed of in accordance with contaminated soil disposal procedures. Excess contaminated soil cannot be used as backfill elsewhere on the site.

c. If the area in which the excavation occurs is already known or suspected to contain contaminated soil, the Directorate of Public Works, Environmental Sustainment Office, Environmental Compliance Branch (ECB) should make the installation's construction office aware of the contamination. If soil (or other) contamination is discovered during a construction project excavation in an area not previously known to be contaminated, the installation's construction office must notify the ECB and the ECB will treat the newly discovered contamination as a new site.

d. The Installation should take all precautions to protect workers from exposure to contaminated soils.

F. Waste Disposal

1. HW
2. NHSW
    a. The design must include maximum reuse during construction. This can include conversion of grubbing and land-clearing debris to mulch, limited cut and fill to minimize excess soil.
    b. The design can include the use of Fort Bragg C&D and LCID Landfills; however, strict compliance with State and Installation standards is required.
    c. Economic analysis for reuse must include DOT compliant transportation to the landfill with loads segregated for further reuse.
    d. Contractor-generated waste that is not associated with demolition or construction must be managed separately from other waste streams and is prohibited from on-post land filling.

G. Storm water

1. The storm water plan should include Low Impact Design (LID) to retain as much water as possible on site. This allows for:
    a. Infiltration into the ground water table
    b. Evaporation, the more water that evaporates is less water that is put into the storm drain system.
    c. Transportation, as plants take up water out of the ground it allows more water to infiltrate.
    d. Filtration, storm water that filters through vegetation, rain gardens and other landscaped areas pollutants are removed.
2. The following are critical in order to meet the requirements of NPDES Phase I and Phase II:
    a. Rain barrels on down spouts; the captured storm water can be used for irrigation at a later time.
    b. Bio swales to allow storm water to filter through prior to entering drainage system.
    c. Rain gardens which enhances the aesthetics and reduces runoff.

H. Air Quality

The design agency will be responsible for completing all permit applications, submitting to ESO for approval and, once approved, obtaining all necessary air/water pollution permits, including but not limited to septic tanks, wells, boilers, heating/cooling plants, back-up generators, and/or incinerators. A summary of required permits include but is not limited to the following:

a. Emergency generators, no2 diesel, greater than 590 KW, used more than 500 hours/yr.
b. Emergency generators, natural gas, greater than 680 KW, used more than 500 hours/yr.
c. Emergency generators, LP gas, greater than 1800 KW, used more than 500 hours/yr.

d. Boilers combusting natural gas at 10mm BTU/hr or greater.
e. Boilers combusting no. 2 diesel at 2.25 mm BTU/hr or greater.
f. All paint spray booths and incinerators.

3.2.2 General Considerations

(UFGS Division 02 – SITE CONSTRUCTION)

A. Demolition.
   1. For buildings to be demolished by the Government, the contractor shall notify the Contracting Officer within 30 calendar days after award of the construction contract. The contractor shall allow the Contracting Officer 21 calendar days from the date of notification before construction can begin.
   2. Demolition permits are required for buildings to be demolished by the contractor. Demolition permits will be included in the contract special clauses. Demolition shall include an asbestos survey and removal for each building, and removal of underground storage tanks. Tanks shall be located during the initial survey.
   3. For projects requiring building demolition, Savannah District must provide the installation a list of buildings to be used during construction. Lacking such notification, all buildings to be demolished will have all salvageable material removed prior to an issuance of NTP.

B. The design agency must locate all existing underground utilities in three dimensions and indicate these utilities on the contract drawings. Permits will be required for all excavations. Excavation permits will be included in the contract special clauses.

C. The design agency will obtain all necessary permits, licenses, and approvals from state and local authorities and coordinate with the DPW Environmental Officer through the Savannah District and the Fort Bragg Project Managers.

D. Any government-furnished equipment to be installed by the contractor for this project, such as intrusion detection systems, must be detailed on the design plans and specifications.

E. Unless otherwise specified at the predesign meeting, concept (35 percent), preliminary (60 percent), final (90 percent) and corrected final submittals are required. All previous design review comments must be included as part of the submittal.

F. The architectural design of the project must be approved by the Fort Bragg Architectural Review Board prior to proceeding to 60 percent. All colors selected must be approved by the Architectural Review Board prior to the final design. Before construction, exterior materials and finishes must be submitted to the Architectural Review Board for approval (see Architectural and Structural, paragraph F).

G. The design agency shall submit the final design drawings in electronic format to the DPW Project Manager. Upon completion of the construction contract, reproducible as-built drawings with all modifications shall be submitted to the Contracting Officer. Both the reproducible and electronic format as-built drawings are to be submitted to DPW, Real Property Planning Team.

H. Unforeseen site conditions, unknown utility systems, and historical/ archeological items encountered during construction shall be reported to the Contracting Officer.

I. If convenient to the project site, water and electricity will be available to the contractor site from the Fort Bragg utility systems; otherwise, the contractor will be responsible for connections to an existing utility system. The contractor will be required to install approved meters and will be charged the current rates.

J. The design agency shall provide space for the contractor staging area within the construction limits of the project.

K. Fort Bragg Guide Specifications -- The design agency shall use Fort Bragg Design Specifications as follows:
   - FBGS02013, Environmental Protection During Construction
   - FBGS02547, Bituminous Pavement with Base Course (Modified NCDOT Specifications)

- FBGS08702, Builders Hardware
- FBGS16721, Fire Detection and Alarm Systems

3.2.3 Site Development and Utility Systems

(UFGS Division 02 – SITE CONSTRUCTION)

A. No cutting of existing pavement (except in parking lots) is allowed. Design shall include boring and jacking under existing pavement to place new utility lines (water, sewer, gas, etc.). All piping shall be supported with spider spacers. Supporting with oak boards is not allowed.

B. Connection to an existing water line shall be a mechanical tee, installation of which shall be observed by DPW personnel.

C. New storm drainage pipe shall be reinforced concrete pipe (RCP) only.

D. Include a manhole at each new sewer connection to the existing system. Precast manholes are preferred in lieu of built-in-place.

E. Copper or other metallic tracer wire shall be used for all new water & sewer lines, force mains, gas lines (natural and LP) and other non-metallic pipe. The tracer wire shall be installed below the pipe and connected from manhole to manhole (or valve, etc.) with enough additional length for the end to reach the ground surface for attachment of energizing equipment. Wire shall enter manhole so it is not cut or severed during installation. Metallic marking tape shall also be installed at approximately 18-inches below finished grade.

F. Parking.

    1. The authorized number of privately owned vehicles (POV's) is 100 percent of assigned personnel for administrative areas, 100 percent of assigned personnel of the largest shift for vehicle maintenance shops, and 100 percent of design capacity for unaccompanied enlisted personnel housing.
    2. Parking stalls shall be at least 18 feet in length and at least 9 feet wide. With strong justification, minimum-parking requirements can be 19 feet in length and 10 feet wide.
    3. Parking stall markings (single stripe) shall be per NCDOT guide specifications.

G. Curb and gutter shall be 24 inches with 18-inch gutter and 6-inch curb.

H. All site accessories will conform to Section A.3.4.

I. All signs will comply with the Fort Bragg Installation Design Guide.

J. A detailed site survey must include all existing conditions. In addition, the site survey must identify all individual trees and tree lines necessary for the tree removal plan (See Environmental Considerations, paragraph D). The design agency will prepare the site survey.

K. Savannah District Engineer will provide the design agency with soil boring test results. Specific locations shall be identified by the design agency.

L. The designer shall verify all existing utilities for suitability and capacity upstream and downstream and provide recommendations/design solutions during the concept design analysis.

M. Include water, electrical, and gas meters. Aboveground meters shall be located so that an average person could read the meter without the aid of a ladder. Meters placed below ground shall be in a vault at a depth easily readable by a person standing on the ground surface. Meters shall be located such that no controlled areas must be entered to take a reading.

N. Fuel Oil Tanks.

    1. Aboveground tanks with a capacity of 10,000 gallons and above are required to be bottom-filled.
    2. Aboveground tanks with capacity less than 10,000 gallons are top-filled only. These tanks should be designed to provide for a ladder and catwalk with side rails to provide safe access to the fill port. Secondary containment must be provided for all above ground tanks containing POL or other chemicals.

3. Underground tanks are not permitted. All associated underground piping must be double walled.

O. Dumpster Enclosures and Pads.

1. Dumpster enclosure shall be located in a position that will allow a truck to have easy access to the entrance. Pad shall be 6-inch thick reinforced concrete. Enclosure shall be evergreen shrubs, which are 5 feet tall at installation.
2. The minimum size of a dumpster pad shall be no smaller than 13 feet by 13 feet, for a single dumpster.
3. Enclosures for two dumpsters should be a minimum of 23 feet, wide allowing 3 feet, between dumpsters.
4. The approach to the dumpster shall be reinforced concrete.

3.2.4 Landscape Elements Requirement

(UFGS Division 02 – SITE CONSTRUCTION)

A. Tree Preservation and Stakes.

1. Do not install tree stakes on pine trees.
2. Remove tree stakes 90 days after planting.
3. The site should be designed to utilize the existing topography. The project should require the smallest grade change possible around existing trees.
4. The contractor shall be responsible for ensuring that all possible measures are taken during the clearing process to avoid damages to trees designated to remain after construction.
5. Protective barricades shall be constructed prior to clearing around all trees to remain. These barricades shall be located at the dripline of the trees and shall be approximately four feet in height. The barricade should be sturdy enough to survive the entire construction period.
6. Absolutely no fill, building materials, trash or other objects shall be placed inside these protective barriers. No equipment will be parked or stored inside the barriers. If fill is deposited adjacent to these areas a suitable temporary or permanent retaining structures shall be constructed to prevent siltation of the barricaded area.
7. When over four (4) inches of fill is proposed within the dripline area, wells of an approved design shall be constructed.
8. Where traffic areas are proposed at or near natural grade, alternate pervious surfaces such as “Turf-block” or percolating asphalt may be required in tree driplines areas.
9. Swalling and minor negative grade changes should always be designed around the dripline area. Piping should be used where deep swales or ditches would require significant grade changes adjacent to trees.
10. Trenching of any type should be avoided in the dripline area. Where underground installations are required adjacent to the trunks of trees tunneling should be used. When trenching or tunneling near trees to remain, protective measures should be taken by the contractor. If a cluster of trees needs protection, place barrier around entire cluster several feet beyond the drip line of trees that lie on the parameter of the cluster instead of fragmenting cluster and placing barrier around individuals.
11. The contractor shall not attach a sign or other object of a permanent or temporary nature to a tree by the use of nails, wire, or any other method which may be harmful to the tree.

B. Approved General Plant List. A complete plant list can be found in the Fort Bragg Installation Design Guide.

C. Longleaf Pine. To provide erosion control and future habitat for the red cockaded woodpecker (RCW), the landscape plan shall include longleaf pine. Specifications for the planting of longleaf pine seedlings include the following:

1. Containerized seedlings should be approximately 6 months old, bare root seedlings should be approximately 1 year old, and potted seedlings should not be older than 5 years.
2. If bare root seedlings are used, the root collar should be no less than 2/5 inch in diameter. In addition, roots of these seedlings shall be dipped in mud or moisture retention solution immediately after opening to prevent root drying during the planting process.
3. Potted trees should be no more than 24 inches tall, and in no less than a 5-gallon pot.
4. Planting stock should be no more than 24 inches tall and in no less than a five-gallon pot.
5. A planting spacing of 8 feet by 8 feet, or 10 feet by 10 feet is acceptable.
6. Planting site should be prepared to eliminate or reduce competition from both herbaceous and woody plants. The soil should not be compacted and should contain sufficient moisture to support the trees.
7. Mulching around seedlings is beneficial to seedling establishment and survival; however, this process will be very expensive. Mulching should only be specified when a limited number of potted trees are being planted for landscaping effect. Seedlings should not be planted in association with warm season grasses.
8. Bare root seedlings should be planted during the period January through February, containerized seedlings during the period November through December, and potted seedlings may be planted anytime of the year; however, they do best when planted during the dormant season. If planted any other time during the year, potted seedlings will require watering during periods of drought. No planting of any type should occur while the ground is frozen.
9. Planting Mix. The planting mix for landscaping materials must include Agrosoke Crystals or equal. These water-absorbing crystals have been enormously successful at Fort Bragg in insuring the survival of plant materials.

D. The table below displays the suggested practical plantings for Fort Bragg. Click to view the Practical Plantings Table in PDF format. Photos of the suggested plants can be seen by accessing the Photographs of IDG Practical Plantings document in PDF Format.

IDG Practical Plantings

			Zone			Type		Function				Light			Moisture Level			Bloom Color					Bloom Season				Plant Density		Maintenance Issue	
ID#	Common Name	Scientific Name	Natural	Urban	Historical	Evergreen	Deciduous	Habitat	Shade	Screen	Erosion Control	Full Sun	Part Sun	Shade	Wet	Medium	Dry	White/Green	Red	Purple/Blue	Yellow/Orange	Pink	Spring	Summer	Fall	Winter	Massing	Stand Alone	Yes	No
	Tall Trees	**>20' Tall**																												
TT0	American holly	Ilex opaca	•	•	•	•		•	•	•	•	•	•	•	•	•		•					•		•		•	•		•
TT1	Atlantic white cedar	Chamaecyparis thyoides	•	•	•	•		•	•	•	•	•	•	•	•	•									•		•	•		•
TT2	Darlington oak	Quercus laurifolia	•	•	•	•	•	•	•		•	•	•			•	•						•		•			•		•
TT3	Live oak	Quercus virginiana	•	•	•	•	•	•	•		•	•	•			•	•						•		•			•		•
TT4	Longleaf pine	Pinus palustris	•	•	•	•		•	•	•	•	•	•		•	•	•						•		•		•	•		•
TT5	Red maple	Acer rubrum	•	•	•		•	•	•		•	•	•		•				•				•			•		•		•
TT6	Southern magnolia	Magnolia grandiflora	•	•	•	•		•	•	•	•	•			•	•		•					•		•		•		•	
TT7	Tulip poplar	Liriodendron tulipifera	•	•	•		•	•	•		•	•	•		•	•					•		•		•			•		•
TT8	White oak	Quercus alba	•	•	•		•	•	•		•	•	•			•	•						•		•		•	•		•
TT9	Willow oak	Quercus phellos		•	•		•	•	•			•	•			•	•						•		•			•		•
	Small Trees	**8' to 20' Tall**																												
ST0	Chickasaw plum	Prunus angustifolia	•	•	•		•	•	•		•		•				•	•					•			•	•	•		
ST1	Crabapple	Malus angustifolia	•	•			•	•	•		•	•				•	•	•				•	•	•			•	•	•	
ST2	Crepe myrtle*	Lagerstroemia indica			•		•	•	•	•	•	•	•				•	•	•	•		•		•			•	•	•	•
ST3	Chokeberry	Sorbus arbutifolia	•	•	•		•	•	•		•		•	•	•	•		•				•	•		•		•	•		•
ST4	Dogwood	Cornus florida	•	•	•		•	•	•	•	•	•	•	•		•	•	•				•	•	•			•	•		•
ST5	Easter red cedar	Juniperus virginiana	•	•	•	•		•	•	•	•	•	•			•	•						•		•			•		•
ST6	Persimmon	Diospyros virginiana	•	•	•		•	•	•		•		•	•		•	•		•		•	•	•	•	•		•	•		•
ST7	Redbud	Cercis canadensis	•	•	•		•	•	•		•	•	•			•	•			•			•				•	•		•
ST8	Sassafras	Sassafras albidum	•	•	•		•	•			•	•	•			•	•	•	•			•	•	•			•	•		•
ST9	Sourwood	Oxydendrum arboreum	•	•	•		•	•	•	•	•		•	•		•	•	•						•	•			•		•
ST10	Yaupon tree	Ilex vomitoria	•	•	•	•		•	•	•	•	•	•	•	•	•			•				•		•		•	•		•
	Large Shrub	**4' to 8' Tall**																												
LS0	Camellia*	Camellia japonica		•	•	•		•	•	•	•	•							•			•				•	•	•		•
LS1	Kalmia	Kalmia latifolia	•	•	•	•		•	•		•		•		•	•	•	•				•	•		•		•	•		•
LS2	Oakleaf hydrangea	Hydrangea quercifolia	•	•	•		•	•			•			•				•	•								•			•
LS3	Oleander*	Nerium oleander			•	•		•			•																	•		
LS4	Redbay	Persea borbonia	•	•	•	•		•	•	•	•		•	•	•	•		•						•			•	•		•
LS5	Rhododendron	Rhododendron spp.	•	•	•	•		•			•	•	•			•		•				•		•	•		•	•		•
LS6	Rose of sharon*	Hibiscus syriacus	•	•	•		•	•		•	•	•	•					•		•		•		•	•		•			•
LS7	Serviceberry	Amelanchier arborea	•	•	•		•	•	•	•	•	•	•					•					•	•			•			•
LS8	Wax myrtle	Myrica cerifera	•	•	•	•	•	•	•	•	•	•	•		•	•	•						•			•	•	•		•
	Medium Shrub	**2' to 4' Tall**																												
MS0	Aculba variegated*	Aculba spp.			•	•		•			•		•	•			•	•					•		•		•	•		•
MS1	Azalea*	Rhododendron spp.		•	•			•			•			•			•	•	•	•		•	•	•			•			•
MS2	Gardenia*	Gardenia spp.		•	•			•			•			•		•	•	•									•			•
MS3	Mapleleaf viburnum*	Viburnum acerifolium	•	•	•		•	•			•	•	•		•	•		•					•	•			•			•
MS4	Strawberry bush	Euonymus americanus	•	•	•	•	•	•			•				•	•			•		•		•		•		•			•
MS5	Sweet pepperbush	Clethra alnifolia	•	•	•		•	•			•	•	•		•	•		•						•	•		•	•		•
	Small Shrub	**0' to 2' Tall**																												
SS0	Azalea evergreen*	Rhododendron spp.		•	•	•		•			•		•	•		•		•				•		•	•		•			•
SS1	Big Hosta*	Hosta lancifolia		•	•		•	•	•		•		•	•		•											•			•
SS2	Dwarf Gardenia*	Gardenia spp.		•	•	•		•			•		•	•		•	•										•			•
SS3	Dwarf Nandina*	Nandina domestica		•	•		•	•		•	•	•	•			•	•										•			•
SS4	Dwarf Yaupon	Ilex vomitoria 'Nana'	•	•	•	•		•			•	•	•		•	•			•				•		•		•			•
SS5	Hawthorne	Crataegus spp.	•	•	•			•	•	•	•	•	•			•	•	•					•				•			•
SS6	Purple Muhly grass	Muhlenbergia capillaris		•	•		•		•	•	•	•	•			•	•				•						•			•
	Groundcover	**<1' Tall**																												
GC0	Ajuga*	Ajuga reptans			•	•		•			•		•							•			•				•			•
GC1	Blue fescue*	Festuca ovina 'Glauca'		•	•	•		•	•		•	•	•			•	•			•				•			•			•
GC2	Creeping juniper*	Juniperus horizontalis		•	•	•		•			•	•	•			•	•	•						•			•			•
GC3	Dwarf Huckleberry	Gaylussacia dumosa	•	•	•		•	•			•	•	•			•	•	•					•	•			•			•
GC4	Liriope*	Liriope spp.		•	•			•	•		•		•			•	•	•		•							•			•
GC5	Periwinkle spp.*	Vinca major	•	•	•	•		•			•		•			•	•	•		•		•	•				•			•
GC6	Periwinkle spp.*	Vinca minor			•	•	•	•			•		•			•	•			•			•	•			•			•
GC7	Phlox	Phlox spp.			•	•		•			•		•			•	•	•		•			•	•			•			•
GC8	Weil's delight	Vaccinium chassifolium	•	•	•	•		•			•	•	•			•		•					•	•			•			•
GC9	Wintercreeper*	Euonymus fortunei	•	•	•	•		•			•	•	•		•												•			•
GC10	Wiregrass	Aristida stricta	•	•	•	•		•	•	•	•	•	•			•	•				•				•		•			•

* Non-native plant to Sandhills region; discontinue use of planting by FY 2013.

Last Modified: 4 March 2009

3.2.5 Architectural and Structural

(UFGS Division 07, THERMAL AND MOISTURE PROTECTION, UFGS Division 09 FINISHES, UFGS Division 14, CONVEYING SYSTEMS)

Architectural designs must reflect the intended district's image according to the Installation Design Guide for a Sustainable Fort Bragg. Compatibility, both operationally and aesthetically, with adjacent activities and structures are required. "High Tech" architectural designs are not generally considered appropriate for use at Fort Bragg.

A. Federal Specification 595b Numbers, not manufacturer brand names, shall identify all paint colors. Contact Savannah District Project Manager for a copy of the Federal Specifications Numbers.

B. All acoustical ceiling tiles shall be 2 ft (600 MM) by 2 ft (600 MM) with an omni directional grid system.

C. Specialized Trade Licensing. Required trade association/state certification for elevators, IDS, etc., must be obtained before acceptance by the Contracting Officer and DPW. Elevators must be designed IAW Americans with Disabilities Act (ADA) standards.

D. Finishes, materials, and equipment shall be industry-standard to ensure availability of repair/replacement parts. The Fort Bragg Architectural Review Board will be the final authority on selection of materials, finishes, and colors used in this project.

E. Exterior and Interior Finishes

    1. The Fort Bragg Architectural Review Board must approve all exterior and interior materials and colors (See 3.2.7 Interior Material and Finishes Specifications). The designer shall submit to the DPW Project Manager (copy furnished w/o enclosures to Savannah District Project Manager) a preliminary color selection submittal. The preliminary color selection submittal shall be submitted no less than 45 days before final (90 percent) design submittal is due. The preliminary color selection submittal shall include a minimum of two color schemes. The Fort Bragg Color Review Board will review and comment on the preliminary color submittal. Two copies of the final color boards shall be bound in a notebook binder and submitted to the DPW Project Manager no later than the final design submittal.

    2. The construction contractor must submit an exterior finish sample board to the Architectural Review Board for approval prior to ordering any materials for construction.

F. Keying/Locks.

    1. Keying plan will provide a minimum of six grand master, six master, six change keys per lock, and ten blanks per change key.

    2. Specifications for keys should be as follows: "Contract is required to use a registered locksmith who has a minimum certification of Certified Registered Locksmith (CRL) certified by the Associated Locksmiths of America to install all lock and key systems procured for the contract. The keying schedule must be submitted through the Contracting Officer to the DPW Project Manager. The DPW Real Property Planning Team will then assure the review of the keying schedule by both the DPW key shop and the facility using service for compatibility and function. The bidding list, which includes the type of keying systems used and the actual identification of key cuts and codes, shall be sent by registered mail to the DPW key shop. A copy of the approved keying schedule which identifies individual keys for each door/lock, shall accompany the bidding list. The contractor will change out all construction cores before final inspection and all keys will be inserted in the locks before final inspection. The contractor will surrender all external keys to the construction agency representative after all work is accomplished and they will be transferred to DPW with the DD Form 1354. No beneficial occupancy date will be authorized until the above requirements are completed."

G. The type of roofing system will be compatible with the specific district's intended image. Sloping roofs, if compatible with the district's intended image, shall be asphalt or fiberglass shingles according to memorandum, AFZA-PW-PM, 2 Aug 93. Standing seam metal roofs are not normally allowed at Fort Bragg. Projects requesting standing seam metal roofs must be approved

by the Director of the Directorate of Public Works. The design agency shall ensure that adequate roof ventilation is achieved using such means as gable vents, ridge vents, soffit vents, etc.

H. The architectural style of the proposed project will be in strict compliance with the Fort Bragg Installation Design Guide. Any variations from this manual must be requested by the designer and approved by the Director of the Directorate of Public Works.

I. The Fort Bragg Cultural Resource Program is located in the Environmental Sustainment Office of the Directorate of Public Works and is the installation Point of Contact and liaison to the North Carolina State Historic Preservation Office (NC SHPO). The CRP facilitates the Historic Preservation Consultation Process to ensure that repairs will be completed using appropriate designs, materials, and methods of construction that preserve the architectural character of the historic building/structure/district. As such, the CRP cooperates with the Post Architect and Architectural Review Board (ARB) to develop design details/standards for typical building elements such as window repair, window replacement, handicapped ramps, street lighting, light fixtures, and others as determined by the Directorate of Public Works (DPW). Further, the CRP serves as liaison with the NC SHPO and the Post Architect to design new construction, either within the historic district, or visible from the historic district, to be compatible with the historic buildings of the district, thereby enhancing the character of the district.

The military landscape reflects the history and culture traditions within which it has evolved. The principal force that shapes the landscape of military installations is the military mission. The military missions that helped shape and reshape installations are often significant within a national military context.

An understanding of the relationship between the changing mission of an installation and its landscape is the key to identifying the historical significance of the military landscape. Historic military landscapes are architecturally designed landscapes associated with historic building districts in Army cantonment areas. Designed historic military landscapes are a component of the larger encompassing installation cultural landscape.

Buildings, structures and objects are landscape characteristics that serve human needs related to the occupation and use of the land. Their function, materials, date of construction, condition, construction methods and locations reflect the historic activities, military customs, preferences and skills of the people who built them. Buildings are designed to shelter military and other human activities. Structures are designed for functions other than human shelter. Objects are relatively small, but important, stationary or movable constructions.

All stakeholders of historic resources (buildings, structures, and landscapes) on Fort Bragg will be made aware of the procedures required concerning undertakings (maintenance, repair, alteration, or demolition) to such resources. To summarize:

- Compliance with the historic preservation consultation process on Fort Bragg is not arbitrary or optional.
- The Commanding General of Fort Bragg is ultimately responsible for compliance with the consultation process.
- All projects concerning buildings/structures built before 1960 will be reviewed by the CRP for the potential to affect historic resources.
- Consultation requirements must be fulfilled before work can continue.
- The CRP will work with you to complete the consultation process as smoothly and efficiently as possible.
- Any and all questions concerning this document or the consultation process should be directed to the CRP at 396-6680.

J. All windows shall be standard design, operable units with insulated glazing. Frame finish, preferably anodized, will be factory applied. Painted or contractor coated frames are not acceptable.

K. Flat roofs and interior roof drains are not considered acceptable designs for use at Fort Bragg. All roofs will have a minimum of 1/8-inch slope per one foot with external roof drains.

L. **Roof Penetrations** - Vents through roofs, boiler stacks air intake and exhaust fans are acceptable penetrations. They shall be installed using manufactured transition devices and flashed according to manufacturer's instructions. Penetrations shall be installed to insure water and air tightness. Vents in the roof shall be combined into one. Air intakes and exhausts shall be curb mounted and not located on the front of buildings. All piping, ducts and stacks etc. shall be painted to match roof color. All other roof penetrations are prohibited except for energy savings features such as skylights, photovoltaic arrays, solar tracking devices and hot water heating arrays. In those cases the feature shall be installed on metal curbs, or standoff supports, a minimum of 8" above the roof surface. Installation shall strictly follow the manufacturer's recommendations regarding water and air tightness, structural performance and flashing. Clerestory lighting is preferable to low sloped skylights. Further, the costs associated with the roof installation shall be included in the 40 year life cycle cost analysis consistent with ESIA Section 432 demonstrating the benefit of the feature.

M. Fort Bragg is in Seismic Zone one. Seismic analysis, design, and construction are required. Technical Manual (TM) 5-809-1, Seismic Design for Buildings, and American Standards (AS) 2121-79, The Design of Earthquake Resistance Buildings apply.

N. DPW and the user will provide the design agency with lists of all equipment proposed to be used in this facility.

3.2.6 Exterior Sign, Fence, Handrail, Equipment, and Poles

(UFGS Division 09 – FINISHES) Fed Std 595B is reference standard.

1. Signs
    - Traffic signs and street signposts and backs 20059.
    - Street address signs on buildings – Reflective white with brown reflective numerals.
    - Organization sign backs and posts 20059.
    - Redwood signs – Cabot stain #0534 20059.
    - Monument signs on masonry base bronze 24084.
2. Fences and Handrails
    - Wood Fence – Cabot stain #0534 20059.
    - Dumpster enclosures 20059.
    - Equipment enclosures 20059.
    - Privacy fences Horse fences 20059.
    - Handrails, freestanding 20059.
    - Wrought iron fencing 20059. In Historic District 24084.
    - Handrails, attached to buildings 24084.
3. Equipment
    - Traffic signal control boxes 20059.
    - Bike racks 20059 Dumpsters 20059.
    - PT equipment should be unpainted galvanized steel.
    - Post indicator valves, 20059.
    - Other objects out from building, in-yards transformers, gas meters Bollards, Type I, high visibility 20059.
    - Bollards, Type II, industrial or parking area 20059. Where bollards are used to protect buildings from vehicles, they shall be striped with yellow (Fed Std Color 13655) 45 degree diagonal stripes 3" wide 5" apart.
    - Above ground petroleum storage tanks 23617.
    - Generators 20059.

    - Tanks, cannon, statues, etc. 24084.
    - Portolets 23617.
4. Flag Poles and Exterior Light Poles
    - Main Post, general 24084.
    - Main Post Parade Field 17925.
    - Other parts of post, match building trim (either natural aluminum or bronze)

3.2.7 Interior Materials and Finishes Specifications

(UFGS Division 09 - FINISHES)

The specifications are intended to provide guidance in the interior design of new and renovated buildings. It is the intent of the guidelines to promote uniformity, quality, cohesiveness, sustainability, and reduce interior maintenance. Finishes integral to the building interior (attached to the building) shall be of a neutral colorway as outlined below. Permission to vary from these specifications must be obtained from the DPW Business Office.

All building interiors shall employ one of the four approved colorways. The colorways are as follows:

- Khaki
- Neutral Almond
- Warm Grey
- Blue Grey

The approved colors and materials for each of the colorways are outlined in matrix following the specifications.

Each colorway is to be further divided into either **BASIC SCHEME or ENHANCED SCHEME**

Basic Scheme - predominately used schemes based on large quantities of a single paint. Examples include housing, offices, shops, etc.

- Barracks
- Company Operations
- Battalion HQ
- Installation Support (Soldier Support Center)
- Operations- military

Enhanced Scheme - Special use schemes for non-repetitive applications such as small retail shops, daycare, and command sections

- Brigade HQ
- Administration- civilian
- Dining Facility
- Transient Quarters
- Installation Support (Soldier Support Center)
- Community Support (CASBC)
- Child Development Center
- Soldier Community Center (Day Room)

The specifications are presented two distinct categories, **Basic** and **Enhanced**. The color boards are representative of each building type, indicating colorways and basic or enhanced scheme. The finishes are specified according to these building interior schemes.

INTERIOR SPECIFICATIONS

* Denotes Sustainable Products

All finishes and materials to comply with current building codes and the ADA. For exact colors refer to matrix of specific Colorway

- **Flooring**
    - **Ceramic Tile**
        - *Areas: Restrooms*

    - Comply with ANSI A137.1 “American National Standard Specifications for Ceramic Tile” All ceramic floor tile shall be Unglazed Mosaic Tile. Tile shall be inherently slip resistant.
    - Size 2” x 2”, ¼” thick
    - Use with glazed ceramic tile cove wall base, size 4” x 4”
    - **Basic Scheme:** One color tile
    - **Enhanced Scheme:** Neutral field color with one accent color.
- **Porcelain Tile**
    - *Areas: Dining Facility Serving Lines, Building Lobby Entrances, Areas of High Traffic*
    - Comply with ANSI A137.1-1998
    - Tile shall be inherently slip resistant
    - Color shall be through body from manufacturers standard colors
    - Size shall from manufacturers standard sizing, ¼” minimum thickness
    - **Basic Scheme:** One color tile
    - **Enhanced Scheme:** Neutral field color with accent colors
- **Quarry Tile**
    - *Areas: Dining Facility Kitchens, Serving Lines, Laundry Facilities, Building Lobby Entrances*
    - Comply with ANSI A137.1-1988
    - Tile shall be inherently slip resistant
    - Size shall be 6” x 6”, ½” thick
    - Use with coordinating color cove wall base, size 6” x 6”
    - Color shall be from manufacturers standard colors
    - Dark colors to be used in Dining Facility
    - One color used throughout space
    - Safety Tread tile to be used in Food Preparation Areas and Kitchens
- **Vinyl Composition Tile (VCT)**
    - *Areas: Building Lobby Entrances, Corridors, Work Rooms, Barrack Bedrooms*
    - Comply with ASTM F 1066 non-asbestos formulated
    - Non-slip tiles shall be used in sloped areas
    - Size 12” x 12”, 3/32” thick from manufacturers “standard” product line
    - **Basic Scheme:** One color tile
    - **Enhanced Scheme:** Neutral field color with accent colors
- **Vinyl Sheet Flooring**
    - *Areas: Wet Areas of High Traffic, Small Kitchens*
    - Comply with ASTM F 1303, Type II
    - Size 6’-0” wide (roll), 0.085 in. thick
    - Seams shall be heat welded with matching bead
    - Color shall be from manufacturers standard colors
- **Linoleum Flooring***
    - *Areas: Wet Areas of High Traffic, Small Kitchens*
    - Comply with ASTM F 2034, Type I “Standard Specification for Sheet Linoleum Floor Covering”
    - Size 6’-6” wide (roll), 0.080 in.
    - Color shall be from manufacturers standard colors
    - **Enhanced Scheme only**
- **Carpet**

  Modular carpet tile and modular (walk-off) carpet tile shall be used in the following authorized areas:
    - General Officers and command suites.
    - Conference Rooms

- Administrative offices
- Entry Vestibules (modular walk-off carpet tile)

ENVIRONMENTAL ATTRIBUTES

5. Recycled Content: Carpet must contain a minimum of 35% pre consumer recycled content. The recycled content % must be based on total product weight.
6. Carpet must have minimum rating of “Silver” in accordance with “NSF 140 2007 e" Sustainable Carpet Assessment Standard. Carpet manufacturer must supply “NSF 140 2007 e” certificate from third party auditor.
7. Carpet Face Yarn: In accordance with Executive Order 13101, carpet face yarn must be third party certified as an Environmentally Preferred Product (EPP).
8. Low Emitting Materials: Carpet and all installation components including adhesives, sealers, seam welds and seam sealers must meet the Low Emitting Materials standards as outlined in U.S. Green Building Council LEED criteria. Adhesives must meet VOC emissions standards per South Coast Air Quality Management District Rule #1168.

For the complete policy and guide specifications go to 3.3.2 Detailed Specifications Section 096813 – Carpet Tile

At the largest working group level the unit should select 2 colors that compliment one of the 4 (Khaki, Neutral Almond, Warm Gray or Blue Gray) colorways from the IDG. Typically these colors should be a lighter and a darker neutral color allowing the building occupant to mix and match tile in a variety of ways to meet the needs of the facility.

- **Grout**
  - Comply with ANSI A118.6 for Latex- Portland cement Grout with Mildew Resistant Silicone Sealant.
  - Floor Grout shall be darker in color than tile
  - **Resilient Accessories** (vinyl reducer strips, stair nosing)
  - Color to match flooring material
- **Wall Base**
  - **Rubber Base**
    - Comply with FS SS-W-40, Type I
    - Cove base style, 4” high, 1/8” thick
    - Areas of extreme high traffic use 6” high base
  - **Wood Base**
    - Comply with AWI Custom Grade for Standing and Running Trim
    - Size approx 5 ½” high x ½” thick
    - Profile to be appropriate with interior from standard/ stock profiles
    - Clear Southern Yellow Pine to be stained
    - **Enhanced Scheme for 06 levels only**

- **Wall**
  - Gypsum Board to be 5/8” thick
  - CMU in areas of high traffic for durability and sound control
  - Use MR gypsum board behind EWC
  - Use DensGlass behind ceramic wall tile
  - Provide acoustical sound bats at conference rooms, restrooms, high ranking offices, barracks
    suites
  - Use wood trim on gypsum board to simulate wood paneling
  - **Paint**
    - *Areas: All Basic Schemes; Enhanced Scheme- above WC wainscot, Offices*

        - Paint Colors shall be referenced to Fed Std 595B
        - Use only paint colors from Colorway with one Colorway per building
        - All paints to be acrylic latex, eggshell finish
        - Epoxy paint to be used in medical and food preparation areas only
        - Apply one coat of tinted primer and two coats of paint
        - Apply block filler primer at CMU walls
    - **Ceramic Tile**
        - *Areas: Restrooms*
        - Comply with ANSI A137.1 “American National Standard Specifications for Ceramic Tile”
        - Glazed Tile Only
        - Size 4 ¼” x 4 ¼”, 5/16” thick
        - Colors shall be from manufacturers standard colors
        - Locate accent tile above 7’-0” on WC wall
        - Wainscot height to be 5’-0”
        - Provide full wall height ceramic tile at perimeter of bathtub/ shower and behind WC’s
        - **Basic Scheme:** One Color
        - **Enhanced Scheme:** One Field Color with One Accent Color
    - **Wallcovering***
        - *Areas: Building Lobby Entrances, Corridors, Offices, Conference Rooms, and Reception Areas*
        - Vinyl Wallcovering to be Type II, Class A, 20 oz weight for high traffic areas
        - Vinyl Wallcovering to be Type I, Class A, 13 oz weight for low traffic areas
        - Vinyl Wallcovering manufactured of recycled material is strongly recommended
        - Use wallcovering with large-scale pattern with variety of colors in pattern
        - Coordinate wallcovering with wall paint color
        - Vinyl Wallcovering to be below chair rail in corridors and conference rooms
        - Use Plaster backed wallcovering at CMU applications
        - Fabric Wallcovering to be Class A, 100 percent Polyolefin
        - Use neutral color for fabric wallcovering
        - **Basic Scheme:** Vinyl Wall covering only
        - **Enhanced Scheme:** Vinyl and or fabric wallcovering
- **Door**
    - • All Interior Doors shall be 6’-8” x 1 ¾”, solid core, wood veneer, stained CMU in areas of high
      traffic for durability and sound control
    - • All hinges and door hardware to match
    - • All hardware shall have brushed stainless
    - • Locksets shall be similar to “Best” or “Falcon” locks with seven pin tumbler
    - • General Officers only shall have polished brass hardware
    - • For heavy duty applications, all frames to be welded steel, 16 gauge
    - • For light duty applications, all frames to be welded steel, 18 gauge
- **Window**
    - All mini blinds shall be 1” tempered aluminum slat, color to match Levelor 112 “Alabaster“
    - Mini blind valance to match mini blind slat color
    - Mini blinds shall be equipped with drawstrings and acrylic wand handle extensions
    - Paint all metal trim at window jamb and head to match window frame
    - All fabric valences to have a 15” approximate drop from window head
    - Valences and drapery should meet all appropriate flammability requirements
    - Provide acrylic wand handle extensions for drapery
    - Provide room darkening lining at drapery in transient housing guest rooms
    - **Basic Scheme:** Plastic Laminate Window Stools

    - **Enhanced Scheme:** Solid Surface Window Stools
- **Ceiling**
    - All ceiling heights to be no less than 8'-0" AFF
    - All ceilings to be inherently white or painted Fed Std 37886, flat finish
    - Use semi gloss finish in wet areas, restrooms, and kitchens
    - Use White Aluminum Grid to be 2' x 2' x 1", rust proof in wet areas
    - Center grid in ceiling space
    - All ceiling diffusers and grilles shall be white
    - Use 6" One piece Crown Molding with stained finish only in General Officer's Suite (Command Section)
    - **Acoustical Panel (Tile)**
        - Comply with ASTM E 1264 for general usage; check fire code for specific applications
        - Use Non Regular, Fissured Pattern, Omni Directional, White Color
        - Size 2' x 2", 5/8" thick
        - Use vinyl faced tiles in wet areas, food preparation areas, and kitchens
- **Cabinetry**
    - Areas: Barrack Kitchens, Workrooms, and Breakrooms
    - Comply with AWI Custom Grade for Millwork
    - Hardware to be brushed stainless steel
    - All plastic laminate cabinetry to have plastic laminate interior
    - Plastic Laminate to have small or no pattern
    - No wood grain plastic laminate
    - Countertops to be ½" Methylmethacrilate in barracks kitchen
    - Countertops to be post formed
    - **Basic Scheme:** High Pressure Plastic Laminate
    - **Enhanced Scheme:** Hardwood cabinetry with raised panel doors, stained finish, Plastic Laminate in high traffic areas
- **Lighting**
    - All fixtures to have fluorescent lamping
    - All light fixtures and ceiling fans to be hardwired
    - All ceiling diffusers and grilles shall be white
    - Dimmer switches shall be only in Conference Rooms in Enhanced Schemes
    - Use wall washers to accent artwork an highlight building circulation
    - Fluorescent Lighting Fixtures to Comply with UL 1570, NEMA LE 4
    - Use Ambient Light Type Wall Sconces in Barracks Corridors
    - Use Ceiling Fans with White Blades
    - Use Ceiling Fans with Wood Blades in Administration Areas only
    - Exit light fixtures shall have white frames
    - Provide adequate clearance between light fixtures and ceiling fan blades
    - **Basic Scheme:** 2' x 4' recessed lay –in type fixture with acrylic prismatic lens
    - **Enhanced Scheme:** 2' x 4' recessed lay –in type fixture with 6" x 6" parabolic lens
    - **Enhanced Scheme:** 2' x 2' recessed lay in type fixture with 6" x 6" parabolic lens in lobby and reception areas
- **Plumbing**
    - All fixtures to be white in color
    - All fittings shall be polished chrome
    - All faucets shall meet ANSI/ NSF 61
    - Provide floor mounted toilet partitions with lateral cross bracing
    - **Basic Scheme:** Wall hung lavatories
    - **Basic Scheme:** *Toilet Partitions shall be Solid Plastic Construction of Recycled Materials
    - **Enhanced Scheme:** Toilet Partitions to be Plastic Laminate with Wood Core

3.2.8 Mechanical Systems

(UFGS Division 15 – MECHANICAL).

A. The designer will ensure that the mechanical and electrical areas are located for easy access. Selected mechanical systems must be compatible with the existing systems and composed of standard commercially available items with readily available service and repair parts into the foreseeable future. Any mechanical rooms above the first floor shall have access (door, removal louvers, etc.) of ample size such that the largest piece of installed equipment could be removed through the opening and transported to the outside of the building.

B. All piping shall be installed to permit access without requiring removal of permanent walls, floor, or ceilings. All equipment, piping, etc. in mechanical rooms shall be arranged such that each piece of equipment can be removed without having to remove any other piece of equipment. Coil pull areas shall be included in the mechanical room layouts. Isolation valves and unions shall be installed on supply and return piping to all mechanical equipment.

C. Ventilation for indoor air quality should follow the American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE) standards. Carbon dioxide sensor operated outdoor air supply dampers shall be used on commercial space heating and cooling systems above 1200 CFM.

D. Four-pipe heating, ventilating, and air conditioning (HVAC) systems shall be installed for year-round heating and cooling in barracks and administrative spaces. Radiant heat shall be installed in all high bay areas that require heating.

E. Barracks rooms shall have individual thermostats that can be manually adjusted within a temperature range consistent with current energy conservation directives.

F. All new construction projects that install HVAC systems shall have open protocol, LONWorks certified, direct digital control (DDC) and shall include the ability to impose range limits to individual thermostats, night setback, equipment on/off, and energy monitoring within the software package.

G. All renovation, repair, maintenance, and service order projects within existing barracks rooms that replace existing stand-alone HVAC system thermostats shall install an adjustable or fixed style of limiting thermostat.

H. Chillers shall include as a minimum the following features:

    1. Scroll or screw type compressors with 5 year parts and labor warranties.
    2. Microprocessor controllers with self-diagnostic capabilities.
    3. Open protocol, LONWorks certified, direct digital control (DDC) compatible.
    4. Tube and bundle type heat exchanger.
    5. Low ambient controls to 0 degrees F.

I. Copper-fin-tube hot water boilers are preferred for all comfort heating and large domestic hot water requirements. Outdoor boilers shall be equipped with freeze protection. Primary/secondary piping with primary loop pump interlock as primary freeze protection is preferred. Freeze valve or solenoid that flows water through the boiler on power failure is acceptable.

J. Gravity flow, tank type, water closets, 12-inch rough-in and 1.6 gallon per flush or less, are preferred and shall meet or exceed American Society of Mechanical Engineers (ASME) A112.19.6M for hydraulic performance and ASME A112.19.2M for fixture dimensions.

K. . Schedule 40 PVC or cast iron soil pipe shall be used for all drain, waste, and vent (DWV) applications. Approved couplings or fittings shall be used when transitioning from one material pipe to the other, such as for fire break applications through floor slabs. A relieving arch or pipe sleeve shall be used when piping is routed under foundations.

L. Type L copper pipe shall be used for water supplies above grade. Type K copper shall be used for water supply under floor slabs. Sleeve all concrete slab penetrations and center copper piping with foam or fiberglass insulation to ensure copper does not contact concrete.

M. Provide isolation valves in all supply and return distribution piping at all laterals, wings, floors, and as necessary to limit affected areas during maintenance and repair outages.

Fort Bragg Supplement
to
LONWorks Direct Digital Control for HVAC and Other
Local Building Systems

Where this supplement fails to address, UFGS 23 09 23 dated 11/08 requirements apply. http://wbdg.org/

1. The building control network shall be a single complete non-proprietary Direct Digital Control (DDC) system for control of the heating, ventilating and air conditioning (HVAC) systems. The building control network shall be an Open implementation of LONWORKS® technology using ANSI/EIA 709.1B as the only communications protocol and shall use only LonMark Standard Network Variable Types (SNVTs), as defined in the LonMark® Resource Files, for communication between DDC Hardware devices to allow multi-vendor interoperability.

2. The building automation system shall be open in that it is designed and installed such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without further dependence on the original Contractor. This includes, but is not limited to the following:

2.1. Install hardware such that individual control equipment can be replaced by similar control equipment from other equipment manufacturers with no loss of system functionality.

2.2. Necessary documentation (including rights to documentation and data), configuration information, configuration tools, programs, drivers, and other software shall be licensed to and otherwise remain with the Government such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without subsequent or future dependence on the Contractor.

2.3. At Fort Bragg the following systems are prohibited for new installation:

2.3.1. BACNet
2.3.2. Proprietary DDC systems
2.3.3. Pneumatic systems or combination Direct Digital Control (DDC)/Pneumatic systems

2.4. Gateways may be used provided that each gateway communicates with and performs protocol translation for control hardware controlling:

2.4.1. A single major component (chiller, boiler, etc)
2.4.2. Legacy or existing equipment in a building that is to remain

3. DDC Hardware (controllers) Requirements:

3.1. All DDC Hardware shall:

3.1.1. Be connected to a TP/FT-10 ANSI/EIA 709.3 control network.
3.1.2. Communicate over the control network via ANSI/EIA 709.1B exclusively.
3.1.3. Communicate with other DDC hardware using only SNVTs
3.1.4. Conform to the LonMark® Interoperability Guidelines.
3.1.5. Be locally powered; link power (over the control network) is not acceptable.
3.1.6. Be fully configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (nci), or hardware settings on the controller itself to support the application. All settings and parameters used by the application shall be configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (nci), or hardware settings on the controller itself

3.1.7. Provide input and output SNVTs required to support monitoring and control (including but not limited to scheduling, alarming, trending and overrides) of the application. Required SNVTs include but are not limited to: SNVT outputs for all hardware I/O, SNVT outputs for all setpoints. SNVT inputs for overrides of all setpoints, and SNVT inputs for overrides of all hardware Outputs.

3.2. Application Specific Controllers have a fixed factory-installed application program (i.e. ProgramID) with configurable settings and do not have the ability to be programmed for custom applications. In addition to the requirements for all DDC Hardware ASCs shall:

3.2.1. Be LonMark Certified unless otherwise approved.

3.2.2. Be configurable via an LNS plug-in unless otherwise approved

3.3. Application Generic Controllers (AGCs) have a fixed application program which includes the ability to be programmed for custom applications. In addition to the requirements for all DDC Hardware ASCs shall:

3.3.1. have a fixed ProgramID and fixed XIF file

3.3.2. be fully programmable and configurable for the application through one or more LNS plug-in unless otherwise approved

3.4. General Purpose Programmable Controllers (GPPCs) are not installed with a fixed factory-installed application program and must be programmed for the application.

3.5. At Fort Bragg, Local Display Panels (LDPs) shall be installed at a minimum in each mechanical room where an AHU exist and programmed as per the Point Schedules.

4. Do not rely on the control network to perform DDC sequence applications unless otherwise approved.

5. Where multiple pieces of DDC Hardware are used to execute one sequence, all DDC Hardware executing that sequence shall be on a common segment and isolated from all other DDC Hardware via a CEA-709.1B Router.

6. Each scheduled system shall accept a network variable of type SNVT_occupancy (which will be provided by the UMCS outside the scope of this work) and shall use this network variable to determine the occupancy mode. If the system has not received a value to this network variable for more than 60 minutes it shall default to [a configured occupancy schedule][the occupied mode].

7. Fort Bragg currently has an Open LonWorks technology Utility Monitoring Control System (UMCS) manufactured by Johnson Controls, Inc. Integration of building DDC system are performed by Fort Bragg's System Integration contractor. This should be coordinated with the UMCS System Manager.

8. Submittals:

8.1. Prior to DDC system installation the following should be submitted for Government approval:

8.1.1. Points Schedules: Submit Points Schedules using the Points Schedule template located at https://eko.usace.army.mil/fa/bas/ for each piece of DDC Hardware. Points Schedules shall be submitted in hard copy (11"x17") and electronic format. Electronic submission shall be in [AutoCAD][Microstation][Excel] format and submitted on CD or DVD.

8.1.2. Control System Schematic diagram and Sequence of Operation for each HVAC system.

9. Deliverables:

9.1. Upon completion of project the following should be delivered to the Government for acceptance:

9.1.1. Final (as-built) commissioned Turbo LONWORKS® Network Services (LNS®) database with Lon Credits transferred to the Government.

9.1.2. eXternal Information Files (XIF), Resource files and Plug-ins for the completed system.

9.1.3. Point Schedules: Final (as-built) Points Schedules using the Points Schedule template located at https://eko.usace.army.mil/fa/bas/ for each piece of DDC Hardware. Points Schedules shall be submitted in hard copy (11"x17") and electronic format.

Electronic submission shall be in [AutoCAD][Microstation][Excel] format and submitted on CD or DVD.

9.1.4. Control System Schematic diagram and Sequence of Operation for each HVAC system.

9.1.5. Programming Software: All software, including licensing information and user manuals, necessary to program GPPCs installed under this contract.

9.1.6. GPPC and AGC Application Source Code: Copies of the installed application programs (all software that is not common to every controller of the same manufacturer and model) as source code compatible with the supplied programming software.

9.1.7. Operation and Maintenance Instructions including procedures for system start-up, operation and shut-down, a routine maintenance checklist, and a qualified service organization list.

9.1.8. Quality Control (QC) checklist completed by the Contractor's Chief Quality Control (QC) Representative.
(Click here to download)

10. Perform a Performance Verification Test (PVT) prior to system acceptance. During the PVT, demonstrate to a Government representative that the system performs as specified, including but not limited to demonstrating that the system is Open and correctly performs the Sequences of Operation.

11. Provide a 1 year unconditional warranty on the installed system and on all service call work. The warranty shall include labor and material necessary to restore the equipment involved in the initial service call to a fully operable condition. Subsequent integration of the building control system into a basewide Utility Monitoring and Control System by the Government or its agents shall not void warranty.

12. Provide a minimum of [8 hours] training at the project site on the installed building system. Upon completion of this training each student, using appropriate documentation, should be able to start the system, operate the system, recover the system after a failure, perform routine maintenance and describe the specific hardware, architecture and operation of the system.

Table: Quality Control Checklist

Instructions: Initial each item, sign and date verifying that the requirements have been met.		
#	Description	Initials
1	All DDC Hardware is installed on a TP/FT-10 local control bus.	
2	Communication between DDC Hardware is only via EIA 709.1B using SNVTs. Other protocols and network variables other than SNVTs have not been used.	
3	All sequences are performed using DDC Hardware.	
4	XIF files, Resource files and Plug-in's are up-to-date and accurately represents the final installed system	
5	Commissioned Turbo LNS database with the understanding that the Lon Credits will be transferred to the Government as a complete system.	
6	All software has been licensed to the Government	
7	Local Display Panels (LDPs) have been created for all building systems, including all override and display points indicated on Points Schedule drawings.	
8	Final As-built Drawings accurately represent the final installed system.	
9	O&M Instructions have been completed and submitted.	
10	LonWorks® Network Services (LNS) based M&C software was provided	
By signing below I verify that all requirements of the contract, including but not limited to the above, have been met.		
Signature:_____	Date:_____	

3.2.9 Electrical Systems

(UFGS Division 16 – ELECTRICAL)

A. Service for all electrical, mechanical, telephone, and cable systems shall be underground and include a copper or other metallic tracer wire. All distribution cables installed shall have concentric neutral. Primary and secondary lines shall be installed in conduit. At least two delivery points shall be identified to create a loop-feed configuration for buildings. No more than two points will be needed for groups of buildings.

B. The design agency will be responsible for evaluating fuel considerations and preparing cost comparison analysis of potential heating, ventilating, and air conditioning (HVAC) systems. Evaluation, cost comparisons, and recommendations will be according to the current issues of DOD Manual 4270.1-M, Department of Defense Construction Criteria, 1 Jun 78; Army Regulation 420-54, Air Conditioning, Evaporation Cooling, Dehumidification, and Mechanical Ventilation; ETL

1110-3-309, Interim Energy Budgets for New Facilities; and all other applicable statutes and publications.

C. The preferred method of electrical service will use pad-mounted transformers, underground lines, with above ground switches. COE Guide Specifications 16375, Section 3.7.1.1, Pad Mounted Equipment Installation, shall be revised to indicate that the rectangular holes shall be filled with number 57 stone in lieu of masonry grout.

D. Mechanical and electrical parts catalog, service/operator manuals, and operator/maintenance personnel training will be provided by the contractor.

E. Transformers and switches being replaced during the duration of the construction contract shall remain the property of the U.S. Government. The contractor shall transport the transformer to the DPW transformer yard. Prior to transportation, the contractor shall provide the Contracting Officer the following data sheet:

- DATE (of transport): _____
- LOCATION (transported from): _____
- TYPE (check one): POLE ___ PAD ____
- SIZE (KVA): _____
- SERIAL NO: _____
- FORT BRAGG I.D. NO: _____
- BRAND NAME: _____
- COMMENTS: _____
- The contractor shall coordinate the turn in of transformers with the Contracting Officer. The Contracting Officer shall notify the DPW Facility Maintenance Division, 432-6336.

F. No transformers containing PBCs will be installed.

G. Transformers shall be surrounded on the sides and rear with a blast-resistant wall. Access to the equipment from the front will be maintained clear of obstructions and vegetation.

H. Gang operating switches shall be installed at each new service tie-in.

I. New poles installed to route service lines from overhead to underground shall have steel galvanized cross-arms.

J. Power outages necessitated by new construction or renovations shall be announced to DPW two weeks in advance and shall occur only after approval has been received.

K. Transformers and switches shall be painted Color No. 20059.

L. Transformers may be placed on the sides or rear of buildings, but not in the front or adjacent to pedestrian walkways or outdoor use areas. The preferred location is within the loading or service area for the building.

M. Planting of shrubs or trees shall be avoided over underground conduit or under overhead utility lines.

N. Main electrical rooms in buildings shall have ground level, unobstructed access from the exterior.

O. Energy efficient T8 lighting shall be the primary form of illumination within buildings. Limited use of other types of lighting is permitted for accent and special uses or task areas.

P. Indoor industrial high and low bay lighting shall be implemented using high efficiency fluorescent lighting fixtures that employ T5 High Output (HO) lamps. HID lighting sources such as metal halide, high pressure sodium and mercury vapor shall not be used. Where needed, consideration should be given to multiple switches to allow multiple lighting levels.

Q. Meters shall be installed for reimbursable customers only.

R. Photocells shall be installed on exterior lighting circuits rather than individual fixtures.

3.2.10 Exterior Electric (Sandhills)

Summary

Sandhills Utility Services, LLC (SUS) shall be the provider of exterior utility service and lighting for Fort Bragg. Electric utility design, whether exterior lighting or electric facilities, can be such that the visual impact can be minimized. With this primary goal, the aesthetic appeal of the Fort Bragg installation can be greatly enhanced. Electric utilities can be designed to blend into the natural landscape. Sandhills Utility Services' goal for Fort Bragg shall be to design a safe and reliable system while minimizing cost, but also enhancing the natural beauty of the area. This shall include the removal of overhead electric utility lines and equipment and, where possible, replacement with underground lines and placement of all new structures in the most visibly appealing locations.

SUS shall install all exterior electric system components and appurtenances in accordance with the manufacturer's instructions, IEEE C2, and the SUS's installation standards. Other governing standards are noted at the end of this document. All necessary transformers, switchgear, poles, hardware, cables, conductors, connectors, and other equipment required for a complete and operable system shall be provided by SUS.

General Installation Guidelines

1. All new primary and secondary electric utility lines shall be underground.

2. As a standard, underground power lines shall be installed one cable per conduit; however, three cables per conduit shall be permitted where deemed necessary. The conduits shall be a minimum of 36-inches below grade.
    a. All power duct-lines (underground conduit lines) shall be trenched when outside of existing paved areas and direct bored under concrete or pavement.
    b. Trenches shall be left open for the minimum time possible to complete the section of work required. Backfilling and tamping shall be completed promptly.
    c. Warning tape will be provided for each trench and placed above the power lines approximately 12"-18" below grade.
    d. All new underground electric utilities shall be coordinated with other utilities including communications, storm drains, sanitary sewers, water lines, steam lines, high temperature water lines, chilled water lines, gas lines, etc. Before any digging begins, a utility locating service shall be called to locate all existing underground facilities to ensure "no cuts".
    e. The minimum separation between electric or communication lines and other utility lines shall be 36-inches (900 mm) vertically and 36-inches (900mm) horizontally when running adjacent. If utilities are crossing minimum separation shall be 12-inches (300 mm) vertically. Where the utility is concrete encasement, the clearance shall be measured from the outmost dimension of the utility line and shall have suitable supports on each side of the upper line to prevent transferring any direct load onto the lower line.
    f. Prior to commencing work on any new underground power line, SUS shall stake the route of each line and indicate the exact location of all new conduit, poles, and transformers for approval.
    g. Site restoration will be performed per the specifications listed at the end of this document.
    h. Where right-of-way clearing is necessary for new underground facilities, the easements should follow natural contours, similar to a road alignment, and avoid cutting long straight gashes through trees. Utility lines shall be buried along the major roadways where possible.
    i. Cable sizes for primary underground (220 mil insulation) shall be standardized on 1/0 AL, 350 AL, and 750 AL where possible. Underground cable shall have a concentric neutral.
    j. Where prudent, new underground duct-lines shall include 2" conduit for future SCADA capabilities. At critical feeder locations, new facilities shall integrate into SUS' Supervisory Control and Data Acquisition (SCADA) system.

3. SUS shall take every opportunity to convert overhead facilities to underground.
4. SUS shall take every opportunity to back-feed all primary feeders from an adjacent substation.
5. Regardless of the size of the area being disturbed an Erosion Control Plan shall be submitted to the PWBC Water Management Branch for approval. The plan can be as simple as; location, what is to be done, when the work will be performed, erosion measures that will be used i.e. silt fence and inlet protection and the seeding specs. If the area is greater than 1 acre then a plan will be submitted to the Water Management Branch and approved prior to being submitted to NCDENR for approval.
6. SUS shall place pad-mounted equipment (switchgear and transformers) in the least conspicuous spot, away from entrances.
7. All above-ground equipment shall maintain a 33' stand-off from all buildings and structures per Force Control.
8. Equipment shall be screened with landscaping when possible.
9. All above-ground pad-mounted equipment shall be painted Sherwin Williams Mission Brown.
10. Below-grade manholes shall be utilized where warranted. Otherwise, the safest, most reliable, and most economical methods will be utilized. Manhole covers shall be 36" rain cover with H_20 bridge loading. Manholes shall utilize knock-outs and include drain hole and gravel for water dispersion.
11. Three phase and single phase meters shall be installed and maintained at new transformers. Where possible, SUS shall strive to install AMR at every distribution padmounted transformer.
12. For all switchgear, dead-front (like PME-9) switchgear equipment shall be installed versus live-front equipment (like PMH-5). SUS will strive, where economically justifiable, to install switchgear capable of automatic switching with remote-control for distribution automation.
13. Provisions shall be made for Substation transformers when the transformers exceed 90% of their FA (forced-air) rating. The transformers shall either be replaced or load transfers shall be performed to reduce peak loading.
14. Substation regulators shall be upgraded when they exceed 90% of regulator capacity rating measured during circuit peak.
15. Line regulators shall be installed at 80% of peak capacity rating for anticipated peak load.
16. Distribution transformers shall be installed at 80% of anticipated demand load.
17. Capacitor banks shall be installed to maintain the power factor near 93% lagging, measured at the circuit breaker. Capacitor banks shall be automatically switched, var-controlled with voltage override, with distribution automation capability for remote switching.
18. Trenches shall be left open for the shortest amount of time possible during excavation. There will be no interruption of work until backfilling is complete. Warning tape shall be placed in the trench above the conduit.
19. Conduit under railroad tracks shall be direct bored at a minimum depth of 10' below grade.
20. Cable and equipment testing – new installations of cable, transformers, and switchgear will undergo testing consisting of an energized period of 48 hours unloaded prior to placing in service. Equipment and cable terminations shall be inspected for breakdown after the testing period is complete.

Site Restoration:

All trenched areas will follow Fort Bragg seeding specs as follows:

a. Area will be tilled to 4" depth.
b. Apply lime at 50 lbs per 1000 square ft or 1 ton per acre.
c. Apply 10-20-20 fertilizer at a rate of 850 lbs per acre or 20 lbs per 1000 square ft. The fertilizer should either be slow time release or applied in two applications, 1/2 at time of planting and the second 1/2 after permanent seed germinates.
d. The lime and fertilizer will be worked into the top 2 inches of soil prior to seeding.
e. Seed Mix and Rate:

"Cool Season"; planted between 15 August and 15 April;

50 lbs per acre Rye Grain " ***NO RYE GRASS*** "

15 lbs per acre common Bermuda hulled

15 lbs per acre common Bermuda unhulled

"Warm Season" Planted between 15 April and 15 August

50 lbs per acre German, brown top or fox tail Millet

30 lbs per acre common Bermuda hulled

"Straw Mulch" 4,000 lbs per acre, the ground should be completely covered with no bare spot larger than a quarter, then tacked with emulsified asphalt. Emulsified asphalt applied at a rate heavy enough that the entire area appears black in color.

" Hydro Seeding" Steps 1 thru 4 must be completed prior to hydro seeding. Hydro seeding should be applied in two applications. The first application will consist of 1/3 of the mulch and 2/3 of the seed and the second application will consist of 1/3 of the seed and 2/3 of the mulch. The mulch will include a tackifier and will be applied at a rate of 2,000 lbs per acre.

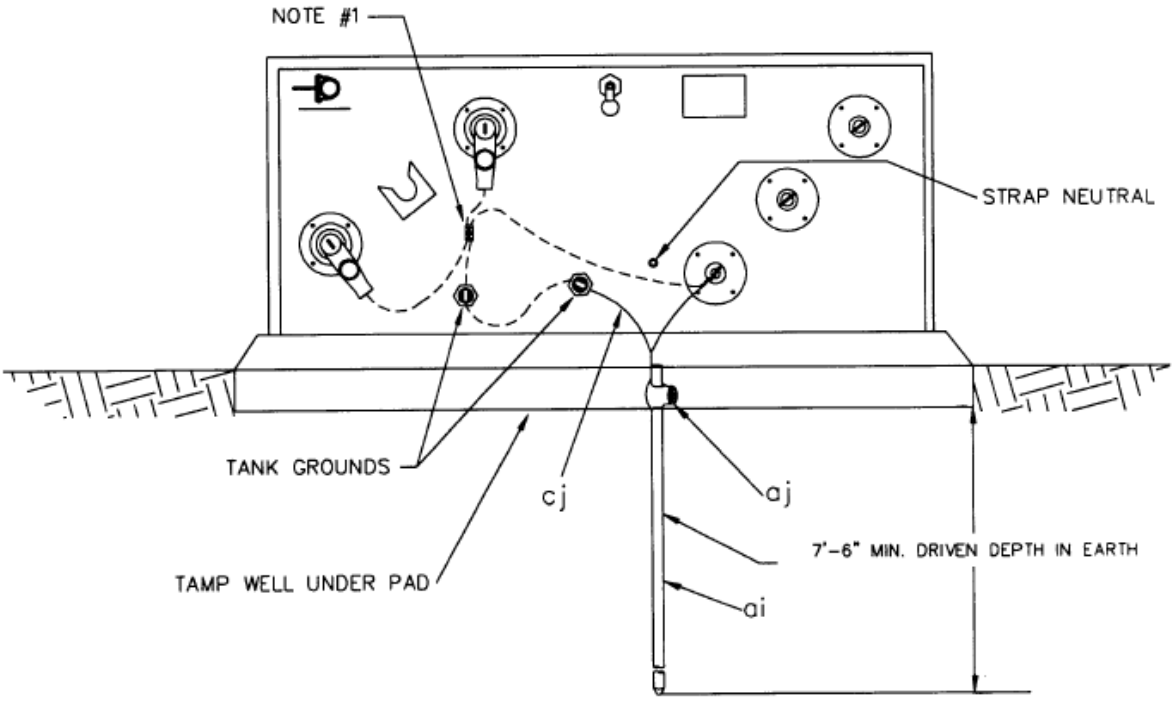
f. Upon completion of the project, prior to leaving the site, the Water Management Branch will be notified to inspect the project; (Contact: Mr. Jack Wilson @ 396-2301 x 224).

Governing Standards

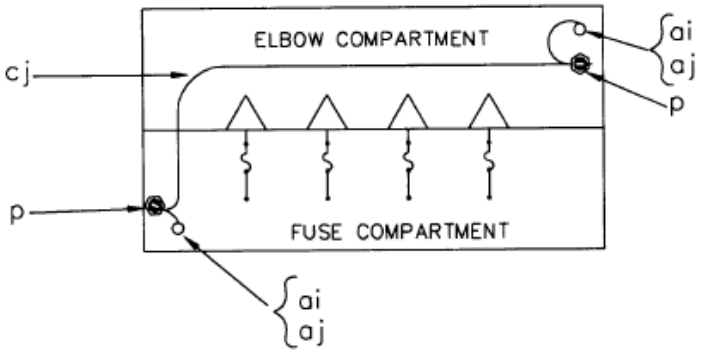
SUS shall, at a minimum, utilize the performance standards and/or specifications outlined by the following. Where conflicts in standards exist, the RUS guidelines shall prevail.
National Electric Safety Code (NESC)

- Rural Utility Service (RUS) Guidelines at www.usda.rus.gov
- American National Standards Institute (ANSI) – Specifically ANSI C2
- National Electrical Manufacturers Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE) – published documents
- State, local, and federal safety, fire, and environmental laws/codes for the Fort Bragg Military Installation
- National Electrical Code (NEC) (NFPA 70) – if SUS finds building electrical services and conditions that do not follow the NEC
- Illuminating Engineering Society (IES) of North America for outdoor lighting systems
- Facilities Engineering - Electrical Exterior Facilities TM 5-684
- Occupational Safety and Health Administration (OSHA)

TRANSFORMER INSTALLATION
(FRONT VIEW)



DEADFRONT FUSE ENCLOSURE
(TOP VIEW)



NOTES:

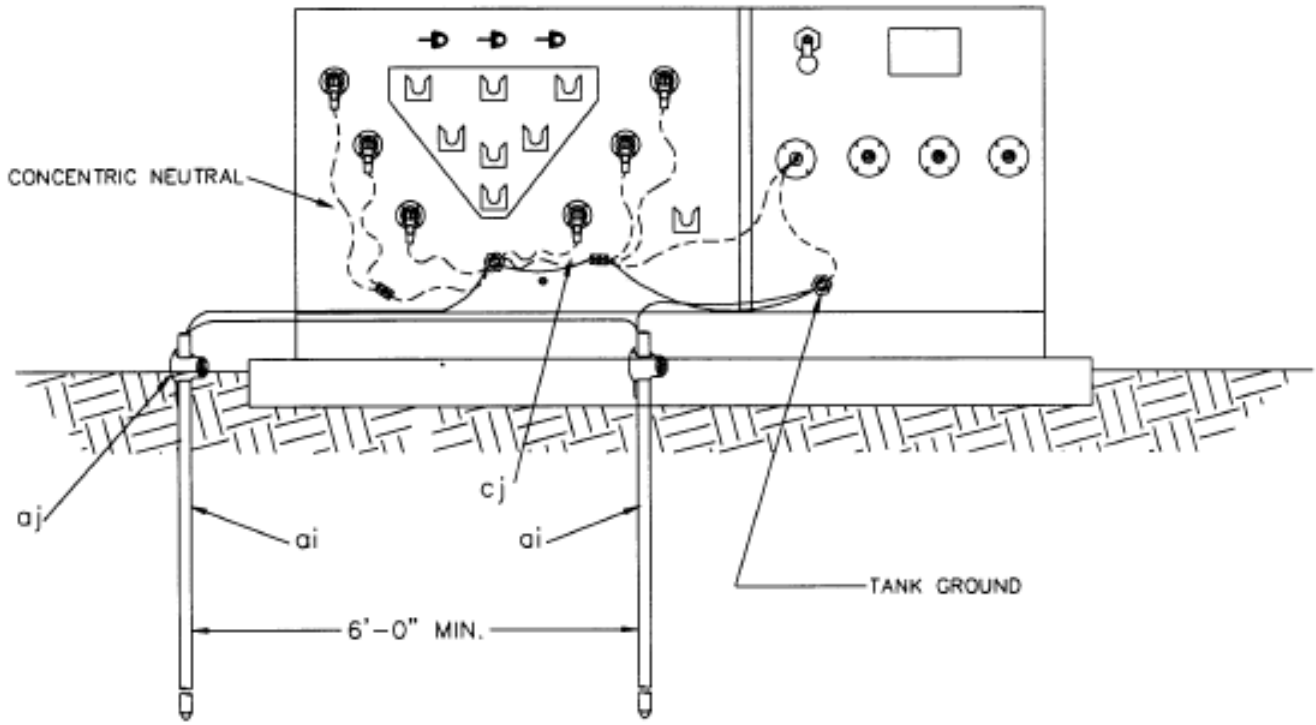
1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL.

ITEM	QTY	MATERIAL
p		Connectors, (as required)
ai		Ground rods, specify number and length
aj		Clamp, ground rod(1 per rod)
cj		Ground wire, #4 copper (as required)

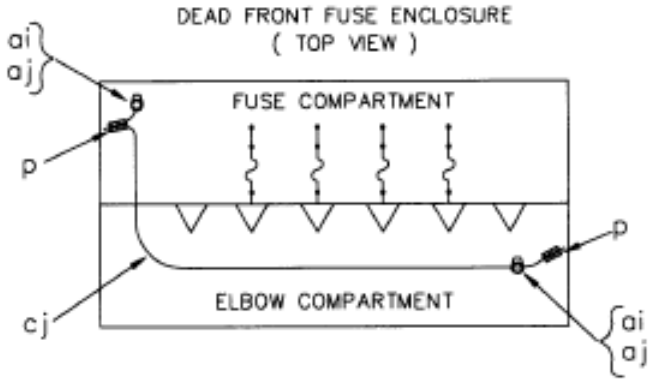
GROUNDING ASSEMBLY FOR
PAD MOUNTED SINGLE PHASE
TRANSFORMERS AND ENCLOSURES

2000 | UM48-1

TRANSFORMER INSTALLATION
(FRONT VIEW)



DEAD FRONT FUSE ENCLOSURE
(TOP VIEW)



NOTES:

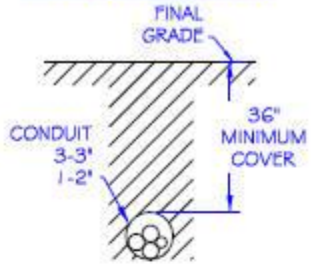
1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL.
2. MULTIPLE RODS MAY NOT FIT INSIDE ENCLOSURE. ONLY 1 ROD MUST BE INSTALLED INSIDE ENCLOSURE.
3. THE QUANTITY OF RODS IS TO BE DETERMINED BY THE SPECIFIER. THE USE OF TWO RODS RATHER THAN ONE AT A MUTI-PHASE TRANSFORMER OR ENCLOSURE IS NOT A STANDARD OR REQUIREMENT BY RUS.

ITEM	QTY	MATERIAL
p		Connectors, as required
ai		Ground rods, specify number and length
aj		Clamp, ground rod (1 per rod)
		Jumpers, copper, as required

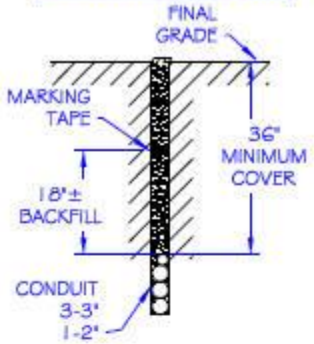
GROUNDING ASSEMBLY FOR PAD MOUNTED MULTI PHASE TRANSFORMERS AND ENCLOSURES

2000 | UM48-2

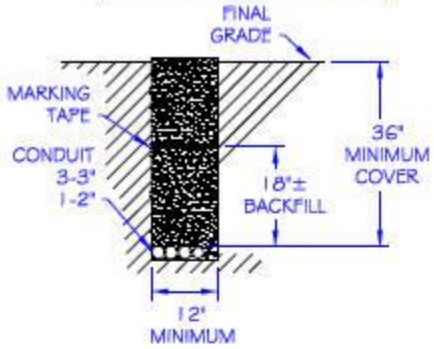
TYPICAL BORE

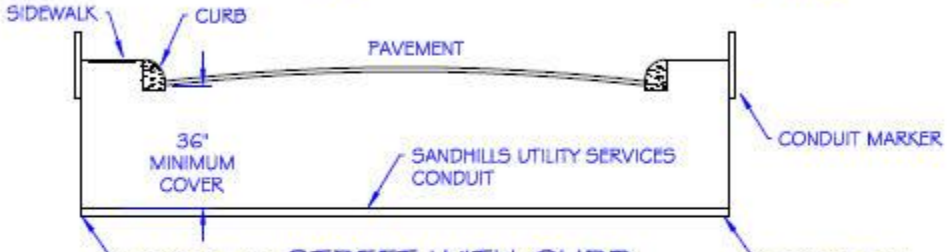


TYPICAL PLOW

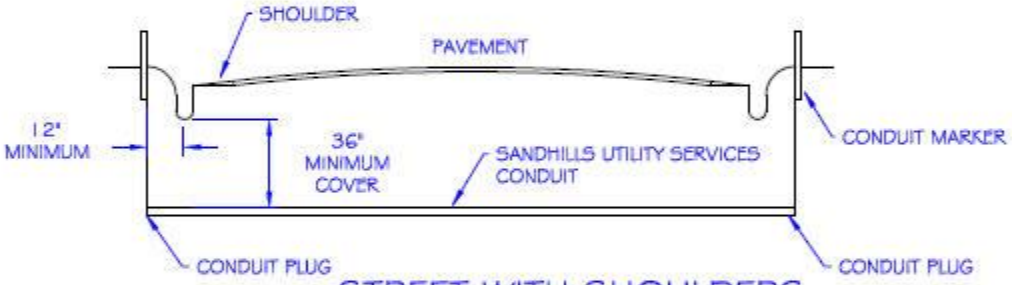


TYPICAL TRENCH





STREET WITH CURB



STREET WITH SHOULDERS

I. TRENCH

A. TRENCH SHALL BE DEEP ENOUGH SO CONDUIT WILL HAVE A MINIMUM OF 36" OF COVER TO FINAL GRADE FOR PRIMARY. (24" FOR SECONDARY)

B. BOTTOM OF TRENCH TO BE FREE OF DEBRIS AND RELATIVELY SMOOTH, UNDISTURBED EARTH.

C. TRENCH SHALL BE BACKFILLED IN 18± INCH LIFTS, AND EACH SHALL BE MECHANICALLY COMPACTED. BACKFILL SHALL BE FREE OF SOLID MATERIAL GREATER THAN 8 INCHES IN MAXIMUM DIMENSIONS. WARNING TAPE SHALL BE INSTALLED AFTER THE FIRST LIFT.

II. CONDUIT INSTALLATION

A. CLEAN CONDUIT END AND APPLY A HEAVY COAT OF PVC CEMENT (PROVIDED). IMMEDIATELY PUSH THE CONDUITS TOGETHER FIRMLY TO THE INSIDE SHOULDER OF THE COUPLING SOCKET. ROTATE CONDUIT IN THE COUPLING SOCKET 1/4 TURN TO SPREAD CEMENT EVENLY. HOLD JOINT TOGETHER FOR 15 SECONDS TO ALLOW INITIAL SET. REPEAT PROCEDURE FOR EACH JOINT. ALLOW COMPLETED JOINT TO STAND FOR TWO HOURS BEFORE ANY ROUGH HANDLING OR BENDING OF CONDUIT RUN.

B. CONDUITS CROSSING STREETS SHALL CROSS PERPENDICULAR TO THE STREET.

C. CONDUIT ENDS TO BE MARKED WITH STAKES, PAINT, OR OTHER SCRAPS OF CONDUIT.

D. CONDUIT SHALL BE SEALED WITH TAPE AT BOTH ENDS UNTIL IT IS READY TO BE USED.

SANDHILLS UTILITY SERVICES, LLC

NO.	REVISIONS	DATE
1		

SANDHILLS UTILITY SERVICES
FORT BRAGG, N.C.

CONDUIT INSTALLATION (TYPICAL)

ELECTRIC SYSTEMS ENGINEERING

DWN. D.G.A.	DATE 08/09/05	DWG. NO. AE-1001
CKD.	APP'D.	Sh. 1 of 3
SCALE N.T.S.		

3.2.11 DOIM (Directorate of Information Management)

Purpose

This section outlines the procedures for requesting telephone and network services from the DOIM. It also provides the minimum requirements for all communications systems installations and additional requirements
specific to Ft Bragg and associated tenants for Contractor design and installation of Outside Plant (OSP) and Premise Distribution Systems.

3.2.11.1 Requesting Communications Services

3.2.11.1.1 Work Order Requests

To request expansion or modification of existing communications systems, the requesting unit must submit a work order through the unit Information Management Officer (IMO). IMOs are appointed through their units by submitting a Memorandum for Record (MFR) signed by the unit commander addressed to the DOIM, Information Assurance Branch (IA). For more information on the IMO and their functions please call 396-2552.

3.2.11.1.1.1 Work orders must be submitted by the unit IMO through the Remedy Work Order System. Additional information on the Remedy Work Order System can be obtained by calling 396-4444.

3.2.11.1.2 Organization and Maintenance, Army (OMA)

OMA projects are those construction and major renovation projects under $750,000 using unit OMA funding. These projects are designed and managed through the Directorate of Public Works (DPW). Requests for a Government Cost Estimate (GCE) to provide communications installation and equipment to service OMA projects will be submitted through the Remedy Work Order System by the DPW IMO. NOTE: Communications is considered to be a utility and will be included in the project's funding cap.

3.2.11.1.2.1 Work Order Request

The DOIM Plans and Requirements Branch (PRB) will assign a Project Manager (PM) upon receipt of the Remedy Work Order. The PM will provide the GCE for the project, the engineering and design for the communications systems, and Quality Assurance (QA) for the project. NOTE: All OMA projects will have communications designed and installed in strict compliance with the Installation Information Infrastructure Architecture Guidelines (I3A).

3.2.11.1.2.2 Government Cost Estimates

GCE’s provided for OMA projects are good only for the current fiscal year in which the estimate was completed. Funding for any estimate must be transferred and obligated (all materials ordered and installation completed) during the fiscal year that the estimate was provided.

3.2.11.1.2.3 Construction Completion

Construction for OMA projects must be completed no later than 30 June of the fiscal year in which the estimate was provided. Any project not completed by this deadline will have all funds returned and a new estimate will be required in the next fiscal year.

3.2.11.1.3 Military Construction, Army (MCA)
The MCA projects are managed by the U.S. Army Corps of Engineers and are funded as part of the Military Construction (MILCON) process. The DOIM PRB provides cost estimates, QA, and engineering and design for all of these projects.

3.2.11.1.3.1 Project Manager
The DOIM will assign a project manager for all MCA projects. The project manager will provide the GCE, engineering and design for the communications systems, and serve as the project QA. Additionally, the PM will review all construction drawings and provide comments on any deficiencies. NOTE: All communications systems for MCA projects will be designed and installed in strict compliance with the I3A.

3.2.11.1.3.2 Request for Approval
The PM will provide details on communications systems for Request for Proposal (RFP) actions. The PM will also attend all design review meetings.

3.2.11.2 Premises Distribution Sytem
This specification covers the requirements for data and telephone signal distribution paths within premises (formally called inside plant). This specification is to be used in the preparation of project specifications in accordance with the U.S. Army Information Systems Engineering Command, Installation Information Infrastructure Architecture (March 2006). Comments and suggestions on this specification are welcome and should be directed to the Directorate of Information Management, Plans and Requirements Branch, Fort Bragg, NC (910) 396-2548 as the proponent of the specification.

3.2.11.2.1 General

3.2.11.2.2 Applicable Documents, Installation Standards, Site Drawings

3.2.11.2.2.1 Publication

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in areas of the text by basic designation only. However, specific paragraphs of some publications have been addressed for clarification purposes. The publications listed below identify commercial and military standards to be utilized by construction personnel (design, engineers, contractors, installation personnel, etc) during the conception and implementation phases of military construction projects. Construction personnel are required to use the most current publication to design and implement MCA projects.

3.2.11.2.2.2 Compliance

The Contractor shall comply with all federal laws, codes, regulations, and statutes applicable to performance of this contract, including but not limited to those specified in the tables below. The following tables provide locations where some documents may be obtained. It is the Contractor's responsibility to obtain and adhere to all applicable federal standards. The Government will identify and provide the location to the contractor to obtain equipment-unique technical documentation to support Government Furnished Property (GFP). Any other unique Government requirement will be identified in individual, project specific Statement of Objective (SOO).

3.2.11.2.2.2.3 Federal

Army Instructions

AR 25-1 Army Knowledge Management and
AR 25-2 Information Assurance
I3A Installation Information Infrastructure
DCID 1/21 Physical Security Requirements in Construction
NSTISSAM TEMPEST/2-95 (FOUO) RED/BLACK Installation
NSTISSP 300 National Policy on Control of Compromising
NTISSI 7003 Protected Distribution Systems
Technical Guide for Integration of SIPRNET version 4.0

Air Force Instructions

Number	Title
31-10-2	Fanning and Forming Conductors for Ground C-E Equipment
31-10-6	Cable Racks, Troughs and Their Supports
31-10-12	Metal Ducts and Conduits
31-10-24	Grounding, Bonding, and Shielding
31-10-27	Equipment Designations
31W3-10-12	AF Communication Command (E-I Standard) -- Standard Installation Practices -- Outside Plant Cable Placement
31W3-10-13	AF Communications Service (Engineering-Installation Standard) -- Standard Installation Practices -- Outside Plant Cable Splicing
31W3-10-15	Air Force Communications Command (E-I Standard) - Outside Plant Cable Testing
31W3-10-22	Telecommunications Engineering, Outside Plant Telephone

(Copies of the above documents may be obtained from SM-ALC/MMEDTD, McClellan AFB, CA 95652 - 5609.)

3.2.11.2.2.4 Military Standards

Number	Title
MIL-HDBK-419A	Grounding Bonding and Shielding for Electronic Equipment and Facilities

MIL-STD-188-124B	Grounding Bonding and Shielding
MIL-HDBK-1857	Grounding, Bonding and Shielding Design Practices
MIL-HDBK-454A	General Guidelines for Electronics Equipment

(Copies of the above documents may be obtained from the Naval Publications and Forms Center (NPFC 105), 5801 Tabor Ave, Philadelphia PA 19120.)

3.2.11.2.2.5 State, Local, and Site-specific Regulations

The Contractor shall comply with all applicable state, local, and site-specific codes, regulations, and statutes related to the specific task order.

3.2.11.2.2.6 Commercial Standards and Manuals

The Contractor shall comply with the following commercial standards where applicable. Other commercial standards may apply to individual projects and will be stated in individual task orders. It is the Contractor's responsibility to identify and obtain applicable standards proposed for the project in the Statement of Objectives (SOO).

Number	Title	Website or Location
Building Industry Consulting Service International (BICSI)	Building Industry Consulting Service International, Inc (BICSI)	http://www.bicsi.org/
NFPA 70	National Fire Protection Association (NFPA)	http://www.nfpa.org/
ANSI	American National Standards Institute (ANSI) and Internet Standards Resources	http://www.ansi.org/
ANSI J-STD-607-A	Commercial Building Grounding and Bonding Requirements for Telecommunications	http://www.eia.org/ http://www.tiaonline.org/
EIA/TIA	Engineering: EIA/TIA Standards See Commodity Specific Appendices and Individual Task Orders	http://www.eia.org/ http://www.tiaonline.org/

TIA/EIA-526-7	Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7	http://www.eia.org/ http://www.tiaonline.org/
TIA/EIA-526-14	Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant – OFSTP14	http://www.eia.org/ http://www.tiaonline.org/
TIA/EIA-568-B.1	Commercial Building Telecommunications Cabling Standard Part 1: General Requirements	http://www.eia.org/ http://www.tiaonline.org/
TIA/EIA-568-B.2	Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components	http://www.eia.org/ http://www.tiaonline.org/
TIA/EIA-568-B.3	Commercial Building Telecommunications Cabling Standard Part 3: Optical Fiber Cabling Components	http://www.eia.org/ http://www.tiaonline.org/
TIA/EIA-569	Commercial Building Standards for Telecommunications Pathways and Spaces	http://www.eia.org/ http://www.tiaonline.org/
TIA/EIA-570	Residential Telecommunications Cabling Standard	http://www.eia.org/ http://www.tiaonline.org/
TIA/EIA-598	Optical Fiber Cable Color Coding	http://www.eia.org/ http://www.tiaonline.org/
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings	http://www.eia.org/ http://www.tiaonline.org/

TIA/EIA-758	Customer-Owned Outside Plant Telecommunications Cabling Standard	http://www.eia.org/ http://www.tiaonline.org/
EIA-310	Racks, Panels and Associated Equipment	http://www.eia.org/ http://www.tiaonline.org/
ICEA S-80-576	Category 1 & 2 Individually Unshielded Twisted Pair Indoor Cables (With or Without an Overall Shield) for Use in Communications Wiring Systems Technical Requirements	http://telecominfo. telcordia.com/sitecgi/ ido/index.html
GR-20	Generic Requirements for Optical Fiber and Optical Fiber Cable	Insulated Cable Engineer Association, Inc., P.O. Box P, South Yarmouth MA 02664; Telephone (508) 394-4424 GR-409 Generic Requirements for Premises Fiber Optic Cable http://telecominfo. telcordia.com/sitecgi/ ido/index.html
NEMA TC 2	Electrical Polyvinyl Chloride (PVC) Tubing and Conduit	http://www.nema.org/
NEMA TC 6&8 PVC	Plastic Utilities Duct for Underground Installations	http://www.nema.org/
NEMA TC 9	Fittings for PVC Plastic Utilities Duct for Underground Installation	http://www.nema.org/

NOTE: Ensure that the design provides for adequate communications pathways and spaces using EIA/ANSI/TIA/EIA-569B as a minimum requirement. Coordinate electrical, grounding, and HVAC requirements with the associated disciplines. Network type, size and configuration must be coordinated with the user's representative, if known. The same cable pathways and spaces will be used for both telephone and data (including local area network (LAN)) systems. However, secure and classified areas should meet requirements of NACSIM 5203 and DIAM 50-3 for facility design, cable distribution and wiring.

3.2.11.2.3 Inside Plant / Telecommunication Room

3.2.11.2.3.1 Telecommunication Room (TR)
Telecommunications telephone/LAN equipment room should be sized at 1.1 percent of Gross Square Footage (GSF) with a minimum size 10 feet x 11 feet and separate from other utility rooms (i.e., electrical, mechanical). The TR will be centrally located within newly constructed or renovated facilities. A TR will be required for each 25,000 SF of floor space supported. Note: See Figure 2-1 for TR detail. A TR sizing considerations for facilities over 10,000 SF should be reviewed in EIA/TIA-569A, Chapters 7 & 8 with additional guidance found in Building Industry Consulting Service (BICSI) Telecommunications Distribution Methods Manual (TDMM), Chapter 3. The same should be considered for totally refurbished facilities funded under OMA projects.

3.2.11.2.3.2 Access Control Points
The requirement for full sized TRs may be an excessive or cost prohibitive factor for specialized buildings such as Access Control Points (ACPs). These "undersized" buildings will still require a securable, environmentally controlled facility of adequate size in which to easily access all required telephone and network components. Note: The DOIM PRB will approve all variances to telephone room sizes.

3.2.11.2.3.3 Telephone Connectivity
The DOIM provides telephone connectivity to a wide variety of temporary or semi-permanent structures or areas. There are no special considerations for environmental or security for these telephone connections.

NOTE: ANY BUILDING/FACILITY NOT POSSESSING A SECURABLE AND ENVIRONMENTALLY CONTROLLED TELEPHONE ROOM WILL NOT RECEIVE NETWORK CONNECTIVITY.

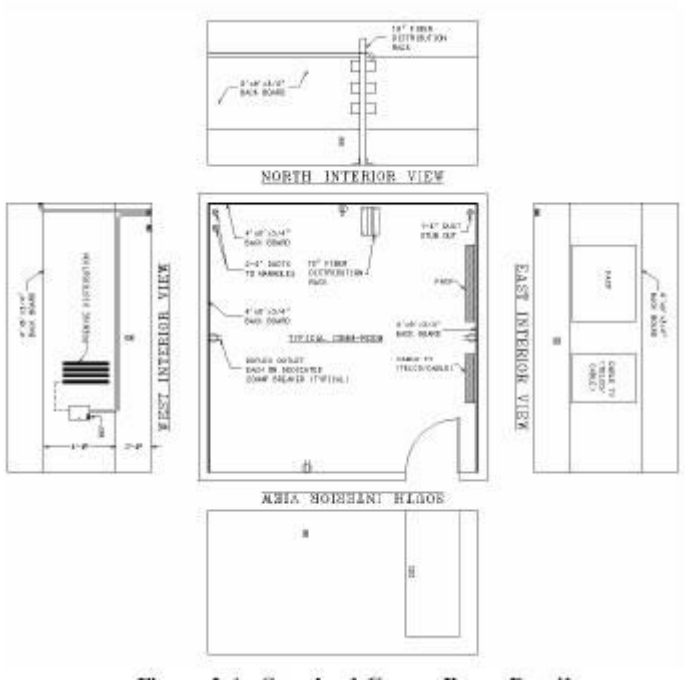


Figure 2-1: Standard Comm-Room Detail

3.2.11.2.4 Hardware
Connecting hardware will be rated for operation under ambient conditions of 0 to 60 degrees C, 32 to 140 degrees F, and in the range of 0 to 95 percent relative humidity, non-condensing.

3.2.11.2.5 Temperature and Humidity
The temperature and humidity will be controlled to provide continuous operating ranges of 18 degrees centigrade (64 degrees Fahrenheit) to 24 degrees centigrade (75 degrees Fahrenheit) with 30 percent to 55 percent relative humidity.

3.2.11.2.6 Ambient Temperature
The ambient temperature and humidity will be measured at a distance of five feet (1.5m) above the floor level, after the equipment is in operation, at any point along an equipment aisle center line.

3.2.11.2.7 Ventilation
Adequate ventilation will be provided for battery backup systems

3.2.11.2.8 Air-conditioning
The telecommunications equipment room will be air-conditioned on a 24 hoursper-day, 365 days-per-year to accommodate LAN File Server/Hub equipment being housed in that room. With separate environmental monitoring and temperature settings to ensure telecommunications are in a separate environmentally controlled room from the rest of the facility. A positive pressure will be maintained with a minimum of one air change per hour, or as required by applicable code. When active devices (heat producing equipment) are present a sufficient number of air changes should be provided to dissipate the heat. The HVAC system serving the TR will be connected to the standby power sources of the facility (if available).

3.2.11.2.9 Equipment racks floor mounted open frame.
A nineteen inch equipment rack will be installed in the TR. DOIM PRB personnel will specify which type and model will be installed. Equipment racks will have a minimum of 3 feet clearance between the front and rear of the rack and any other equipment, backboard or wall. Clearances between racks and ceiling lights or cable trays should be observed to ensure accessibility.

3.2.11.2.10 Floor Mounted Cabinets
ANY use of equipment cabinets must be approved by the DOIM- PRB.

3.2.11.2.10.1 Specifications
Equipment cabinets will be floor-mounted enclosures 19 inches (480 mm) wide and will be 72 inches (1828 mm) high and 30 inches (760 mm) deep with side panels; acrylic plastic front doors; rear louvered metal doors; depth-adjustable front and rear mounting rails; and louvered top. Ventilation fans will be included. Vertical cable management devices must be integral to the cabinet. A 110 VAC Power strip with 12 outlets will be provided within the cabinet. The 110 VAC power strip must be on its own 20-amp breaker. Cabinet exteriors will be painted beige. The cabinet much house a rack mounted UPS.

3.2.11.2.10.2
Cabinets must have a 3 feet front and rear clearance from walls and floor

mounted obstructions and must be mounted to the floor. See Figure 2-8 for detail.

3.2.11.2.11 Cable Rack
Channel-type cable rack must be used in TRs to provide distribution raceway between telephone backboards, equipment racks, riser conduits, and distribution cable trays.

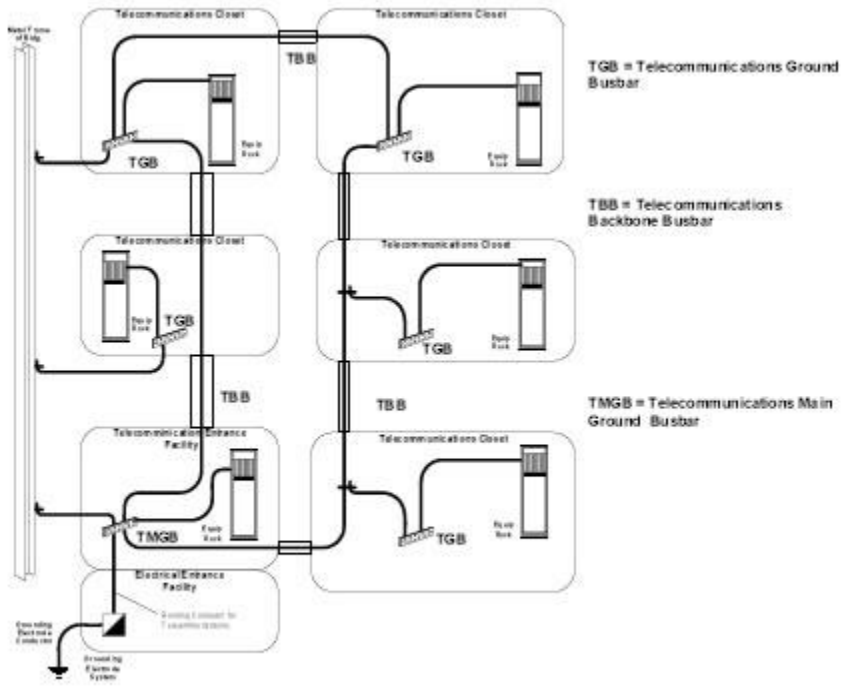


Figure 2-2: Telecommunications Grounding and Bonding

3.2.11.2.12 Ground Point
The TRs will have a ground point that has an earth ground resistance of 25 ohms or less. The backboard and racks will be grounded (6 AWG) and bonded IAW EIA/TIA-607 and NFPA 70 (National Electric Code (2002) – Article 250 – Information Technology Equipment and Article 800 – Communications Circuits). A main ground bus bar will be located on the telephone backboard and attached to the signal ground. See Figure 2-2

3.2.11.2.13 Interconnection
If more than one TR is used, each will be interconnected with the main TR using riser rated copper house cable and single mode (SM) fiber cable with conduit and/or cable raceway. Multi-story facilities will have TRs configured in a stacked riser configuration for ease of riser cable management from floor to floor.

3.2.11.2.14 Termination
Communications service entrance cables (outside plant cable) will be terminated on 189 (or equal) type gas protectors designed for compatibility with 66 block connector systems. (Note: Cables entering buildings will be grounded IAW EIA/TIA-607 and NFPA 70 (Article 800). At no time will outside plant cable extend more than 50 linear feet inside a building.

3.2.11.2.15 Gas Protectors
The 189 type gas protectors will be equipped with common telephone (4B1-EW or equal) orange “gas” surge protector modules. These modules will be three element heavy duty breakdown protections with sneak current protection. A gas protected terminal will be mounted 5 feet high to the center of the terminal or string of terminals from the floor. The terminal will be secured on the left side of the telephone backboard, at least 18 inches from any fixed object within the telecommunications equipment room.

3.2.11.2.16 Communications outlet
One each data/voice data jacket outlet will be installed on the wall next to the light switch in each TR.

3.2.11.3 Power Requirements

3.2.11.3.1 Dedicated Power
The TR will have a dedicated power source provided by four separate 20 AMP circuit breakers. The DOIM will install a rack mounted 1500 KVA Uninterruptible power supply (UPS) in each TR. This UPS will provide sufficient power for either an end user building or a backbone switch. Additional UPS units may be required as equipment is added.

3.2.11.3.2 Lighting
Lighting will be a minimum of 540 lx (50 foot candles), measured 3 feet (1m) above the finished floor with light units spaced to afford the best illumination. The lighting will be controlled by one or more switches located near the entrance door(s) to the room. Dimmer switches should not be used in the equipment room. Emergency lighting and signs should be properly placed in the equipment room where absence of light would hamper emergency exit.

3.2.11.4 Equipment Mounting Board

3.2.11.4.1 Telephone Backboard

Each telecommunications/LAN equipment room will have plywood backboard on at least three walls (omitting wall with the entrance door) and at least one equipment rack with an installed patch panel. The plywood backboards will be rigidly affixed to three adjacent walls, sized 4 feet x 8 feet x 3/4 inch and painted with two coats of light colored (no white or gray) fire retardant paint per ANSI/TIA/EIA-569A. They will be installed horizontally onto the wall with the height beginning at 2 feet AFF to a height of 6 feet AFF. The backboard will have a 3 feet clearance from any and all equipment racks. The telephone backboard will accommodate central office terminals, 66 blocks for premise distribution of voice and any related PBX equipment.
Note: Each mounting board must have one each 110 VAC dual outlet receptacle that is serviced by its own 20 AMP breaker

3.2.11.5 Premise Wiring

3.2.11.5.1 Premises Distribution System

The premises distribution system (PDS) will consist of inside-plant horizontal, riser, and backbone cables, as well as connecting hardware needed to transport telephone and data signals between equipment items in a building. The PDS will

originate from a lockable TR that services the facility areas. Conduits and cable tray raceways feeding each other will be rigidly connected and supported. Cable trays will be sized appropriately for the number of drops being serviced by the tray. The tray will have 1" of cross-sectional area for every drop (i.e., 4 inches x 9 inches cable tray can handle 36 drops). Conduits running from communications voice/data outlets will not be less than 1inch in diameter, home run to overhead cable tray raceways, and rigidly connected.
Radius - Each turning radius for conduit/cable tray raceways must not exceed 90 (long sweep) degrees, and no more than “2 per” home run. There will be no more than two 90 degree sweeps or an equivalent of 180 degrees in a combination of offsets and bends per home run. Raceways are standard factory provided cross/corner turns.

Cable Trays
Install cable trays suspended from the ceiling of all facility floors and above false ceilings to accommodate 4-pair, CMP-rated, CAT-6 unshielded twisted pair (UTP) cable to support Local Area Networks and voice requirements. Trays should bisect the buildings with as few turns as possible.

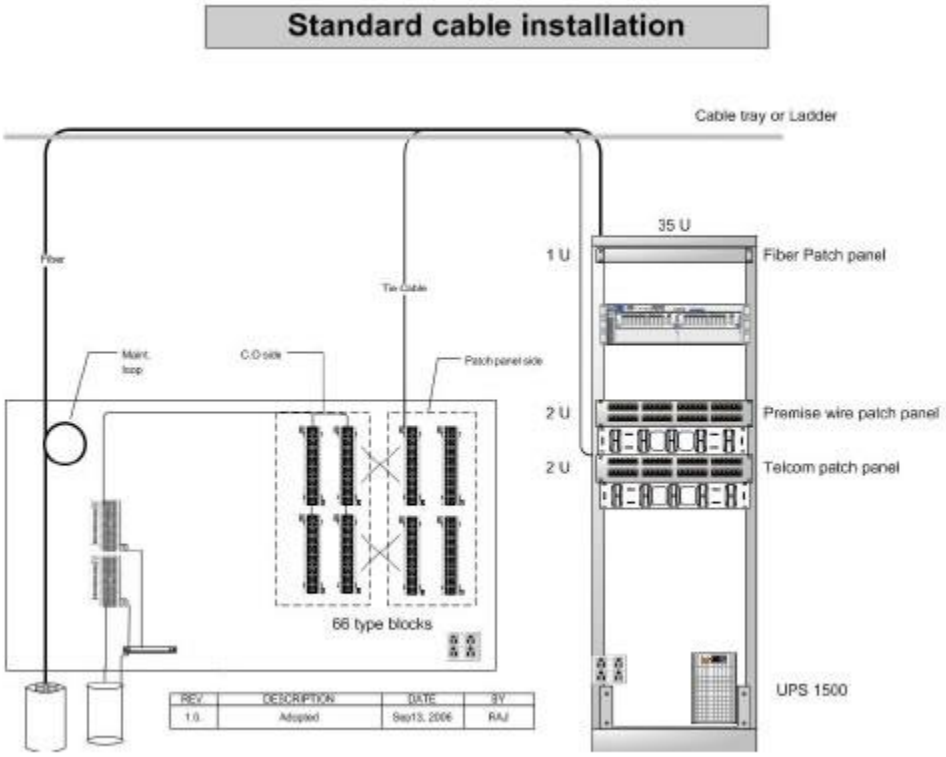


Figure 2-3: Typical Communications Room Layout

3.2.11.5.2 Communications Cables

All communication cables will run from the main or local telecommunications equipment room in cable tray raceways and conduit in a home run fashion to individual outlets.

3.2.11.5.3 Unshielded Twisted Pair

The installation of Category 6 Unshielded Twisted Pair (UTP) cable assigned to support “Data” requirements will not exceed 295 feet (90 meters) from the TR to the furthest jack outlet supporting adequate LAN connectivity. See 2.2.13

Cable specifications: Category 6 Non-plenum rated cable

# of Pairs	Conductor size	Insulation	Cable jacket material	Cable jacket OD	Max Freq. range
		Thickness in/mm	Thickness In./m	In./mm	MHz
4	23 AWG – solid BC	.008/.20 +,- .002	.022/.6 +,- .002	.240/6.1 +,- .002	400 to 550 MHz

Standard color code:
Green
The standard wire for UNCLASSIFIED.
Red
The standard wire for CLASSIFIED (SECRET
Yellow
The standard wire for CLASSIFIED (TOP SECRET) network drops.

3.2.11.5.4 Designation Strips

Designation strips (labels) will be installed and annotated with correct cable pair count on all wiring blocks by the installation personnel.

3.2.11.3.5.5 Cable Pair

Cable pair of 22/24 gauge wire will be provided from a designated manhole and will terminate on 189 protector terminals in the telephone equipment room. Two – 4 inch conduits with pull string will be provided from the communications room to the nearest communications manhole. These conduits will be terminated 4" above the floor and any unused conduit will be capped to prevent large objects from falling in the conduit. During the earliest design stage, coordination by the design A-E and DOIM PRB should be accomplished to ascertain the number of cable pair required to support a facility scheduled to be constructed.

3.2.11.5.6 Architecture/Engineering (A/E)

The A/E, in coordination with the user, will develop phone, computer, paging, and intercom requirements into the final design. Computer terminal locations will be provided with one -1 inch conduit and 4 11/16 x 4 11/16 receptacle boxes. The outlet box will possess a 2"x4" plaster ring that will accommodate an outlet cover for voice, data, and fiber optic termination points.

3.2.11.5.7 Telecommunications Outlets Faceplates

A six port faceplate will be used for all wall or modular furniture installations. Dust caps will be installed in all unused opens.

3.2.11.5.8 Telecommunications Outlets

3.2.11.5.8.1 Wall outlets

Two each. CAT-6 UTP (4-pair cable, CMR-rated) will be installed in each conduit/cable tray run from the telephone backboard/data patch panel to each (2ea) RJ-45 (data) outlet. A 4 11/16 inches x 4 11/16 inches receptacle box with 2 inches x 4 inches plaster ring and associated dual RJ-45 (data) jacks with (4-spare (blank) jack outlets) will be installed every 14 feet of usable wall space or a fraction thereof. As a minimum, there will be two outlets per wall. Note: Walls less than 12 feet in length will require only one outlet box per wall. Additionally, electrical wall outlets will be installed at a distance of at least 12 inches but not more than 15 inches from each outlet box. All outlets (boxes and conduits) have been sized to support the future installation of fiber to the workstation. All cables will be labeled using color labels on both ends with encoded identifiers per EIA ANSI/TIA/EIA-606. All workstation outlets and patch panel connections will be labeled using color-coded labels with encoded identifiers per EIA ANSI/TIA/EIA-606.

3.2.11.5.8.2. Modular Furniture outlets

If the facility is to be furnished with modular office furniture, the outlet locations should be matched to the furniture design. Outlets must be provided in a 4 11/16 inches x 4 11/16 inches outlet box with a 2 inch x 4 inch plaster ring. All face plates will be 6 outlet faceplates supporting 2 each RJ-45 (data) jacks.

3.2.11.5.8.3 Surface Mount Outlets

Surface mounted types are suitable for mounting on walls and baseboards. Where modular furniture is used outlets suitable for mounting in modular raceways will be provided.

3.2.11.5.8.4 Outdoor Outlets

If an outdoor outlet is necessary, it will be corrosion resistant, weatherproof, and designed to mate with a standard 4-wire outlet.

3.2.11.5.8.5. Wall Phone Outlets

Wall phones are required to have a single-gang outlet box with a single wall-jack, however, 2 each CAT-6 cables will be pulled to the outlet box.

3.2.11.5.8.6. Standard Outlet Port Color Coding

Green
The standard port color for UNCLASSIFIED.
Red
The standard port color for CLASSIFIED (SECRET).
Yellow

The standard port color for CLASSIFIED (TOP SECRET).
Any deviation from these standards requires written/signed approval from the DOIM. Any changes to these specifications agreed upon between DOIM PRB and the Architecture/Engineering (A&E) firm will be added to an appendix and included with these specifications.

3.2.11.5.9 Unshielded Twisted Pair Patch Panels

Patch panels must be mounted in equipment racks with sufficient modular jacks to accommodate the installed cable plant plus 10 percent spares. The patch panel will be Category 6 rated. The DOIM has standardized on 24 and 48 Port Patch panels that will consist of eight-position modular jacks, with rear mounted type 110 insulation displacement connectors arranged in rows or columns on 19-inch (480-mm) rack mounted panels. Jack pin/pair configuration will be T568B per EIA ANSI/TIA/EIA-568-B. Jacks will be non-keyed type. Panels will be labeled with alphanumeric outlet identifiers. Cable guides must be provided above, below, and between each panel.

3.2.11.5.10 Patch Cords

Patch cords will be cable assemblies consisting of flexible, twisted pair wire with eight-position plugs at each end. Cable will be label-verified. Cable jacket will be factory marked at regular intervals indicating organization and performance level. Patch cords will be wired straight through; pin numbers will be identical at each end and will be paired to match T568B patch panel jack wiring per ANSI/TIA/EIA-568-B. Patch cords will be non-keyed type. Patch cords will be factory assembled.
Standard color code:
Green
The standard patch cord color for UNCLASSIFIED.

Red
The standard patch cord color for CLASSIFIED (SECRET).
Yellow
The standard patch cord color for CLASSIFIED (TOP SECRET).

3.2.11.5.11 Equipment racks floor mounted open frame.

A nineteen inch equipment rack will be installed in the TR. DOIM PRB personnel will specify which type and model will be installed. Equipment racks will have a minimum of 3 feet clearance between the front and rear of the rack and any other equipment, backboard or wall. Clearances between racks and ceiling lights or cable trays should be observed to ensure accessibility.

3.2.11.5.12 Floor Mounted Cabinets

ANY use of equipment cabinets must be approved by the DOIM PRB.

3.2.11.5.12.1 Specifications

Equipment cabinets will be floor-mounted enclosures 19 inches (480 mm) wide and will be 72 inches (1828 mm) high and 30 inches (760 mm) deep with side panels; acrylic plastic front doors; rear louvered metal doors; depth-adjustable front and rear mounting rails; and louvered top. Ventilation fans will be included. Vertical cable management devices

must be integral to the cabinet. A 110 VAC Power strips with 12 outlets will be provided within the cabinet. The 110 VAC power strip must be on its own 20-amp breaker. Cabinet exteriors will be painted beige. The cabinet must be able to accommodate a rack mounted UPS.

3.2.11.5.12.2

Cabinets must have a 3 feet front and rear clearance from walls and floor mounted obstructions and must be mounted to the floor (area seismic considerations should be taken into account for further mounting requirements regarding overhead mounting as well as the floor mounting rigidity). See Figure 2-8 for detail.

3.2.11.5.13 Pre-wiring

Intrabuilding prewiring is necessary to accommodate various communicationcomputer systems services (i.e., telephone/voice, data, and support for EMCS, alarms, sensors, video, etc.). This will include provisions for LANs. Examples: Telephone wiring conduits, cable ducts, raceways, computer cabling and CATV cabling. All prewiring requirements will meet requirements in ANSI/TIA/EIA568B (Commercial Building Telecommunications Cabling Standard), ANSI/TIA/EIA-569A (Commercial Building Standard for Telecommunications Pathways and Spaces), ANSI/TIA/EIA-606A (Administrative Standards for the Telecommunications Infrastructure of Commercial Buildings), ANSI/TIA/EIA607 (Commercial Building Grounding and Bonding Requirements for

Telecommunications), and the National Electric Code Handbook – Articles 250 and 800.

3.2.11.5.14 Cablevision

Installation of CATV (cablevision) systems wiring will be installed as indicated at building/project design. Coax cabling will be pulled to the appropriate servicing TR. Adequate space for the installation of amplifiers and splitters has been provided inside every TR. Location for the cablevision distribution will always be to the inside right of the TR.

3.2.11.6 Quality Assurance

3.2.11.6.1 Test Plan

The Contractor shall submit a Test Plan defining the tests that are required to ensure the system meets technical, operational, and performance specifications 60 days prior to the proposed test start date. The test plan must be approved before the start of any testing. The test plan will identify the capabilities and functions to be tested, as well as an outline of detailed instructions for setting up and executing the test plan. Additionally, the plan is required to outline the procedures for evaluating and documenting the results of the test.

3.2.11.6.2 Reports - Test reports

Test reports will be submitted in booklet format with witness signatures verifying execution of all tests listed in the test plan. Additionally, test results will be provided to the DOIM PRB electronically. Reports will show the field tests

performed to verify equipment compliance with specified performance criteria. The test reports will include a record of all physical parameters verified during testing. Test reports will be submitted within 14 calendar days after completion of testing.

3.2.11.6.3 Unshielded Twisted Pair Tests

All metallic cable pairs must be tested for proper identification and continuity. All opens, shorts, crosses, grounds, and reversals will be corrected. Correct colorcoding and termination of each pair will be verified in the communications closet and at the outlet. Horizontal wiring will be tested from and including the termination device in the communications closet to and including the modular jack in each room. Backbone wiring must be tested end-to-end, including termination devices, from terminal block to terminal block, in the respective communications closets. These tests must be completed and all errors corrected before any other tests are started.

3.2.11.6.4 CATV Cable

The CATV cable must be tested for continuity, shorts and opens. Characteristic impedance will be verified over the range of intended operation. Cable length must be verified. Cable will be sweep tested for attenuation over the range of intended operation.

3.2.11.6.5 Fiber Optic Cable

Unless stated otherwise, tests must be performed from both ends of each circuit. Connectors will be visually inspected for scratches, pits or chips and must be reterminated if any of these conditions exist. Each circuit leg and complete circuit will be tested for insertion loss at 1310 and 1550 NM using a light source similar to that used for the intended communications equipment. High-resolution optical time domain reflectometer (OTDR) tests must be performed from one end of each fiber. Scale of the OTDR trace will be such that the entire circuit appears over a minimum of 80 percent of the X-axis.

3.2.11.6.6 CAT 6 Certification testing

All performance testing for Premise wiring is subject to inspection by the DOIM PRB. Data (LAN) cables must be CAT-6 UTP cable and must be tested and passed at 100 megabits per second data rate. Certification results must be provided to DOIM staff in an electronic format (ie. CD or Memory stick). EIA ANSI/TIA/EIA-568-B, EIA ANSI/TIA/EIA-569A, and EIA ANSI/TIA/EIA-606

3.2.11.6.7 Discrepancies

All discrepancies must be re-tested/re-inspected and the results certified correct in writing by a DOIM representative prior to any final acceptance

3.2.11.6.8 Quality Assurance

An appointed Quality Assurance (QA) representative from the DOIM PRB may observe operational tests, and analyze both observed and annotated test results provided by the installation personnel. Any system, equipment, or hardware that

does not meet Department of Defense (DOD), manufacturers, or requirement standards will not be accepted.

3.2.11.7 Cable marking

3.2.11.7.1 Standard Marking

All cables will be tagged with its distant end location at each termination point. All faceplates will also be labeled and its distant end patch panel location for both voice and data will also be labeled with room number and outlet number.

3.2.11.8 Communications & Power Requirements for Panel System

2.8.1. Downtime/Disruption

The following concepts will be considered as they will minimize maintenance downtime and workstation disruption in the event a problem arises with CAT-6 UTP cables being installed in panel and/or modular furniture systems.

3.2.11.8.2 Ceilings

Ceilings can have varied panel heights as long as the top of the panel has cable troughs to allow easy access to communications cables during and after installation. Additionally, CAT-6 UTP cables being installed must be able to follow changes in panel heights. Furthermore, all panels must have a minimum six inch floor level base to accommodate both power and voice/data cables. Floor bases must have metal shielding to separate electrical wiring from voice/data cables.

3.2.11.8.3 Cable Troughs

Top-of-the-panel cable troughs must be sized to accommodate a minimum of six (12) 4-pair (CAT-6 UTP) voice/data cables and should be provided with oval top caps to cover troughs.

3.2.11.8.4 Modular Furniture Outlets

The Modular furniture outlets will support standard 2 inches x 4 inches faceplates and will contain internal channeling for station cable. See Figure 2-4 for detail.

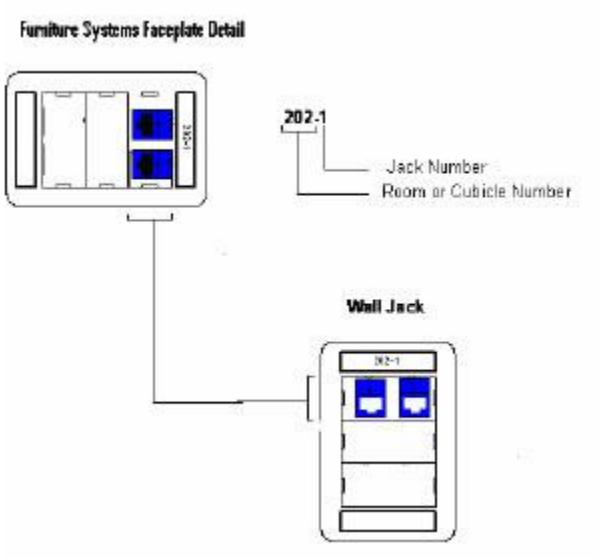


Figure 2-4: Furniture Systems Faceplate Detail

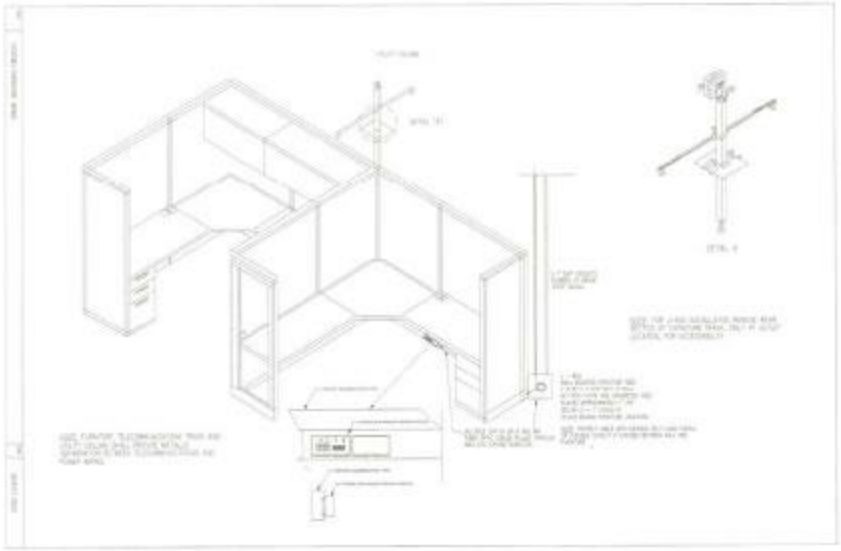


Figure 2-5: Modular Furniture Detail

3.2.11.8.5 Panels

Panels will have six inch bases that will come with four circuits, eight-wire power installed. The base must also be able to accommodate a minimum twenty-four (12) each, 4-pair (CAT-6 UTP) cables. Additionally, each panel base must be able to accommodate power receptacles. If long work surfaces are planned, midrun interconnected units must be notched to allow access to wires and cables within the panel's base.

3.2.11.8.6 Multi-conductor Cable

The use of multi-conductor cable (other than 4-pair CAT-6 UTP) or Multi-user Telecommunication Outlet (MUTOs) is not encouraged for use in modular furniture.

3.2.11.8.7 Installation

During installation, panels must be interconnected with no visible metal edges. Additionally, a minimum six inch vertical cable/wire management panel must be installed at strategic locations to accommodate power, voice, and data outlets at work surface height and have cable access at any height of the panel (spare outlets are requested to be installed below work surface height). All vertical cable/wire management panels must have removable faces for easy access to lay in wires with minimal disruption of the workstation. Panels must be of a design for shared usage in a front/rear or adjacent use configuration. Communications outlets to these panels must be configured for two each RJ-45 (data/voice) modular jacks.

3.2.11.8.8 Under Floor Raceway/Conduit

Use of under floor raceway and conduit is not authorized unless it is installed under a raised computer style floor system. For modular furniture that does not have access to outlets along the wall, the use of power poles is required. Power poles providing support for both power and telecommunications should be separated with a metal spacer.

3.2.11.9 Secure Internet Protocol Routing Network (SIPRNET) Cabling Requirements:

A SIPRNET connection supports the transmission of classified information under strict guidance developed by the DOD, National Security Agency and the oversight of the DOIM. Rooms that house SIPRNET equipment must meet stringent guidelines. Additionally, the communications infrastructure requirements fall outside the normal facility aesthetics and are uncommon since the conduit and outlet boxes must be surface mounted. In order to support those rooms for SIPRNET equipment installation and operations, the following facility construction actions must take place under any project in order to meet the secure room requirements noted under AR 380.5. PDS installation will be in accordance with NTISSI 7003 and Technical Guide for Integration of SIPRNET version 4.0. Coordination with the customer during the design phases will determine to what extent the following must be completed to support a secure environment for the equipment:

3.2.11.9.1 Secure Room guidance

The walls, floor, and roof construction of secure rooms must be of permanent construction materials (i.e., plaster gypsum wallboard, metal panels, hardboard, wood, plywood, or other materials offering resistance to, and evidence of unauthorized entry into the area). Walls will be extended to the true ceiling and attached to permanent construction materials with mesh or 18 gauge expanded steel screen.

3.2.11.9.2 Ceiling

The ceiling will be constructed of plaster, gypsum, wallboard material, hardware or any other acceptable material.

3.2.11.9.3 Doors

The access door to the room will be substantially constructed of wood or metal. The hinge pins of out swing doors will be peened, brazed, or spot-welded to prevent removal.

3.2.11.9.4 Windows

Windows that are less than 18 feet above the ground measured from the bottom of the window, or are easily accessible by means of objects directly beneath the windows, will be constructed from or covered with materials that will provide protection from forced entry. The protection provided to the windows need be no stronger than the strength of the contiguous walls.

3.2.11.9.5 Openings

Utility openings such as ducts and vents should be kept at less than man-passable (96 square inches) opening. Openings larger than 96 square inches will be hardened in accordance with Military Handbook 1013/1 A ref. aaa.

3.2.11.9.6 Conduit and Outlet Box Sizes

The conduit and outlet box sizes are the same for SIPRNET as for standard voice/data outlet. The outlet/connectors and adapters will meet the requirements of ANSI/TIA/EIA-568-B (American National Standards Institute/Telecommunications Industries Association/Engineering Industries Alliance-568A) paragraphs 12.4.3 and 12.4.4 and the adapter will be in the A-B orientation. The outlet/connector box is sized to accept fiber for future requirements.

3.2.11.9.7 Raceway or Wire Mold Products

The use of surface mounted plastic raceway or wire mold products may be used in secure rooms. The raceways will be marked in red tape every 35 inches of the red signal line identifying the run as a classified cabling pathway. All cabling will be installed in a home run fashion from the respective patch panel within the TR to each telecommunications outlet box at each location. PDS or conduit will NOT be run in the walls or above the ceiling. The PDS will be visible and run in accordance with Technical Guide for Integration of SIPRNET guide version 4.0 and NTISSI 7003.

3.2.11.9.8 System Components and Appurtenances

The Contractor shall install a Holocom or equivalent PDS System. The PDS System attributes shall include an interlocking “clam-shell” design that enhances security and flexibility in that it can be securely closed and locked, and then reopened for security inspections and network changes or enhancements. The PDS must also include an electrostatic powder coating, which provides an aesthetically pleasing appearance.
The PDS must be designed in strict compliance with NSTISSI 7003, Army Regulation (AR) 25-2 Chapter 6, Air Force Manual (AFMAN) 33-221,

Navy/USMC IA Pub 5239.22, and Technical Guide for Integration of SIPRNET version 4.0 as a Hardened Carrier PDS. Per these references, each agency,

service, or organization is afforded interpretation and approval authority, by the Designated Approving Authority (DAA), per the respective manual when assessing any PDS design and installation methodology.
System components and appurtenances must be installed in accordance with NFPA 70, manufacturer's instructions and as shown. Necessary interconnections, services, and adjustments required for a complete and operable signal distribution system will be provided. Components will be labeled in accordance with EIA ANSI/TIA/EIA-606. Penetrations in fire-rated construction must be fire stopped in accordance with EIA ANSI/TIA/EIA-569A, Annex A. Conduits, outlets and raceways will be installed in accordance with Section 16415 ELECTRICAL WORK, INTERIOR. Wiring will be installed in accordance with EIA ANSI/TIA/EIA-568-A and as specified in Section 16415 ELECTRICAL WORK, INTERIOR. Wiring, and terminal blocks and outlets must be marked in accordance with EIA ANSI/TIA/EIA-606. Communications cables will not be installed in the same cable tray, utility pole compartment, or floor trench compartment with ac power cables per NFPA 70, Article 800-52(a) (1)c. Cables will be installed in conduit or wire-ways and will be properly secured and neat in appearance. If installed in plenums or other spaces used for environmental air, cables will comply with NFPA 70 requirements for this type of installation.

3.2.11.9.9 Sensitive Compartmented Information Facilities (SCIF)

SCIF will be built to protect emission protection standards IAW with ETL 90-3 and Director of Central Intelligence Directive (DCID) 6/9 - Physical Security Standards for Sensitive Compartmented Information Facilities (Effective 18 November 2002).

3.2.11.10 Copper Horizontal Distribution Cable

3.2.11.10.1 Cable

The rated cable pulling tension must not be exceeded. Cable must not be stressed such that twisting, stretching or kinking occurs. Cable must not be spliced. Copper cable will be installed in appropriately sized solid bottom (trough) cable tray system. A minimum of 12 inches (300 mm) access will be provided and maintained above and to both sides of the cable tray. Care must be taken to ensure that other building components (i.e., air conditioning ducts) do not restrict access to the cable tray. Cable will not be run through structural members or in contact with pipes, ducts, or other potentially damaging items. Placement of cable parallel to power conductors must be avoided, with a minimum separation of 12 inches (300 mm) being maintained between these units. All cables appearing in the TR will be terminated. Minimum bending radius will not be exceeded during installation or once installed. Cable ties must not be excessively tightened such that the transmission characteristics of the cable are altered.

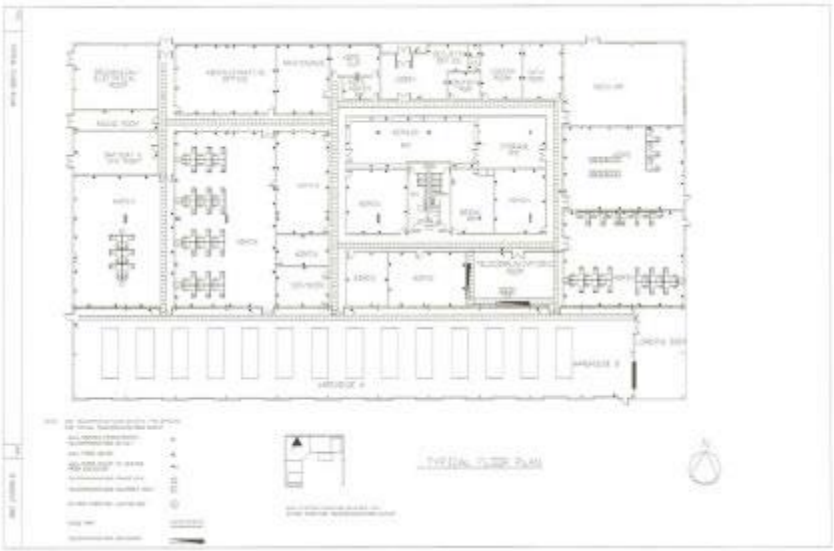


Figure 2-6: Typical Cable Tray Layout

3.2.11.10.2 Riser and Backbone Cable

Vertical cable support intervals must be IAW manufacturer's recommendations. Cable bend radius will not be less than ten times the outside diameter of the cable during installation and once installed. Maximum tensile strength rating of the cable will not be exceeded. Cable will not be spliced.

3.2.11.10.3 Cables

Unshielded twisted pair cables will have a maximum of 6 inches (150 mm) of slack cable loosely coiled into the telecommunications outlet boxes. Minimum manufacturers bend radius for each type of cable will not be exceeded.

3.2.11.10.4 Pull Cords

Pull cords must be installed in all empty conduits. During installation of station wiring, a pull wire will be installed (and remain) to support future fiber optic cable installation.

3.2.11.10.5 Terminal Blocks

3.2.11.10.5.1

Terminal blocks (66 type with standoff brackets) will be mounted in orderly rows and columns. Adequate vertical and horizontal wire routing areas must be provided between groups of blocks. Industry standard wire routing guides will be utilized.
NOTE: THE USE OF "D" RINGS IS ACCEPTABLE FOR MANAGEMENT OF CROSS-CONNECTIONS ON THE TELEPHONE BACKBOARD.

3.2.11.10.5.2

All station wire will follow a six drops (4pr x 6 = 24 pair) top to bottom termination scheme. All feeder copper will follow the same format only it will fill the entire side of a 66 block (1pr x 25). See Figure 2.10.6.2 for details. See Figure 2-7 for detail.

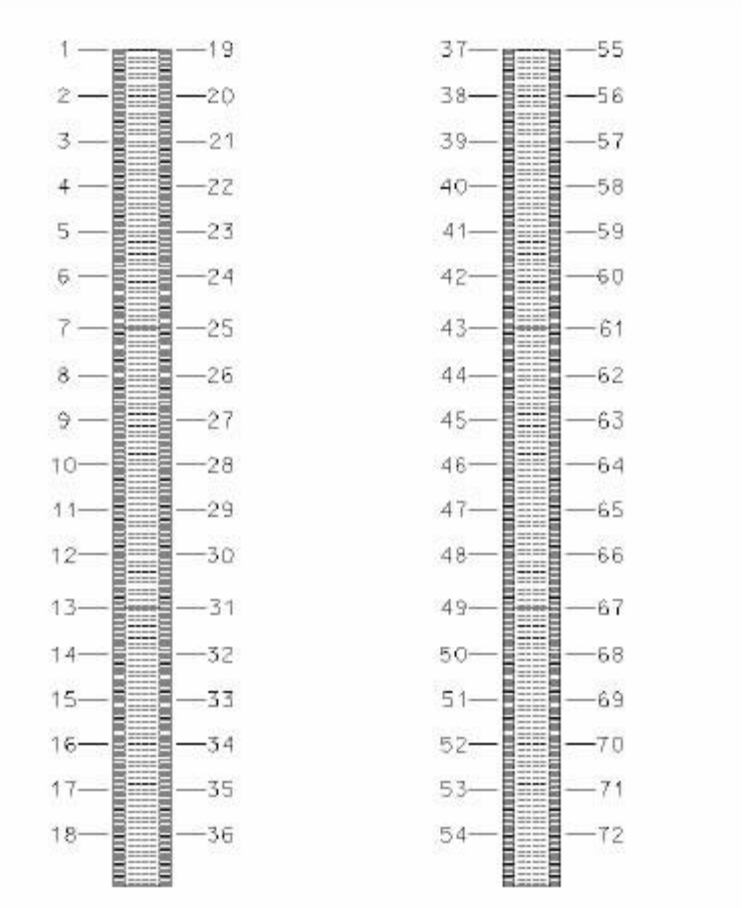


Figure 2-7: Standard “66” Block Numbering Sequence

3.2.11.10.6 Unshielded Twisted Pair Patch Panels

Patch panels must be mounted in equipment racks with sufficient modular jacks to accommodate the installed cable plant plus 10 percent spares. The patch panel will be Category 6 rated. The DOIM has standardized on 24 and 48 Port Patch panels that will consist of eight-position modular jacks, with rear mounted type 110 insulation displacement connectors arranged in rows or columns on 19-inch (480-mm) rack mounted panels. The multi-pair copper tie cable from the 66 block to the patch panel will spare (tie back) the 25 th pair per binder and not terminate it. That would be the 25 th , 50 th , 75 th and so on for larger cable. Panels will be labeled with alphanumeric outlet identifiers. Cable guides must be provided above, below, and between each panel.

3.2.11.10.7 Equipment racks floor mounted open frame.

A nineteen inch equipment rack will be installed in the TR and DOIM PRB personnel will specify which type and model will be installed. Equipment racks will have a minimum of 3 feet clearance between the front and rear of the rack and any other equipment, backboard or wall. Clearances between racks and ceiling lights or cable trays should be observed to ensure accessibility.

3.2.11.10.8 Floor Mounted Cabinets

ANY use of equipment cabinets must be approved by the DOIM PRB.

3.2.11.10.8.1 Specifications

Equipment cabinets will be floor-mounted enclosures 19 inches (480 mm) wide and will be 72 inches (1828 mm) high and 30 inches (760 mm) deep with side panels; acrylic plastic front doors; rear louvered metal doors; depth-adjustable front and rear mounting rails; and louvered top. Ventilation fans will be included. Vertical cable management devices must be integral to the cabinet. A 110 VAC Power strip with 12 outlets will be provided within the cabinet. The 110 VAC power strip must be on its own 20-amp breaker. Cabinet exteriors will be painted beige. The cabinet must be able to accommodate a shelf mounted UPS.

3.2.11.10.8.2

Cabinets must have a 3 feet front and rear clearance from walls and floor mounted obstructions and must be mounted to the floor (area seismic considerations should be taken into account for further mounting requirements regarding overhead mounting, as well as the floor mounting rigidity) See Figure 2-1 for detail.

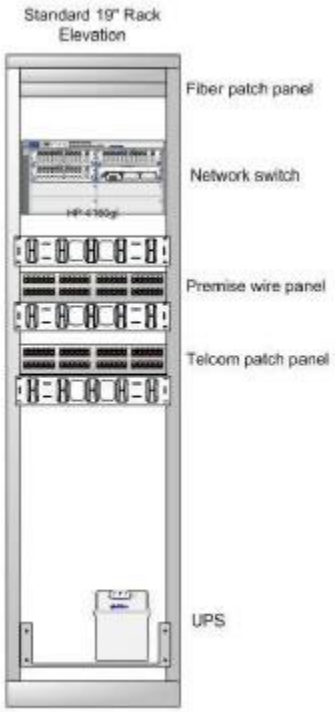


Figure 2-8: Standard Rack Detail

3.2.11.10.9 Rack/Cabinet Mounted Equipment

Equipment to be rack/cabinet mounted will be securely fastened to racks/cabinets by means of the manufacturer's recommended fasteners. Installed rack/cabinet will provide for 3 feet of work space from the wall in the front and back and also sufficient side access.

3.2.11.10.10 Termination

Cables and conductors will sweep into termination areas; cables and conductors must not bend at right angles. Manufacturer's minimum bending radius will not be exceeded. When there are multiple system type drops to individual workstations, relative position for each system must be maintained on each system termination block or patch panel.

3.2.11.10.11 Unshielded Twisted Pair Cable

Each pair will be terminated on appropriate outlets, terminal blocks or patch panels. No cable will be un-terminated or contain un-terminated elements (i.e., un-terminated cable pairs). Pairs will remain twisted together to within the proper distance from the termination as specified in EIA ANSI/TIA/EIA-568-A. Conductors must not be damaged when removing insulation. Wire insulation must not be damaged when removing outer jacket.

3.2.11.10.12 Shielded Twisted Pair Cable

Each cable will be terminated on panel-mounted connectors. Cables will be grounded at patch panels using manufacturer’s recommended methods. Shield braid will be continuous to connector braid terminator. Wire insulation must not be damaged when removing shield.

3.2.11.10.13 CATV Cable

Home run type station CATVP (horizontal) CATVR (Riser) cables will be terminated at each end. Backbone cables will be terminated with appropriate connectors or end-of-line terminators as required. Loop-type cable systems must be terminated with appropriate drop connectors and terminators as required. Backbone cable shield conductor will be grounded to communications ground at only one point and must not make electrical contact with ground anywhere else. CATV coaxial cable will meet or exceed the requirements of EIA ANSI/TIA/EIA 568-A and NFPA 70.

3.2.11.10.14 CATV Connecting Hardware – Connectors

CATV connectors will meet or exceed the requirements of EIA ANSI/TIA/EIA 568-A and NFPA 70.

3.2.11.10.15 Unshielded Twisted Pair Cable System Cable Insulation

For each individual Category 6 cable, the insulation, material used on each pair will be the same in all physical, electrical, and chemical respects. The use of

Teflon insulated, CMP rated Category 6 (or better) cable is required for plenum applications. Teflon insulated plenum rated cable will be used by the Installer and will be Type 4x0; where all four pairs are Teflon insulated. Type 3x1 and 2x2 are not acceptable.

3.2.11.10.16 Riser Cable

Riser cable will meet the requirements of ICEA S-80-576 and EIA ANSI/TIA/EIA-568-A for Category 6, 100-ohm, unshielded twisted pair cable. Cable will be label-verified. Cable jacket will be factory marked at regular intervals indicating organization and performance level. Conductors will be solid copper 24 AWG. Cable will be rated CMR per NFPA 70.

3.2.11.10.17 Horizontal Cable

Horizontal cable will meet the requirements of EIA ANSI/TIA/EIA-568-A for Category 6 Unshielded Twisted Pair (UTP) horizontal cable. Cable will be labelverified. Cable jacket will be factory marked at regular intervals indicating organization and performance level. Category 6 UTP cable assigned to support “Data” requirements will not exceed 295 feet (90 m) from the telecommunications closet to the furthest jack outlet meeting these distance limitations to support adequate LAN connectivity. Conductors will be solid untinned copper 24 AWG. Cable will be rated CMP per NFPA 70, Article.

3.2.11.10.18 Connecting Hardware

Hardware for protecting or connecting hardware for termination of outside plant cables entering the facility will be provided per EIA ANSI/TIA/EIA -758. Connecting and cross-connecting hardware will be the same category as the cable it serves. Hardware will be IAW and EIA ANSI/TIA/EIA-568.

3.2.11.10.19 Patch Cords

Patch cords will be cable assemblies consisting of flexible, twisted pair wire with eight-position plugs at each end. Cable will be label-verified. Cable jacket will be factory marked at regular intervals indicating verifying organization and performance level. Patch cords will be wired straight through; pin numbers will be identical at each end and will be paired to match T568B patch panel jack wiring per EIA ANSI/TIA/EIA-568-A. Patch cords will be non-keyed type. Patch cords will be factory assembled. See 2.5.10 for standard color code

3.2.11.11 Fiber Optic Horizontal Distribution Cable

Single mode fiber optic cable is the Fort Bragg DOIM standard. Only single mode cable will be used. All deviations must be approved by the DOIM PRB.

3.2.11.11.1 Fiber optic cable system.

Single mode fiber optic backbone cable will meet the requirements of EIA ANSI/TIA/EIA-568-A and ICEA S-83-596 for 62.5/125-micrometer single mode graded index optical fiber cable. Numerical aperture for each fiber will be a minimum of 0.275. The pull strength between the connector and the attached fiber will not be less than 25 pounds (11.3 kg). The mated pair loss, without rotational optimization must not exceed 1.0 dB. Fiber optic connectors will be

installed per EIA ANSI/TIA/EIA-568-A. Cable construction will be tight buffered type. Individual fibers will be color coded for identification. Cable will be imprinted with fiber count and aggregate length at regular intervals. Cable will be rated OFNR per NFPA 70, Article 770-51(b). Fiber will be terminated as determined at installation.

3.2.11.11.2 Fiber Connecting Hardware

Connectors will be SC or LC types with ceramic ferrule material with a maximum insertion loss of .5 dB. Connectors will meet performance requirements of EIA ANSI/TIA/EIA-568-A. Connectors will be field installable. Connectors will use crimps for fiber attachment to ferrule. Connectors must terminate fiber sizes as required for the service. Faceplates will be ivory in color, impact resistant plastic, with double-sided female SC or LC coupler. Mounting plates will be provided for system furniture and must match the furniture system in color.

3.2.11.11.3 Fiber Patch Panels

Closet connector housings of the appropriate size (12 strand typically) will be mounted in the top position of each equipment rack. Special-purpose locations (i.e., Main Communications Nodes - MCNs or Area Distribution Nodes - ADNs) will have the closet connector housings sized for their individual requirements. A slack loop of fiber will be provided within each panel. Loops will be provided as recommended by the manufacturer. The outer jacket of each cable entering a patch panel will be secured to the panel to prevent movement of the fibers within the panel. Patch panels will be a complete system of components by a single manufacturer, and must provide termination, splice storage, routing, radius limiting, cable fastening, storage, and cross-connection. Patch panels will be 19-inch (480-mm) rack mounted panels. Panels will be labeled with alphanumeric xy coordinates. Patch panel connectors and couplers will be the same type and configuration as used elsewhere in the system.

3.2.11.11.4 Fiber Patch Cords

Patch cords will be cable assemblies consisting of flexible optical fiber cable with connectors of the same type as used elsewhere in the system. Optical fiber will be the same type as used elsewhere in the system. Patch cords must be complete assemblies from manufacturer's standard product lines.

3.2.11.11.5 Equipment racks floor mounted open frame.

A nineteen inch equipment rack will be installed in each TR. DOIM PRB personnel will specify which type and model will be installed. Equipment racks will have a minimum of 3 feet clearance between the front and rear of the rack and any other equipment, backboard or wall. Clearances between racks and ceiling lights or cable trays should be observed to ensure accessibility.

3.2.11.11.6 Floor Mounted Cabinets

ANY use of equipment cabinets must be approved by the DOIM PRB.

3.2.11.11.6.1 Specifications

Equipment cabinets will be floor-mounted enclosures 19 inches (480 mm) wide and will be 72 inches (1828 mm) high and 30 inches (760 mm) deep with side panels; acrylic plastic front doors; rear louvered metal doors; depth-adjustable front and rear mounting rails; and louvered top. Ventilation fans will be included. Vertical cable management devices must be integral to the cabinet. A 110 VAC Power strip with 12 outlets will be provided within the cabinet. The 110 VAC power strip must be on its own 20-amp breaker. Cabinet exteriors will be painted beige. The cabinet must be able to accommodate a rack mounted UPS.

3.2.11.11.6.2 Cabinet Placement

Cabinets must have a 3 feet front and rear clearance from walls and floor mounted obstructions and must be mounted to the floor (area seismic considerations should be taken into account for further mounting

requirements regarding overhead mounting, as well as the floor mounting rigidity) See Figure 2-1 for detail.

3.2.11.11.7 Rack/Cabinet Mounted Equipment

Equipment to be rack/cabinet mounted will be securely fastened to racks/cabinets by means of the manufacturer's recommended fasteners. See Figure 2-8

3.2.11.12 Telecommunications Outlet Boxes

3.2.11.12.1 Electrical Boxes

Electrical boxes for telecommunication outlets will be 4-11/16 inches (117 mm) square by 2-1/8 inches (53 mm) deep with minimum 3/8 inch (9 mm) deep single or two gang plaster ring as shown. Provide a minimum 1 inch conduit. Turning radius for conduits must not exceed 90 degrees (long sweep) and no more than two per home run. There will be no more than two 90-degree sweeps or an equivalent of 180 degrees in a combination of offsets and bends per home run.

3.2.11.12.2 Residential:

Residential refers to barracks space only.

3.2.11.12.2.1 Cable requirements

DOIM will provide Copper and Fiber Optic cable to all new Barracks facilities. A 12 strand fiber cable will be installed to each Barracks.

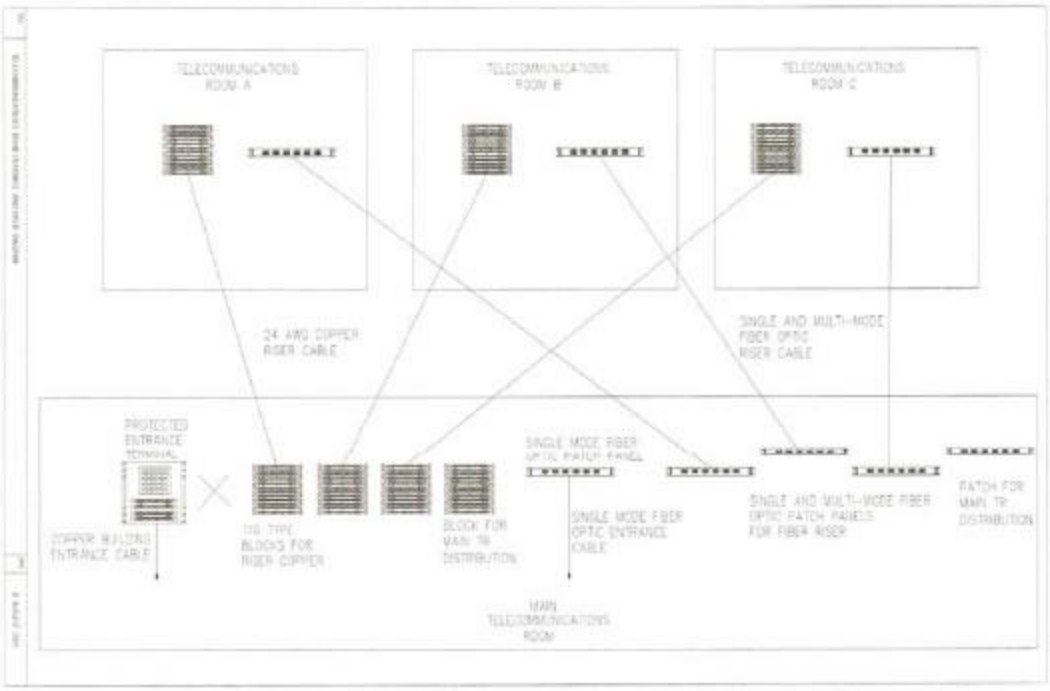


Figure 2.9: Connectivity for Barracks only

3.2.11.12.2.2

All drops will terminate on a CAT-6 certified 110 block in the respective TR. All drops at the work area outlet will be terminated on a CAT-6 certified RJ-45 jack.

3.2.11.12.2.3

An appropriate size multipair 24 AWG riser rated house cable will be extended from the main TR to each floor TR. These feeder cables will be terminated on 66 blocks. A single jumper will be placed on the appropriate blocks/outlets and numbered to identify the room outlet in the Main TR.

3.2.11.12.2.4

Coaxial cable will be terminated with male F connectors.

3.2.11.13.0 CONTRACTOR RESPONSIBILITIES

3.2.11.13.0.1 Responsibilities

The contractor is responsible for installing all communications pathways (i.e., cable tray, Electrical Metallic Tubing (EMT), PVC duct and manholes). Design and installation of these systems will be reviewed and inspected for Quality Assurance (QA) by the DOIM PRB.

3.2.11.13.0.2 Instructions - Manufacturer's Recommendations

Where installation procedures require recommendations from the manufacturer on the material being installed, printed copies of all recommendations will be provided before installation takes place. Installation of the item will not be allowed to proceed until the recommendations are received and approved.

3.2.11.13.0.3 Materials and Equipment

When materials or equipment are specified to conform, they must be constructed or tested to meet the specified requirements and certification must be presented showing that the items provided conform to the required specifications. Certification will be completed by a nationally recognized testing laboratory where a representative sample of the material has been sent for specification testing. The contractor may opt to use a publication or catalog with a specification statement reflecting that the item meets the referenced standard to meet certification requirements. Compliance with these requirements does not relieve the contractor from compliance with other individual specification requirements. All equipment must meet current DOD Army certification standards and be on the approved products list. The Fort Bragg DOIM IA staff can assist in validating the proposed equipment list.

3.2.11.13.0.4 Delivery and Storage

Equipment delivered and placed in storage will be stored with protection from the weather, humidity and temperature variation, dirt and dust, and all other potential contaminants at the contractor’s expense. Government will not store or provide space for any materials for contractors.

3.2.11.13.0.5 Operation and Maintenance Manuals

Commercial off the shelf manuals will be furnished for operation, installation, configuration, and maintenance of all products provided as a part of the premises distribution system. Specification sheets for all cable, connectors, and other equipment will be provided.

3.2.11.13.1 Documentation

3.2.11.13.1.1 Premises Distribution System

Detail drawings including a complete list of equipment and material. Detail drawings will contain complete wiring and schematic diagrams and other details required, demonstrating that the system has been coordinated and will function properly as a system. Drawings will include vertical riser diagrams, equipment rack details, and elevation drawings of telecommunications closet walls, outlet faceplate details for all outlet configurations, sizes and types of all cables, conduits, and cable trays. Drawings will show proposed layout, anchorage of equipment, appurtenances, and equipment relationship to other parts of the work including clearance for maintenance and operation.

3.2.11.13.1.2 Record Drawings

Record drawings for the installed wiring system infrastructure per EIA ANSI/TIA/EIA-606. The drawings will show the location of all cable terminations, location, and routing of all backbone and horizontal cables. The identifier for each termination and cable will appear on the drawings.

3.2.11.13.1.3 Records

Record keeping and documentation on cables and termination hardware will be in accordance with ANSI/TIA/EIA-606.

3.2.11.13.1.4 Record keeping and Documentation – Cables

A record of all installed cable will be provided in hard copy format and on electronic media using Windows based computer cable management software per EIA ANSI/TIA/EIA-606. A licensed copy of the cable management software, including documentation will be provided. The cable records will include the required data fields for each cable, and complete end-to-end circuit report for each complete circuit from the assigned outlet to the entry facility per EIA ANSI/TIA/EIA-606.

3.2.11.13.1.5 Termination Records

A record of all installed patch panels and outlets will be provided in hard copy format and on electronic media using Windows based computer cable management software per ANSI/TIA/EIA-606. A licensed copy of the cable management software including documentation will be provided. The hardware records will include only the required data fields per EIA ANSI/TIA/EIA-606.

3.2.11.13.2 Products

Provide electrical and telephone outlets installed per the Americans with Disabilities Act (ADA) to accommodate telecommunications device for the deaf (TDD) and other devices. Ensure that the 40 percent maximum conduit and other raceways fill are met when sizing raceways. Materials and equipment will conform to the respective publications and other requirements specified above and to the applicable requirements of NPFA 70.

3.2.11.13.3 Telecommunications Contractor Qualifications

3.2.11.13.3.1 Minimum Contractor Qualifications

Contractor will be qualified with the ability to prove that they have graduated and have been certified by BICSI for all telecommunications work that will be performed. Three years or more telecommunications experience in the application, installation, splicing, and testing of the specified telecommunications system equipment may be substituted for BICSI certification. Government will not provide training to any contractor.
All Primary contracting companies responsible for telecommunication pathway (manhole/duct-bank & cable tray/EMT) installation shall have the DIN EN ISO 9001 or 9002 accreditation or be a candidate for accreditation.
A copy of the certificate or supporting documentation for candidates shall be provided with all contract proposals.

3.2.11.13.3.2 Contractor provided equipment

All furnished and installed equipment, as well as all work accomplished under this section will be performed by a certified telecommunications contractor. The only exception to this is the electrical contractor may furnish and install conduit

and electrical boxes. The telecommunications contractor will have the following qualifications in telecommunication system installation:

3.2.11.13.3.3 Certifications

All supervisors and installers assigned to the installation of fiber optic cable and Category 6 cabling and their associated hardware will have certifications showing they are qualified to install and/or test the aforementioned materials and equipment. General electrical trade staffs are prohibited from installing premise distribution system cables and associated hardware. All installers assigned to the installation of any system will have a minimum of 3 years experience in the installation of telecommunications system components.

3.2.11.13.3.4 Proof of Certification

The contractor will submit certification that all the installers are factory certified to install and test the provided products.

3.2.11.13.4 Security

3.2.11.13.4.1 Security clearance

When working in areas or equipment requiring a security clearance, all contracted personnel involved with the project will have proper clearances to the level required to perform the work The contractor shall be capable of performing projects classified up to and including SECRET. The contractor may be required to work in secure/controlled areas. The contractor shall identify and coordinate access and escort needs with the DOIM Project Manager.

3.2.11.13.4.2 Following are the security requirements for unclassified contracts:

3.2.11.13.4.2.1 Employee List

The contractor shall maintain a current listing of all employees. The list shall include the employee's name, social security number, and type of investigation if contract work involves unescorted entry to restricted areas or other sensitive areas designated by the installation commander. The list shall be provided to the Program Manager and sponsoring agencies' Security Manager. An updated listing shall be provided when an employee's status or information changes.

3.2.11.13.4.2.2 Security Training

The contractor shall ensure all contractor employees receive initial and recurring security education training from the sponsoring agencies' Security Manager. Training shall be conducted IAW DOD 5200.1-R, Information Security Program Regulation, and AR 380-5, Department of the Army Information Security Program. Contractor personnel who work in AF controlled/restricted areas shall be trained IAW AR 380-5, Department of the Army Information Security Program.

3.2.11.13.4.2.3 Pass and Identification Items

The contractor shall ensure the pass and identification items required for contract performance are obtained for employees and non-government owned vehicles.

3.2.11.13.4.2.4 Retrieving Identification Media

The contractor shall retrieve all identification media, including vehicle passes from employees who depart for any reason before the contract expires; e.g. terminated for cause, retirement, etc.

3.2.11.13.4.2.5 Traffic Laws

The contractor and employees shall comply with base traffic regulations.

3.2.11.13.4.2.6 Weapons, Firearms, and Ammunition.

Contractor employees are prohibited from possessing weapons, firearms, or ammunition, on themselves or within their contractor-owned vehicle or privately owned vehicle while on Ft Bragg.

3.2.11.13.4.2.7 For Official Use Only (FOUO)

The contractor shall comply with DOD 5400.7-R, Chapter 4, DOD Freedom of Information Act (FOIA) Program and requirements. This regulation sets policy and procedures for the disclosure of records to the public and for marking, handling, transmitting, and safeguarding FOUO material.

3.2.11.13.4.2.8 Reporting Requirements.

Contractor personnel shall report to an appropriate authority any information or circumstances of which they are aware may pose a threat to the security of DOD personnel, contractor personnel, resources, and classified or unclassified defense information. Their immediate supervisor upon initial on-base assignment will brief contractor employees.

3.2.11.13.4.2.9 Physical Security.

The contractor shall be responsible for safeguarding all Government property and controlled forms provided for contractor use. At the end of each work period, all Government facilities, equipment, and materials shall be secured.

3.2.11.13.4.2.10 Key Control.
The contractor shall establish and implement methods of ensuring all keys issued to the contractor by the Government are not lost or misplaced and are not used by unauthorized persons. The contractor shall not duplicate any keys issued by the Government.

3.2.11.13.4.2.11 Lost Keys
The contractor shall immediately notify the Quality Assurance Personnel (QAP) or Program Manager of any occurrence of lost or duplicated keys.

3.2.11.13.4.2.12 Replacement Keys
In the event keys, other than master keys, are lost or duplicated, the government may replace the affected lock/locks or perform re-keying and deduct the cost of such from the monthly payment due the contractor. In the event a master key is lost or duplicated, the Government shall replace

all locks and keys for that system and the total cost will be deducted from the payment due the contractor.

3.2.11.13.4.2.13 Security of Keys
The contractor shall prohibit the use of keys issued by the government by any persons other than the contractor's employees and the opening of locked areas by contractor employees to permit entrance of persons other than contractor employees engaged in performance of contract work requirements in those areas.

3.2.11.13.5 Mass Notification Systems
The DOD is required to provide mass notification for new and existing buildings when required by UFC 4-010-01. Beginning with the fiscal year 2004 construction program, mass notification is required in all new inhabited buildings, including new primary gathering buildings and new billeting. Mass notification is required in existing primary gathering buildings and existing billeting when implementing a project exceeding the replacement cost threshold specified in UFC 4-010-01. Mass notification is recommended in other existing inhabited buildings when implementing a project exceeding the replacement cost threshold. Mass notification is required for leased buildings, building additions, and expeditionary and temporary structures (see UFC 4-010-01).

3.2.11.13.6 Control Access Card (CAC)
Use of CAC readers have been mandated for all MILCON projects beginning in FY07 projects per the Policy Memorandum from Assistant Chief of Staff for Installation Management dated December 14, 2004. The policy is to utilize hotel room type card locks on Interior and Exterior doors where keys are provided to successive tenants over the life of the building. Stand Alone locks require no networking and will require no cabling. The Installation may elect at their cost to provide a networked solution that would require cabling. The networked solution will require the necessary (IA) reviews and certifications prior to the installation.

3.2.11.13.7 Hours of Operation.
3.2.11.13.7.1 Normal Hours of Operation.
The contractor shall perform services during normal duty hours of the site where work is being performed. Known schedule deviations will be identified in a specific SOO. Any other work schedule outside of normal duty hours requires DOIM PRB approval.

3.2.11.13.7.2 Holidays.
The contractor shall not perform on federal holidays or site-unique down-days unless expressly authorized by the CO or otherwise directed in the SOO.

3.2.11.13.7.3 On Call/Emergency Services.
The contractor shall be required to provide support and/or assistance in the resolution of contractor-caused system problems during non-duty hours for emergencies or mission need basis at no change in contract price.

3.2.11.13.8 Safety and Environmental.
3.2.11.13.8.1 Contractors
Contractor shall meet with appropriate local environmental, and DPW offices prior to the commencement of work, unless otherwise stated in the SOO. The DOIM PRB must coordinate with the environmental flight or environmental management office and the installation bio-environmental engineer before any excavation, repair, or removal of telecommunications cable suspected of containing lead can be accomplished for advice, guidance and/or measures to be followed in order to minimize health and environmental risks.

3.2.11.13.8.2 Subcontractors

The Contractor shall be responsible for ensuring subcontractors satisfy the safety and health requirements set forth in OSHA standards or any other identified local procedures.

3.2.11.13.8.3 Accident/Incident Reporting and Investigation.
The contractor shall record and report all available facts relating to each instance of accidental damage to Government property or injury to either Contractor or Government personnel to the DOIM Safety and Security Office unless otherwise stated in the SOO. The Contractor shall secure the scene of any accident and wreckage until released by the accident investigative authority through the Contracting Officer. If the Government elects to conduct an investigation of the incident, the Contractor shall cooperate fully and assist the Government personnel until the investigation is completed.

3.2.11.14.0 OUTSIDE PLANT
3.2.11.14.1 Digging Permits:
3.2.11.14.1.1 Digging Permit Approval
Digging permits must be approved prior to any unearthing that penetrates the ground more than six inches. The contractor will coordinate with the DPW to schedule all excavation and obtain the required digging permits. DPW will notify the DOIM PRB for verification and/or locating of telecommunications infrastructure at the excavation site.

3.2.11.14.1.2 Scope of Work
The contractor will meet on site with the DOIM locator with the appropriate Scope of Work (SOW) documents (drawings, schematics, etc). Permits will be signed at the excavation site after the telecommunications have been located. Each site will require its own digging permit and a copy of the permit must remain on the jobsite while the work is in progress.

3.2.11.14.1.3 Locates
The DOIM or DPW must be responsible for the location and marking of the utilities, unless otherwise stated in the design package. The installer must furnish a schedule of proposed excavation involving maps or diagrams showing locations to the DOIM/DPW in sufficient time to allow marking. An acceptable utility mark must be within 24 inches (600 mm) of the edge of the utility. After the utility are located and marked, the installer is responsible for maintaining the marks until they are no longer required. The intent is that the utilities must be located and marked only once and not after each rainfall. The contractor shall be responsible to locate and mark all new contractor-installed manholes, hand holes, ducts, and cables that have not yet been accepted by the government through the DOIM QA process.
There will be no all day locates. Exceptions: Emergencies, or unavoidable work that will prohibit movement of military vehicle traffic during time of real world situations. Lengthy locates will be scheduled over a period of several days in order for DOIM personnel to stay ahead of work. DPW will contact the Network Monitoring Center to schedule after hours and emergency locates. The Network Monitoring Center will notify the Chief of PRB to gain authorization to dispatch a locator.

3.2.11.14.1.4 Marking of Communications Infrastructure
Communications infrastructure will be marked with a bio-degradable orange paint. If moisture, such as rain or snow, destroys identifying markings before the contractor performs the work, then the contractor will need to reschedule with the DOIM to remark the areas in question.

3.2.11.14.1.5 Excavations
Contractors or other personnel performing excavations on Fort Bragg or Camp Mackall without prior permission will be liable for any and all damages.

Contractors will be responsible for damages on all telecommunications infrastructure that occurs after the routes have been marked.
The contractor shall remove asphalt, concrete, and other material/debris IAW with applicable Directorate of Public Works (DPW) codes. Disposition of any excess dirt will be in compliance with Directorate of Public Works (DPW) codes. Any material used for fill (dirt/aggregate, etc.) and compaction of fill will be in compliance with DPW codes. Any asphalt, concrete curb or sidewalk replacement will be in compliance with DPW codes. Coordinate with DPW to determine if lab testing of removed soil is required. The contractor will coordinate

with DOIM PRB and DPW to determine the best method (trench, bore, etc.) to install buried ducts. Contact DPW for applicable codes and instructions regarding these requirements.

3.2.11.14.1.5 Contractor Storage Area
The contractors' bed-down area (work storage area) shall be kept clean and orderly and will be free of debris per DPW standards. Contact DOIM PRB for applicable codes and instructions regarding this requirement.

3.2.11.14.1.6 Records
The DPW maintains records for the locations and marking of all utilities. The contractor will furnish a schedule of proposed excavation to the DPW and DOIM. After excavation, the contractor will mark all new utilities IAW local requirements and provide an updated drawing to the DOIM PRB and DPW.

3.2.11.14.1.7 Site Restoration
The contractor shall restore all work area sites to its original conditions. Contact DPW for applicable codes and instructions regarding this requirement. All grass areas where excavation occurs shall be restored to the same or better conditions by using seed or sod and appropriate fill dirt. The contractor shall coordinate site restoration requirements with DOIM PRB and DOIM Quality Assurance Evaluator (QAE) prior to any site excavations.

3.2.11.14.2 Damage of Telecommunications Cabling
If any outside plant infrastructure is damaged by a contractor, the contractor must notify the DOIM PRB immediately. If communications duct is damaged it will be the responsibility of the contractor to effect such repairs IAW DOIM guidelines. If any copper or fiber cable is damaged, the DOIM will repair the damage and submit a cost to the contractor. The contractor will reimburse the government for any and all damages.

3.2.11.14.3. General Manhole, Handhole, and Duct Construction Specifications.
3.2.11.14.3.1 PVC
Grade of PVC conduit (Schedule 40, Schedule 80, etc.) to be used for ducts and/or concrete encasement of ducts will be in compliance with DOIM PRB and DPW Engineer codes. Contact DOIM PRB for applicable codes and instructions regarding this requirement.

3.2.11.14.3.2 Pull String
Pull string with a minimum rating of 450 pounds shall be installed in all new ducts.

3.2.11.14.3.3 Manhole Ladders
Manholes shall include a metal ladder with steps at 16 inches on center and bolted to manhole neck.

3.2.11.14.3.4 Duct Penetrations
All ducts shall penetrate manholes perpendicular to the wall surface plane and have bell-ends. The contractor shall use pre-drilled knockouts or use core drill method to establish holes for placement of ducts into all manholes. Chipping or using a jack hammer method to establish holes for conduit placement into the manhole is unacceptable.

3.2.11.14.3.5 MHDS (Manhole Duct Systems) Inspections
The contractor shall notify DOIM PRB or the DOIM QAE NLT 10-days prior to inspection of the new proposed manhole and duct system. No cables shall be installed until all manholes and hand holes have been inspected by the DOIM QAE.
Note: No ducts shall be covered with backfill until DOIM QAE performs a sample inspection of the installed duct bank.

3.2.11.14.3.6 Handholes
Hand holes when specified, will be nominally 4 feet x 4 feet x 4 feet inner dimensions and is provided with a grounding rod, cable rack supports, sump drain, pulling irons, and hand hole cover with required markings. The design and construction will be the same as a manhole except on a smaller scale. Any questions should be directed to DOIM PRB personnel. Hand-holes must have at least 1 feet (12 inches) of ground cover with the hand-hole cover being at grade.

3.2.11.14.4 Bonding and Grounding
3.2.11.14.4.1 Existing Manholes and Handholes
The contractor shall furnish and install ground and bonding ribbon in existing manholes and hand holes where none exists. In existing manholes, bond the splice case to bonding ribbon at the available ground location. For manholes where no existing grounding ribbon or ground point exist, install grounding rods at the bottom of the floor inside the manhole near or adjacent to one of the interior corners furthest away from the manhole opening.

3.2.11.14.4.2 Grounding
Signal distribution system ground will be installed in the telecommunications entrance facility and in each telecommunications closet IAW EIA ANSI/TIA/EIA-607 and Section 16415 ELECTRICAL WORK, INTERIOR. Equipment racks must be connected to the electrical safety ground. See Figure 4-1: Building Grounding Detail.

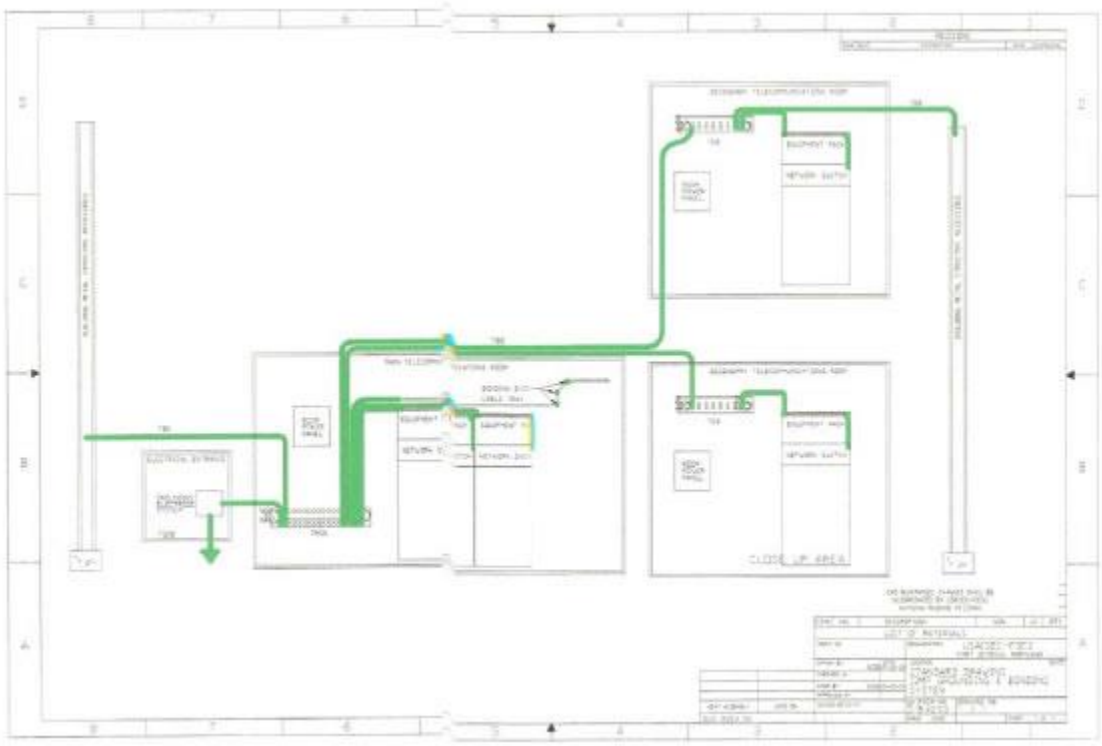


Figure 4-1: Building Grounding Detail

3.2.11.14.5 Manhole Duct Support

3.2.11.14.5.1 Fabric Mesh Innerduct

The contractor shall install Fabric mesh-type innerducts as approved by the U.S. Government and must be limited to a maximum of six cells per tape, unless otherwise approved by the U.S. Government. The designer may specify up to three, three cell, tapes per conduit. Multi-cell fabric mesh will have an uninterrupted, shared, sewn spine to prevent twisting. Conduit formations must not be undersized based on the increased modularity of the fabric-mesh innerduct.

3.2.11.14.5.2 Securing Innerduct

All inner ducts shall be secured in manholes and hand holes. The inner duct needs to be secured to prevent the inner duct from creeping back into the ducts during cable placement.

3.2.11.14.5.3 Maintenance Loops

Contractor shall provide any additional hardware as required to be added in new and existing manholes to accommodate maintenance loops in each specified manhole . Maintenance loops will be provided at each splice point and at a minimum of 60’ not to exceed 1500’ intervals at the nearest manhole. Maintenance loops will be secured at the top of the manhole racking system and will not obstruct manhole or handhole duct openings.

3.2.11.14.5.4 Drawings

The DOIM PRB will provide all engineering drawings for the OSP facilities to include basic routing and duct usage. A butterfly drawing will accompany all work prior to and verified after work is completed. See Figure 4-2

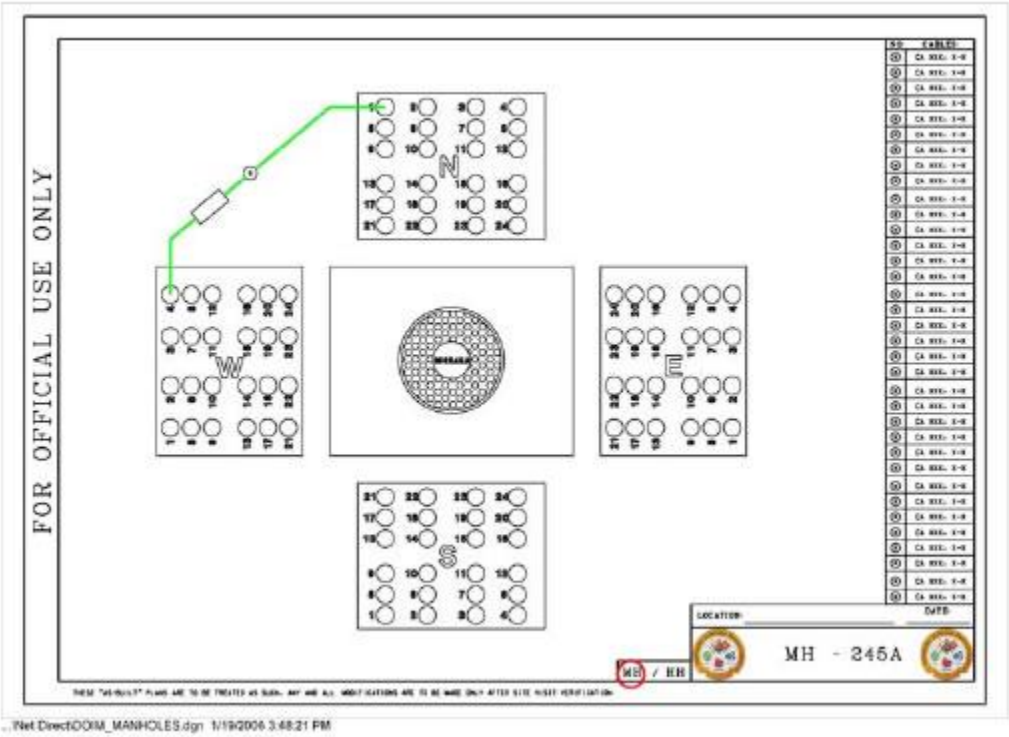


Figure 4-2: Butterfly Drawing

3.2.11.14.5.5 Cable System

Exterior duct and communications cable system to support all valid requirements will be installed from the facility’s communications equipment room(s) to the

closest service connection point. This includes entry ducts, spares, conduits, and duct & manhole systems to the closest service connection point.

3.2.11.14.6 Outside Plant Cable Entrance
3.2.11.14.6.1 Entrance Conduit and Pullstring
All outside plant entrance cabling will provide a minimum of (2 ea) 4 inch entrance ducts into the TR. Facilities with larger telecommunications requirements may require the installation of more ducts. All duct requirements will be dictated during the design review process by DOIM PRB personnel.

These ducts will be run underground from the building to the nearest communications connection point where adequate service is available. All ductwork will include 1/4 inch pull rope rated at 450 pounds minimum. The ducts will stub up 6 inches above the floor in the TR. Conduits will be located to the left of the proposed location of the telephone backboard.

3.2.11.15.0 CABLE INSTALLATION.
3.2.11.15.1 Cable Requirements.
3.2.11.15.1.1 Cable Size
All cables shall be 24 American Wire Gauge (AWG) unless otherwise specified in the SOO.

3.2.11.15.2 Copper Splice and Closure Specifications
3.2.11.15.2.1 Underground Closures
Only stainless steel re-enterable splice closures specifically designed for underground applications shall be used in this installation. The splice closure shall be suitable for pressure encapsulation and shall provide a rigid end plate (plastic or resin laminate) to provide a seal against the cable sheath under pressure for applications at locations where the possibility of immersion exists. The underground closure shall be sealed, and suitable for enclosing straight, butt, and branch splices in a protective housing. The closure shall be of stainless steel material and shall protect the splice and maintain cable shield electrical continuity in a cable vault, manhole, or handhole environment.

3.2.11.15.2.2 Vault Closure
The vault closure in the DCO shall be as follows: 1(ea) Stainless Steel 12.5“X 38” vault splice closure with Fire Retardant End Plate kit, to include grounding harness. The end plates shall be a factory drilled in a 6 section end plate configuration to accommodate 24 (ea), 100-pair tip cables.

3.2.11.15.2.3 Splice Connectors and Splice Method
Type 710 modular connectors shall be used for splices where branch cables are to be transferred into an existing splices. Splicing will be accomplished using the “fold-back” method to allow slack for future maintenance of installed cable. Do not mix 710 modules and pic-a-bond connectors in the same splice. The contractor shall notify the DOIM QAE prior to sealing any splice closures.

3.2.11.15.2.4 Encapsulant
Underground stainless steel splice cases will not be filled with re-enterable encapsulant on Ft Bragg.

3.2.11.15.3 Cable Tagging & Terminal Stenciling.
3.2.11.15.3.1 Tag Type
Tags shall be made of metallic (i.e. stainless steel, etc.) corrosion resistive material suitable for submersion under water and stamped with the applicable cable information identified below.

3.2.11.15.3.2 Cable Tag Information
Tag new cables and retag existing cables that are to be re-used. In the cable vault, tag each tip cable. In manholes and handholes, place a tag on each end of the cable as it enters and exits. At splice locations, place a tag on each side of the

splice. In Communication Rooms, tag cable near cable entry point and at the terminal. Tag cables as they pass through a pull box or an LB. Tag cables where they are exposed in basements. Tag cable to include cable type, cable number, cable size and type, cable count, the origin manhole or termination on the CO side and the destination manhole or termination location on the field side. Dead complements in cables will not be designated as “DD”, “DP”, “XDD” or any variation thereof. Identify dead complements with the appropriate “A” (or B, etc) count. Use “A” count after splice where a cable count is no longer terminated to the CO side but the cable pairs continue. Use “B” count at first appearance where same cable count is not terminated to field side and the cable pairs continue.

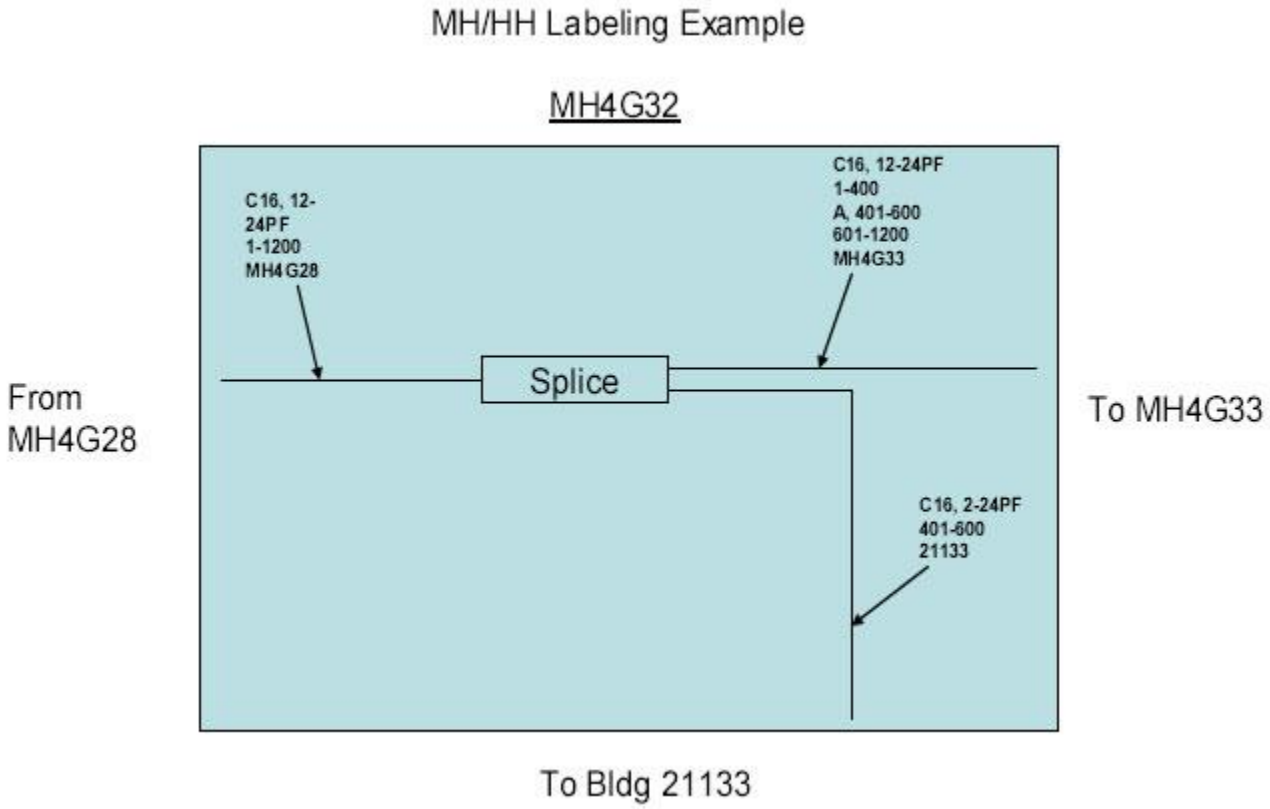


Figure 4-3: Manhole/Handhole Labeling

3.2.11.15.3.3 Terminal Stenciling
Re-stencil existing terminals or backboard to be retained. Stencil all terminals as determined acceptable by DOIM/QAE. Cable Terminal Covers shall be marked with terminal number, cable number, and terminal count.
Example: T 2-1145
C16, 1001-1200

3.2.11.15.4 Testing.
3.2.11.15.4.1 Test Results
Test results will be required 14 days after completion of all testing. 3 copies will be submitted to the identified POC at DOIM PRB. Test results may be recorded on a locally developed test sheet. The Contractor will contact DOIM PRB 5 work days prior to testing start date to afford the government the opportunity to perform over-the-shoulder Quality Assurance during all or part of the testing sequence.

3.2.11.15.4.2 Existing Cables.

Prior to splicing, test existing pairs to be spliced into the new cable. The contractor's tests shall check for cable faults (grounds, shorts, crosses, opens), splicer's errors (splits, reverses, transpositions), shield continuity and insulation resistance (insulation resistance on existing cables is accomplished on spare pairs only). The contractor shall not be responsible for correcting existing cable faults, splicer's errors, open shield continuity or low insulation resistance; however, the DOIM QAE must be notified of such conditions immediately upon identification.

3.2.11.15.4.3 New Cables.
After splicing and terminating new cable and prior to splicing any new cable into existing cable, the new cable will be tested and documented to be free of cable faults (grounds, shorts, crosses, and opens) and splicer's errors (splits, reverses, and transpositions).

3.2.11.15.4.3.1
After splicing and terminating new cable and prior to splicing new cable into existing cable, insulation resistance as tested on a minimum of three conductors in each 25-pair group of the new cable against all other conductors of the cable and the shield, shall be documented to be of a value that is satisfactory for the length and type cable being tested.

3.2.11.15.4.3.2
After splicing and terminating new cable and prior to splicing new cable into existing cable, test to ensure the cable shield is continuous from the MDF to the termination point.

3.2.11.15.4.3.3
After splicing new cable into existing cable test the cable 100% for end-toend cable faults (grounds, shorts, crosses, and opens) and splicer's errors (splits, reverses, and transpositions). Any cable faults or splicer's errors not documented on existing cable test shall be cleared by the contractor, if caused by the new cable installation. Test data shall be submitted the assigned DOIM QAE for inspection and verification prior to cutover to existing cable.

3.2.11.15.4.3.4
Insulation resistance as tested on a minimum of three non-working conductors in each 25-pair group of the cable shall be documented to be of a value that is satisfactory for the length and type cable being tested.

3.2.11.15.4.4 Loop Resistance Tests:
After all splicing and terminating is complete, make a D.C. loop resistance measurement on all affected (non working) cable pairs. Measure from all terminals back to the cable origin or central office.

3.2.11.15.4.5 Cable Shield Continuity.
Test to ensure the cable shield is continuous from the MDF to the termination point.

3.2.11.15.4.6 Ground Point Test
Where the contractor uses an existing ground point, it shall be tested prior to being connected to the system. Even though the National Electrical Code calls for a resistance to ground not to exceed 25 ohms, Military Handbook 419A, paragraph 2.2.2.2 states that 25 ohms is not low enough. In order to protect personnel and equipment, MIL-HDBK 419A recommends a design goal of 10 ohms for communications systems where practical. If the ground point proves unsuitable, the contractor shall notify the DOIM QAE in writing of the defective ground. The tests to be performed on the grounds shall measure the ground potential (ability to dissipate voltage through the ground point to the earth).

3.2.11.16.0 SPECIAL INSTRUCTIONS.

3.2.11.16.1 Cable Transfers
If the contractor is required to make cable transfers, transfer cut sheets will be provided to DOIM PRB (3) weeks in advance of task to be performed. This will allow for proper coordination so that DOIM can schedule running of the half-tap jumpers on the MDF and schedule transfer of jumpers/drops in the field, where necessary. Sequence of operations is at the discretion of contractor with approval from the DOIM PRB. The intent is to make this installation as transparent as possible to the communications user.

3.2.11.17.0 FIBER OPTICS CABLE
3.2.11.17.1 Fiber Optic Cable Specifications for Ft Bragg – (see Appendix A, Page 58)
Fiber optics cable type will be single-mode. The DOIM PRB will determine strand count based on user needs. Fiber optics cabling installed in a conduit system will have no less than 1/4 inch air gap around the outside perimeter of the cable. Fiber optics cabling installed in manholes/hand holes or cable vaults will be formed, racked, supported, and secured in place.

3.2.11.17.2 Fiber Splicing and Splice Closures
All splice closures shall meet the same specifications identified in Section 5.2. Copper Splice and Closure Specifications, as relative to fiber optic cable splices in manhole applications. All cables shall be spliced by fusion method and sealed in an air tight closure. There shall be no exterior splices

3.2.11.17.3 Fiber Terminations – see attachment
All terminations shall be the “LC” or “SC” type connectors. The outside FO cables shall be spliced to UNICAM LC or SC connectors within the FODP. The FODP shall be loaded with LC or SC bulkheads and sized according to the number of FO Strands entering and exiting the FODP.

3.2.11.17.4 FO Cable Tagging & FODP Stenciling.
3.2.11.17.4.1 Fiber Tag Information (Manholes/Handholes)
The contractor shall tag FO cables the same as for copper cables identified in Section 5.3 of this document.
Example (CO side of splice): F-116, 144SM (Fiber Cable Number, Cable Size, and Type)
1-144 (Cable Count)
MH4G28 (“from MH”)
Example (Field side of splice): F-116, 144SM (Cable Number, Cable Size, and Type)
1-72 (Cable Count)
A, 73-96 (“A” Count past splice)
97-144 (Cable Count)
MH4G32 (“To MH”)
Example (Field Side to Bldg): F-116, 24SM (Cable Number, Cable Size, and Type)
73-96
2-1133 (“To Building”)

3.2.11.17.4.2 FODP Labeling
The contractor shall label the FODP for each facility with the fiber cable number, cable count, and logical origin and termination point of each count. Label FODP’s for Trunk Fiber and Distribution Fiber as follows;
Example (Trunk Fiber “TF”): TF-6, 144SM
1-1434/M-8630 (From Bldg 1-1434 to Bldg M-8630)
TF-6, 144SM
M-8630/1-1434 (Reverse for opposite end Panel)
Example (Distribution Fiber “F”): F-116, 144SM
1-60, 5-6211
61-96, 5-6214
97-108, 6-8444

109-144 (Not labeled until used)
Example (Distribution Fiber “F”): F-116, 144SM
1-60, 1-1434 (Panel label at Bldg 5-6211)

3.2.11.17.5 Testing FO Cables
3.2.11.17.5.1 Test Procedures
The contractor shall test all FO cables for the following as a minimum:
a. Bi-directionally End-to-End (each segment of cable, building to building, etc.) @ 1550nm and 1330nm.
b. Power loss measurements utilizing Power Meter (dB loss as compared to distance). Contractor shall obtain all required Technical Requirements and Software Specifications to include locally generated Test Documentation Format and Data Sheets.
Note: DOIM/QAE shall determine preferred method of testing IAW applicable standards for Ft Bragg.

3.2.11.17.5.2 Test Results
The contractor shall provide documentation reflecting all measurements and test results the same as identified in Section 5.4.1.

3.2.11.18.0 CONTRACTOR DELIVERABLES
3.2.11.18.1 Contract Data Requirements List (CDRL).

CDRL #	Title	Due Date	Required
A001	Status Report	Weekly	Yes
A002	“Redline” Drawings	Final Inspection and Acceptance	Yes
A003	Cable Test Records	Final Inspection and Acceptance	Yes
A004	“As-built” Drawings	60 days after Installation Completion	Yes
A005			
A006			
A007			
A008			

3.2.11.18.2 As-Built Drawings.
3.2.11.18.2.1 Drawing Format
The contractor shall provide all drawings in either AutoCAD or Microstation formatted drawings. The contractor shall contact DOIM PRB for information regarding software requirements to accomplish all updates identified in this IDG.

3.2.11.18.2.2 Drawing Submittals
The contractor shall provide the DOIM PRB one (1) electronic and (1) hardcopy of the final installation Cable Diagram drawings, “D” size series. The drawings shall reflect all cable and duct pathways, manholes, manhole sizes, distance between manholes, number of conduit in each duct bank, and the size, type, and

cable designations. The contractor shall provide three (3) hard copies of the “redline” Cable Diagram drawings, “D” size series to DOIM PRB prior to or during final inspection and acceptance.

3.2.11.18.2.3 Butterfly Drawings
The contractor shall provide the DOIM PRB one (1) electronic and (1) hardcopy of the final installation Manhole Racking Diagram (butterfly) “D” size series drawings. The drawings shall reflect all cable and duct penetrations, manhole sizes, conduit placement in relation to the manhole, and the size, type, and cable designation. The contractor shall provide three (3) hard copies of the “red-line” Manhole Racking Diagram (butterfly) drawings, “D” size series to DOIM PRB prior to or during final inspection and acceptance.

3.2.11.18.3 Test Results (See Sections 5.4 and 8.1)
3.2.11.18.4 CONTRACTOR PERSONNEL.
3.2.11.18.4.1 Program Manager
The contractor shall provide a Program Manager (PM) and alternate(s) responsible for contract performance and continuity. The contractor shall identify the Program Manager or alternate's range of authority to act for the contractor relating to daily contract operation. The Contractor Program Manager shall provide the following while performing any tasks associated with this IDG to the DOIM PRB.

3.2.11.18.4.1.1
Weekly project status report to DOIM PRB

3.2.11.18.4.1.2
A project timeline that illustrates critical milestones and/or other significant points of interest (i.e. road closures, facility access, etc.).

3.2.11.18.4.1.3
Request for information, modification, or engineering changes to the original SOO. All requests shall be made in writing and submitted to DOIM PRB for action.

3.2.11.18.4.1.4
Changes in schedule or delays that will cause a change in the project timeline.

3.2.11.18.4.1.5
Submit all work order clearance requests (digging permits) to DPW no later than 2 weeks in advance of schedule excavations.

3.2.11.18.4.2 Team Leader
The Contractor shall designate the Contractor's on-site team leader and alternate(s) as the Site POC for individual projects in their Site Visit Request Letter. The Site POC or alternate(s) shall be on site during duty hours until project completion. The Site POC shall be the interface for all work site communications with the government, including quality, safety, and discrepancy matters. The Site POC shall provide DOIM PRB with their contact information (i.e. phone number, e-mail, etc.).

3.2.11.18.4.3 Team Communication
The Program Manager, Site POC, and respective alternate(s) shall be able to read, write, speak, and understand English.

3.2.11.19.0 GEOSPATIAL INFORMATION
3.2.11.19.1 Format.
Geospatial information shall be delivered on storage media (specify magnetic or optical media preferences), in a “shape file” format within a folder named the same as the prefix of the shape file, e.g., if the shape-file is named "points_pafb_28.shp" the folder shall be named "points_pafb_28". The folder shall contain all the files that make up the general

shape file, i.e., “.shp”, “.shx”, “.dbf”, etc. along with a standard metadata file, i.e., “.shp.xml”. Any collected “z-values” shall be reported in a dedicated field, in the appropriate table, and in the format/datum consistent with the standard elevation methods in use by the DPW.

3.2.11.19.2 Attributes.
Attributes and data table formats for communication infrastructure/facilities are described and defined in the Communications Mission Data Set promulgated by the DOIM PRB. The following attributes are to be reported in the appropriate shape file for the geospatial features collected by the contractor:
- Manhole Number
- Secure Manhole Lid (Yes or No)
- Location of Manhole\
- Nearest Intersection
- Nearest Manhole
- Nearest Bldg
- Existing Copper Cables
- Existing Fiber Cables
- Comments (Manhole Condition)
- Date Collected
- Date of Last update
- Obstructions

Subcommodity_a (Table: xxxyyy) {for feature y}
Attribute_1 (Field: aaabbb)
Attribute_4 (Field: cccddd)
Subcommodity_e (Table: yyyzzz) {for feature z}
Attribute_7 (Field: zzzaaa)
9.3. Data Delivery.
The contractor shall provide the geospatial information in electronic format to each of the following:
DOIM PRB, Attn: Larry White
Ft Bragg, NC
DPW, Attn:
Ft Bragg NC

GLOSSARY, ACRONYMS, AND ABBREVIATIONS
AC alternating current
ADN Area Distribution Node
ADRP Army DISN Router Program
ADSL Asymmetric Digital Subscriber Line
AFH Army Family Housing
AIS Automated Information System
A-MCN Alternate Main Communications Node
ATM Asynchronous Transfer Mode
AWG American Wire Gauge
BISDN Broadband Integrated Services Digital Network
BTU British Thermal Unit
C3
I Command, Control, Communications, and Intelligence
CAN campus area networks
CAS Central Authentication Server
Cat 3 Category 3
Cat 5e Enhanced Category 5
Cat 6 Category 6
CATV cable television
CC center-to-center

CCTV closed circuit television
CEGB cable entrance ground bar
CMIP Common Management Information Protocol
CONUS Continental United States
COOP Continuity of Operations Plan
COT central office terminal
COTS commercial-off-the-shelf
CP Consolidation Point
CP center-to-point
CSU Channel Service Unit
CUITN Common User Installation Transport Network
DA Department of the Army
dB decibel
DC direct current
DCO Dial Central Office
DDN Defense Data Network
DISA Defense Information System Agency
DISN Defense Information Systems Network
DNS Domain Name Service
DoD Department of Defense
DoDD Department of Defense Directive
DoDI Department of Defense Instructions
DOIM Director of Information Management
DPW Department of Public Works
DSN Defense Switched Network
DSSMP Digital Switched Systems Modernization Program
DSU Digital Service Unit
EIA Electronics Industry Association
EMT electrical metallic tubing
ESM Enterprise Systems Management
EUB end user building
FDDI Fiber Distributed Data Interface
ft foot
FODP Fiber Optic Distribution Panel
GbE Gigabit Ethernet
GSP galvanized steel pipe
HQDA Headquarters, Department of the Army
HVAC heating, ventilation, and air-conditioning
I&A identification and authentication
I/O input/output
I3A Installation Information Infrastructure Architecture
I3AIP Installation Information Transfer System Improvement Program
ICEA Insulated Cable Engineers Association
IEEE Institute of Electrical and Electronics Engineers
IMA Information Mission Area

in inch
IS Information System
ISDN Integrated Services Digital Network
JIEO Joint Interoperability and Engineering Organization
JTA Joint Technical Architecture
JTA-A Joint Technical Architecture-Army
kb/s kilobits per second
LAN local area network
LANE LAN Emulation
MACOM Major Command

MAN metropolitan area network
Mb/s megabits per second
MCA Military Construction-Army
MCN Main Communications Node
MDF main distribution frame
MER Minimum Essential Requirements
MGB master ground bar
MIB Management Information Base
MLPP multi-level precedence and pre-emption
MPOA Multi-Protocol Over ATM
MS NT Microsoft New Technology
MUTOA Multi-User Telecommunication Outlet Assembly
NEC National Electrical Code
NIC network interface card
NIPRNET Non-classified Internet Protocol Router Network
N-ISDN Narrowband-Integrated Services Digital Network
nm nanometers
NSM Network and Systems Management
O&M operation and maintenance
OCONUS Outside Continental United States
OPSEC Operations Security
OSCAR II Outside Cable Rehabilitation-II
OSI Open System Interconnection
OSP outside plant
OSPF Open Shortest Path First
PBX private branch exchange
PC personal computer
PDS Premises Distribution System
PET protected entrance terminal
PICS Protocol Implementation Conformance Statement
PKI Public Key Infrastructure
POTS Plain Old Telephone Service
PP point-to-point
PVC polyvinyl chloride
REA Rural Electrification Administration
RF radio frequency
RMON Remote Monitoring
RSU Remote Switching Unit
RT remote terminal
RUS Rural Utilities Service
SBU Sensitive, But Unclassified
SDCO Small Dial Central Office
SF square feet
SLC subscriber loop carrier
SMOC Security Management Operations Center
SNMP Simple Network Management Protocol
SONET Synchronous Optical Network
TC Telecommunications Closet
TCP/IP Transmission Control Protocol/Internet Protocol
TIA Telecommunications Industry Association
TMN Telecommunications Management Network
TNSOC Theater Network and Systems Operations Center
TR Telecommunications Room
UL Underwriters Laboratory
USAISEC United States Army Information Systems Engineering Command

USASC United States Army Signal Command
UTP unshielded twisted pair
VLAN virtual LAN
WAN wide area network
WG Working Group
WWW World Wide Web

APPENDIX A:
Ft Bragg Fiber Optic Cable and Component Specifications

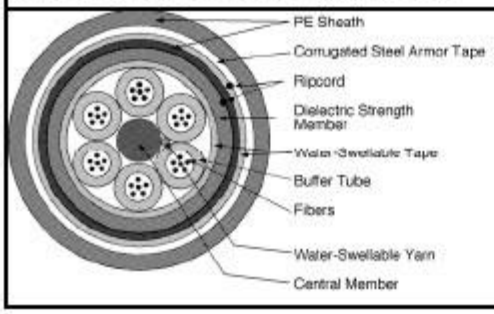
Cable with Low Water Peak Single-Mode Fiber

Primary Applications: Regional, metro, local access telephony, CATV networks, CWDM applications; operating wavelengths from the 1310 nm band to the 1550 nm band.

Single-mode fiber shall meet the following specifications. A germania-doped silica core surrounded by a concentric silica glass cladding shall comprise each optical fiber. The fiber shall be a matched clad design manufactured by the outside vapor deposition process (OVD). Each optical fiber refractive index profile shall be step index. Each fiber shall be proof tested by the fiber manufacturer at a minimum of 100 kpsi (0.7 GN/m²). The fiber shall be coated with a dual acrylate protective coating and the coating shall be in physical contact with the cladding surface. The single-mode fiber shall meet EIA/TIA-492CAAB, "Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak," and ITU-T G.652.D, "Characteristics of Single-Mode Optical Fiber Cable." Fiber shall have a mode field diameter of 9.20 ± 0.40 µm at 1310 nm and 10.40 ± 0.50 µm at 1550 nm. Fiber core-clad concentricity shall be </= 0.5 µm. Fiber cladding diameter shall be 125.0 ± 0.7 µm. Fiber cladding non-circularity shall be </= 0.7%. Fiber coating diameter shall be 245 ± 5 µm. The attenuation specification shall be a maximum value for each cabled fiber at 23 ± 5°C on the original shipping reel. The cabled fiber attenuation for Loose Tube and Ribbon cable constructions shall be < 0.35 dB/km at 1310 nm and < 0.25 dB/km at 1550 nm. For Tight Buffered constructions the cabled fiber attenuation shall be <0.65 dB/km at 1310 nm and <0.5 dB/km at 1550 nm. The attenuation at the water peak (1383 nm) shall not exceed the 1310 nm attenuation value. The cabled fiber shall be capable of operating in the 1360 nm to 1480 nm water peak region. The attenuation due to 100 turns of fiber around a 50 ± 2 mm diameter mandrel shall not exceed 0.05 dB at 1310 nm and 0.05 dB at 1550 nm. The attenuation due to 100 turns of fiber around a 60 ± 2 mm diameter mandrel shall not exceed 0.05 dB at 1625 nm. There shall be no point discontinuities greater than 0.05 dB at 1310 nm and 1550 nm. The maximum dispersion shall be </= 3.2 ps/(nm•km) from 1285 nm to 1330 nm and shall be </= 18 ps/(nm•km) at 1550 nm. The cabled fiber shall support Gigabit Ethernet (GbE) operation according to the 1000BASE-LX (1310 nm) specifications up to 5000 m in accordance with the GbE standard. The cabled fiber shall support laser-based 10 Gigabit Ethernet (10GbE) operation according to the 10GBASE-LX4 (1300 nm region), 10GBASE-L (1310 nm) and 10GBASE-E (1550 nm) specifications for distances of 10 km, 10 km and 40 km, respectively. The cabled optical fiber shall support industry-standard multi-gigabit Fiber Channel physical interface specifications.

Double-Jacket/Single-Armor Cable, 2-288 Fibers

Primary Applications: Rugged outside plant cable for direct burial, outdoor duct or aerial overlash installation.



Cable shall be armored, stranded loose-tube design with dry waterblocking for direct burial, outdoor duct and aerial installations in fiber counts from two to 288. Each fiber shall be distinguishable by means of color coding in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding." The fibers shall be colored with ultraviolet (UV) curable inks. Buffer tubes shall be made from polypropylene. Each buffer tube shall contain a water-swellable yarn for water-blocking protection. The water-swellable yarn shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter. This yarn will preclude the need for other waterblocking material; the buffer tubes shall be gel-free. The optical fibers shall not require cleaning before placement into a splice tray or fan-out kit. The buffer tubes shall be manufactured to a standard 3.0 mm in size, regardless of fiber count, to reduce the number of required installation and termination tools. Buffer tubes containing fibers shall be color coded with distinct and recognizable colors in accordance with TIA/EIA-598-B. Buffer tube colored stripes shall be inlaid in the tube by means of co extrusion when required. The nominal stripe width shall be 1 mm. Buffer tubes in in a hybrid cable (cable containing more than one type of fiber) shall contain only one fiber type. Identification of fiber types in a hybrid cable shall correspond to fiber core diameter (or mode field diameter) from smallest to largest in accordance with TIA/EIA-598-B. Buffer tubes shall be stranded around the dielectric central member using the reverse oscillation stranding process. Two polyester yarn binders shall be applied contra helically with sufficient tension to secure each buffer tube layer to the dielectric central member without crushing the buffer tubes. The binders shall be non hygroscopic, non wicking, and dielectric with low shrinkage. Water swellable yarn(s) shall be applied longitudinally along the central member during stranding. For dual layer cables, a second (outer) layer of buffer tubes shall be stranded over the original core to form a two layer core. A water swellable tape shall be applied longitudinally over both the inner and outer layer. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter. Armored cables shall have an inner jacket shall have an inner sheath of MDPE. The inner jacket shall be applied directly over the tensile strength members (as required) and water swellable tape. A water swellable tape shall be applied longitudinally around the outside of the inner jacket. The armor shall be a corrugated steel tape, plastic-coated on both sides for corrosion resistance, and shall be applied around the outside of the water blocking tape with an overlapping seam with the corrugations in register. The outer jacket shall be applied over the corrugated steel tape armor. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus. Cable jacket shall be marked with the manufacturer's name, month and year of manufacture, sequential meter or foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code® (NESC®), fiber count, and fiber type. **Next to the manufacture marking at two feet intervals, the outer jacket shall additionally be marked with the designation of "DOIM" to identify ownership for the Directorate of Information Management on Ft Bragg.** The actual length of the cable shall be within -0/+1% of the length markings. The print color shall be white, with the exception that cable jackets containing one or bmore coextruded white stripes, which shall be printed in light blue. The height of the marking shall be approximately 2.5 mm. Cable shall have a storage temperature range of -40° to 70°C, an installation temperature range of -30° to 70°C, and an operating temperature range of -40° to 70°C. Cable shall have a short-term tensile rating of 2700 N. No fiber strain shall occur over the service life of the cable when subjected to a maximum, long-term tensile rating of 890 N. Cable shall be listed with Rural Utilities Service (RUS) 7 CFR 1755.900 and be fully compliant with ICEA S 87 640. Manufacturer shall be ISO 9001 and TL 9000 registered. Cable manufacturer shall have a minimum of 20 years in manufacturing optical fiber cable in order to demonstrate reliable field performance. Cable and fiber manufacturer shall be the same company to ensure long-term reliability of the cabled fiber and to ensure the availability of fully integrated technical support. Cable shall be Corning Cable Systems® part number xxxEW5-T4100D20 (SMF-28e)

Ft Bragg Long Haul Fiber Specifications > 25 Miles: Refer to I3A Section 3.15.4.2 (c) March 2006

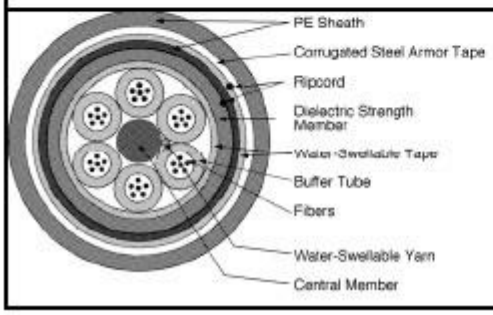
Cable with Non-zero Dispersion-shifted Single-mode Fiber

Primary Applications: Long-haul Telecommunications Applications

Single-mode fiber shall meet the following specifications. A germania-doped silica core surrounded by a concentric silica glass cladding shall comprise each optical fiber. The fiber shall be a matched clad design manufactured by the outside vapor deposition process (OVD). Each fiber shall be proof tested by the fiber manufacturer at a minimum of 100 kpsi (0.7 GN/m²). The fiber shall be coated with a dual acrylate protective coating and the coating shall be in physical contact with the cladding surface. The non-zero dispersion-shifted single-mode fiber utilized in the optical fiber cable shall meet ITU recommendation G.655, "Characteristics of a Non-Zero Dispersion Shifted Single-Mode Optical Fiber Cable," (Ref Table 1/G.655-G.655A). Fiber shall have a mode field diameter of 9.62 ± 0.4 µm at 1550 nm. Fiber core-clad concentricity shall be </= 0.5 µm. Fiber cladding diameter shall be 125.0 ± 0.7 µm. Fiber cladding non-circularity shall be </= 0.7%. Fiber coating diameter shall be 245 ± 5 µm. The attenuation specification shall be a maximum value for each cabled fiber at 23 ± 5°C on the original shipping reel. The cabled fiber attenuation for Loose Tube cable constructions shall be < 0.25 dB/km at 1550 nm. The attenuation due to 100 turns of fiber around a 60 ± 2 mm diameter mandrel shall not exceed 0.05 dB at 1550 nm and 0.05 dB at 1625 nm. There shall be no point discontinuities greater than 0.05 dB at 1550 nm. The dispersion shall be 2 - 6 ps/(nm•km) from 1530 nm to 1565 nm and shall be 4.5 to 11.2 ps/(nm•km) at 1565 nm to 1625 nm.

Double-Jacket/Single-Armor Cable, 2-288 Fibers

Primary Applications: Rugged outside plant cable for direct burial, outdoor duct or aerial overlash installation.



Cable shall be armored, stranded loose-tube design with dry waterblocking for direct burial, outdoor duct and aerial installations in fiber counts from two to 288. Each fiber shall be distinguishable by means of color coding in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding." The fibers shall be colored with ultraviolet (UV) curable inks. Buffer tubes shall be made from polypropylene. Each buffer tube shall contain a water-swellable yarn for water-blocking protection. The water-swellable yarn shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter. This yarn will preclude the need for other waterblocking material; the buffer tubes shall be gel-free. The optical fibers shall not require cleaning before placement into a splice tray or fan-out kit. The buffer tubes shall be manufactured to a standard 3.0 mm in size, regardless of fiber count, to reduce the number of required installation and termination tools. Buffer tubes containing fibers shall be color coded with distinct and recognizable colors in accordance with TIA/EIA-598-B. Buffer tube colored stripes shall be inlaid in the tube by means of co extrusion when required. The nominal stripe width shall be 1 mm. Buffer tubes in in a hybrid cable (cable containing more than one type of fiber) shall contain only one fiber type. Identification of fiber types in a hybrid cable shall correspond to fiber core diameter (or mode field diameter) from smallest to largest in accordance with TIA/EIA-598-B. Buffer tubes shall be stranded around the dielectric central member using the reverse oscillation stranding process. Two polyester yarn binders shall be applied contra helically with sufficient tension to secure each buffer tube layer to the dielectric central member without crushing the buffer tubes. The binders shall be non hygroscopic, non wicking, and dielectric with low shrinkage. Water swellable yarn(s) shall be applied longitudinally along the central member during stranding. For dual layer cables, a second (outer) layer of buffer tubes shall be stranded over the original core to form a two layer core. A water swellable tape shall be applied longitudinally over both the inner and outer layer. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter. Armored cables shall have an inner jacket shall have an inner sheath of MDPE. The inner jacket shall be applied directly over the tensile strength members (as required) and water swellable tape. A water swellable tape shall be applied longitudinally around the outside of the inner jacket. The armor shall be a corrugated steel tape, plastic-coated on both sides for corrosion resistance, and shall be applied around the outside of the water blocking tape with an overlapping seam with the corrugations in register. The outer jacket shall be applied over the corrugated steel tape armor. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus. Cable jacket shall be marked with the manufacturer's name, month and year of manufacture, sequential meter or foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code® (NESC®), fiber count, and fiber type. **Next to the manufacture marking at two feet intervals, the outer jacket shall additionally be marked with the designation of "DOIM" to identify ownership for the Directorate of Information Management on Ft Bragg.** The actual length of the cable shall be within -0/+1% of the length markings. The print color shall be white, with the exception that cable jackets containing one or bmore coextruded white stripes, which shall be printed in light blue. The height of the marking shall be approximately 2.5 mm. Cable shall have a storage temperature range of -40° to 70°C, an installation temperature range of -30° to 70°C, and an operating temperature range of -40° to 70°C. Cable shall have a short-term tensile rating of 2700 N. No fiber strain shall occur over the service life of the cable when subjected to a maximum, long-term tensile rating of 890 N. Cable shall be listed with Rural Utilities Service (RUS) 7 CFR 1755.900 and be fully compliant with ICEA S 87 640. Manufacturer shall be ISO 9001 and TL 9000 registered. Cable manufacturer shall have a minimum of 20 years in manufacturing optical fiber cable in order to demonstrate reliable field performance. Cable and fiber manufacturer shall be the same company to ensure long-term reliability of the cabled fiber and to ensure the availability of fully integrated technical support. Cable shall be Corning Cable Systems part number **xxxFW5-T4101D20 (LEAF)**.

Ft Bragg Intra-building Fiber Cable Specifications:

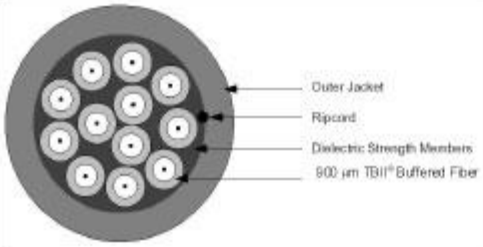
MIC® Riser Cable, 2-24 Fibers

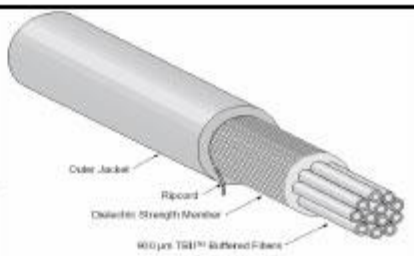
Primary Applications: Intrabuilding backbone and horizontal installations in riser and general purpose spaces.

Cable shall be riser-rated, all-dielectric, with two to twenty-four 900 ± 50 µm tight-buffered fibers. TB2® tight-buffered fiber shall be made of a PVC material and shall have a UV-cured acrylate coating (low friction slip layer) between the acrylate coating of the optical fiber and the PVC buffer. The fiber coating, low friction slip layer and PVC buffer shall be removable with commercially available stripping tools in a single pass for termination or splicing. The individual fibers shall be color-coded for identification. The optical fiber color coding shall be in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding." Fibers shall be stranded together around dielectric strength members or a glass reinforced plastic (GRP) via reverse oscillation and surrounded with dielectric strength members and a ripcord. Cables containing 12 to 24 fibers shall have a dual-layer stranded design. The cable jacket color shall be orange for cables containing all multimode fiber, except for cables containing 50/125 µm, 850-nm Laser Optimized Fiber, which shall have an aqua colored outer jacket. The cable jacket color shall be yellow for cables containing all single-mode fiber. Hybrid cables (containing more than one type of fiber) shall have an outer jacket with the color corresponding to the greatest percentage of total fibers within the cable, except for hybrid cables containing 50/125 µm, 850-nm Laser Optimized Fiber, which shall have an aqua colored outer jacket. Unique color identification of all fibers within the hybrid cable shall correspond to fiber core diameter (or mode field diameter) from smallest to largest in accordance with TIA/EIA-598-B. Cable shall be listed OFNR/FT-4 and be fully compliant with ICEA S-83-596. The outer jacket for all-dielectric cable shall be marked with the manufacturer's name or ETL file number, date of manufacture, fiber count, fiber type, flame rating, listing symbol, and sequential length markings every two feet (e.g., "CORNING OPTICAL CABLE - 01/00 - 12 SM – TB2 - OFNR (ETL) OFN FT4 (CSA) 0001 FEET"). **Next to the manufacture marking at two feet intervals, the outer jacket shall additionally be marked with the designation of "DOIM" to identify ownership for the Directorate of Information Management on Ft Bragg.** The marking shall be in contrasting color to the cable jacket. Cable shall have a storage temperature range of -40° to +70°C, installation temperature range of -10° to +60°C, and an operating temperature range of -20° to +70°C. Cable manufacturer shall be ISO 9001 registered. Cable manufacturer shall have a minimum of 20 years in manufacturing optical fiber cable in order to demonstrate reliable field performance. Cable and fiber manufacturer shall be the same company to ensure long-term reliability of the cabled fiber and to ensure the availability of fully integrated technical support. Cable shall be Corning Cable Systems part number **xxxE81-31131-24 (2-10 fibers, SMF-28e) or xxxE81-33131-24 (12-24 fibers, SMF-28e).**

MIC® Plenum Cable, 2-24 Fibers

Primary Applications: Installed in building plenum spaces such as ceilings and raised floors to support backbone, horizontal and data center stuctured cable plant connectivity.





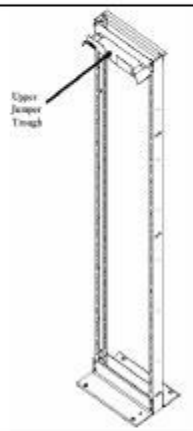
Cable shall be plenum-rated, all-dielectric, with two to twenty-four 900 ± 50 µm tight-buffered fibers. TB2® tight-buffered fiber shall be made of a PVC material and shall have a UV-cured acrylate coating (low friction slip layer) between the acrylate coating of the optical fiber and the PVC buffer. The fiber coating, low friction slip layer and PVC buffer shall be removable with commercially available stripping tools in a single pass for termination or splicing. The individual fibers shall be color-coded for identification. The optical fiber color coding shall be in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding." Fibers shall be stranded together around jacketed or non-jacketed dielectric strength members via reverse oscillation and surrounded with dielectric strength members and a ripcord. Cables containing 12 to 24 fibers shall have a dual-layer stranded design. The cable jacket color shall be orange for cables containing all multimode fiber, except for cables containing 50/125 µm, 850-nm Laser Optimized Fiber, which shall have an aqua colored outer jacket. The cable jacket color shall be yellow for cables containing all single-mode fiber. Hybrid cables (containing more than one type of fiber) shall have an outer jacket with the color corresponding to the greatest percentage of total fibers within the cable, except for hybrid cables containing 50/125 µm, 850-nm Laser Optimized Fiber, which shall have an aqua colored outer jacket. Unique color identification of all fibers within the hybrid cable shall correspond to fiber core diameter (or mode field diameter) from smallest to largest in accordance with TIA/EIA-598-B. Cable shall be listed OFNP/FT-6 and be fully compliant with ICEA S-83-596. The outer jacket shall be marked with the manufacturer's name or ETL file number, date of manufacture, fiber count, fiber type, flame rating, listing symbol, and sequential length markings every two feet (e.g., "CORNING OPTICAL CABLE - 01/00 - 12 SM - TB2 - OFNP (ETL) OFN FT6 (CSA) 0001 FEET"). **Next to the manufacture marking at two feet intervals, the outer jacket shall additionally be marked with the designation of "DOIM" to identify ownership for the Directorate of Information Management on Ft Bragg.** The marking shall be in contrasting color to the cable jacket. Cable shall have a storage temperature range of -40° to 70°C on the original shipping reel, installation temperature range of 0° to 60°C, and an operating temperature range of 0° to 70°C. Cable manufacturer shall be ISO 9001 registered. Cable manufacturer shall have a minimum of 20 years in manufacturing optical fiber cable in order to demonstrate reliable field performance. Cable and fiber manufacturer shall be the same company to ensure long-term reliability of the cabled fiber and to ensure the availability of fully integrated technical support. Cable shall be Corning Cable Systems part number **xxxE88-31131-29 (2-10 fibers, SMF-28e) or xxxE88-33131-29 (12 - 24 fibers, SMF-28e).**

Rack & Cable Management Specifications:

- **Closet Distribution Frame**
- **Inter-bay Storage**
- **Rack Horizontal Jumper Management**

Closet Distribution Frame (CDF)

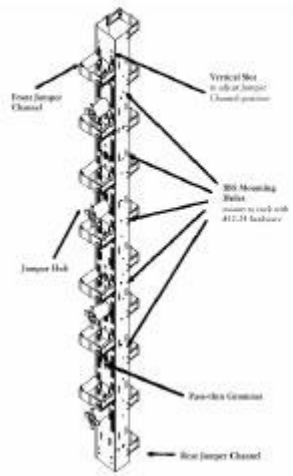
Primary Applications: Cable management.



The equipment rack shall conform to Electronics Industry Association (EIA) EIA-310 standards. The rack shall be 213 cm tall with a 465-mm standard panel mounting flange width and shall contain 44 usable rack spaces. One EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm in height with mounting holes on each upright of the rack. Equipment mounting holes shall be tapped either with 10-32 UNF-2B, 12-24 UNC-2B or M5x.8-6H threads. The equipment rack shall be manufactured from aluminum for lighter weight and ease of assembly during installation. The rack shall be black in color. Installation fasteners shall be included and shall be black in color. The rack shall be supplied unassembled, with all components packed in a single carton. The rack shall come equipped with a top jumper trough with radius guides for distributing jumpers between equipment bays. Additional jumper troughs shall be available in 1U and 2U versions for transitioning jumpers between racks. Manufacturer shall be ISO 9001 and TL 9000 registered. Rack shall be Corning Cable Systems part Number **CDF-ER-7A-19**.

Inter-Bay Storage (IBU)

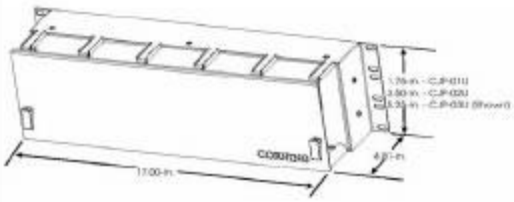
Primary Applications: Cable management.

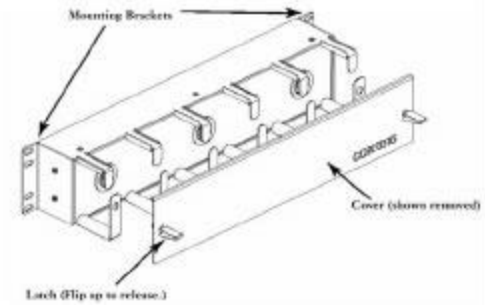


The inter-bay jumper routing and slack storage unit shall have vertically adjustable cable retaining channels. These adjustable routing channels shall be removable and shall contain a swing-out door for ease in jumper installation. The sides of the channels shall have rounded edges to provide fiber minimum bend radius control. Additional channels shall be available. The unit shall accommodate several optional re-locatable cylindrical hubs to assist in management of excess patch cord length. The rear side of the vertical routing area shall provide cable retaining channels that secure data and power cables next to the rack. Pass-through grommets shall be provided for routing cables from the front to the back of the inter-bay management unit. The inter-bay storage unit shall be designed to integrate with EIA standard 213-cm-tall equipment racks. The inter-bay unit shall have a footprint of 15.2 cm wide by 213 cm tall and shall have an optional removable front cover that is flush with the front doors of the connector housings when installed. The panel shall be finished with a wrinkled black powder coat for durability. All fasteners shall be black to match the housings. Manufacturer shall be ISO 9001 and TL 9000 registered. Inter-Bay Storage (IBU) shall be Corning Cable Systems part number **CDF-IBU-7-6**. Covers shall be available under part number **CDF-IBU-CVR-6** and the optional hubs are available under part number **CDF-HUB-05**.

Rack Jumper Management Panel (CJP)

Primary Applications: Cable management.





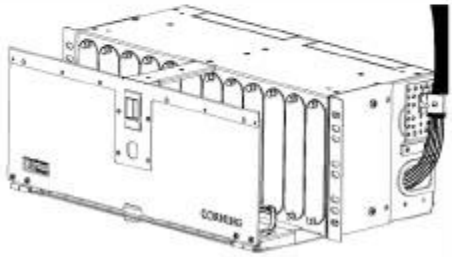
In-rack jumper management panels shall be available in 1U, 2U and 3U sizes and shall have removable front covers to conceal and protect the jumpers when installation is complete. The front of the jumper management panel cover shall be flush with the front door of the termination housing. In-rack jumper management panels shall be designed to maintain a 38-mm minimum bend radius and shall be finished with a wrinkled black powder coat for durability. Installation fasteners shall be included and shall be black in color. The unit shall be mounted with a 12-cm frontal projection, with the option to flush mount. Units shall be manufactured using 16-gauge aluminum or equivalent for structural integrity and shall be finished with a wrinkled black powder coat for durability. Installation fasteners shall be included and shall be black in color. The unit shall meet the design requirements of ANSI/TIA/EIA-568 and the plastics flammability requirements of UL 94 V-0. Manufacturer shall be ISO 9001 and TL 9000 registered. Jumper Management Panel shall be Corning Cable Systems part number **CJP- 01U, CJP-02U or CJP-03U**.

Rack Mount Hardware Specifications:

- **Closet Connector Housing**
- **Adapter Panels**

Closet Connector Housing (CCH)

Primary Applications: Provide interconnect or cross-connect capabilities between outside plant, riser or distribution cables, and the opto-electronics.



CCH-04U

The Rack Mountable Connector Housings shall be mountable in an EIA-310 compatible 465 or 592 mm rack. Housings shall be available in several sizes, including 1U, 2U, 3U and 4U. One EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm in height. The unit shall meet the design requirements of ANSI/TIA/EIA-568 and the polymer compounds flammability requirements of UL 94 V-0. Manufacturer shall be ISO 9001 and TL 9000 registered. The unit shall be available in different sizes to accommodate different port count requirements. Housings shall be manufactured using 16-gauge aluminum or equivalent for structural integrity and shall be finished with a wrinkled black powder coat for durability. Installation fasteners shall be included and shall be black in color. Available sizes, with their corresponding fiber capacities, are given in the table below. Housing shall be Corning Cable Systems Part number **CCH-01U** or **CCH-02U** or **CCH-03U** or **CCH-04U**, according to the required fiber capacity.

CCH Housing Fiber Capacity

Part Number	Unit Size	Panel Capacity	Fiber Capacity w/ 6f Panels	Fiber Capacity w/ 12f Panels	Fiber Capacity w/ 24f Panels
CCH-01U	1U	2	12	24	48
CCH-02U	2U	4	24	48	96
CCH-03U	3U	6	36	72	144
CCH-04U	4U	12	72	144	288

Closet Splice Housings (CSH)

Primary Applications: Provides storage and protection of fiber splices in individually accessible trays.

CSH-05U

CSH-03U

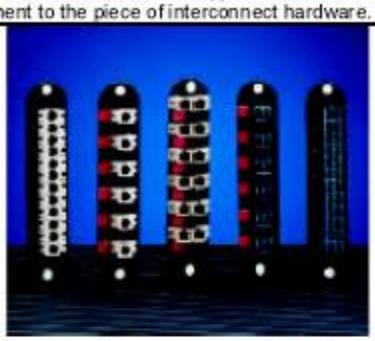
Housings shall be mountable in an EIA-310 compatible 465 or 592mm rack. Housings shall be available in two rack mount sizes of 3U and 5U. One EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm in height. The Splice Housings shall provide individual tray access with minimal disturbance to neighboring trays and fibers. The unit shall meet the design requirements of ANSI/TIA/EIA-568 and the polymer compounds flammability requirements of UL 94 V-0. Manufacturer shall be ISO 9001 and TL 9000 registered. Housings shall be manufactured using 16-gauge aluminum or equivalent for structural integrity and shall be finished with a wrinkled black powder coat for durability. The front and rear doors shall be lockable when used with an optional key lock kit. Brackets shall be available that allow wall mounting of the rack-mounted hardware. Installation fasteners shall be included and shall be black in color. The unit shall be available in different sizes to accommodate different splice-count requirements. Available housing and their splice capacities are given in the table below. Splice housing shall be Corning Cable Systems Part number **CSH-03U** or **CSH-05U**, according to the required splice capacity.

CSH Splice Capacity

Part Number	Unit Size	Tray Height	Tray Capacity	Splice Capacity
CSH-03U	3U	0.2"	12	144
CSH-03U-F	3U	0.4"	7	84
CSH-05U	5U	0.2"	22	264
CSH-05U-F	5U	0.4"	14	168

LANscape® Solutions Adapter Panels

Primary Applications: The panels are used with field-installable connectors or in applications where the preconnectorized cables are routed directly from the equipment to the piece of interconnect hardware.



The Closet Connector Housing Panels shall be offered in 6-, 8-, 12-, 16- and 24-fiber versions for use with the LANscape® Solutions hardware products. The panels shall be able to be used with field-installable connectors or in applications where the preconnectorized cables are routed directly from the equipment to the interconnect hardware. The 6-fiber panels shall be offered in ST® compatible, FC, SC simplex. The 8- and 12-fiber versions shall include ST Compatible Connector, FC, LC duplex, SC duplex and simplex and the MT-RJ multifiber connectors. For high-density applications, the MT-RJ and LC duplex panels shall be available in 16- and 24-fiber versions. When MT-RJ adapters are used, the adapter must be a style that has a polarity adjustment knock-out keyway tab that shall be oriented on the inside of the panel so that it is not accessible to the user once the system is installed. Rack- and Wall-Mountable Connector Housings shall accept an interchangeable connector panel.

The panel shall be attached with two push-pull latches to allow quick installation and removal. Blank connector panels shall be available to fill unused space within the housings. The blank connector panel shall be attached with at least two push-pull latches to allow quick installation and removal. The blank panels shall be manufactured from injection-molded polycarbonate. Panels shall be manufactured from 16-gauge cold rolled steel or injection-molded polycarbonate for structural integrity.

Adapter panel shall be Corning Cable Systems part number CCH-CPXX-YY (where the XX is the fiber count and the YY is the adapter code). SC Duplex SM, YY = 59

No-epoxy/No-polish Connectors

- **SC UniCam Connector, Single-mode**
- **LC UniCam Connector, Single-mode**

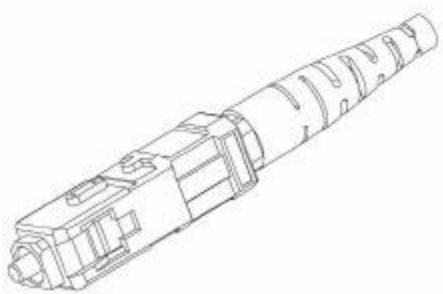
Termination Accessories

- **Buffer Tube Fan-out Kit**

SC UniCam® Standard Single-mode Connector

Primary Applications: Rapid termination of interbuilding and intrabuilding indoor and outdoor optical fiber cables that contain single-mode optical fiber.

1

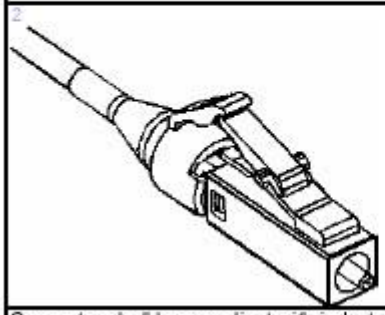


Connector shall be compliant with industry standard ANSI/TIA/EIA-568-B.3. The connector shall comply with TIA/EIA Fiber Optic Connector Intermateability Standard (FOCIS) document, TIA/EIA-604-3. The connector installation shall not require the use of epoxies, adhesives or ovens. The connector shall be installable upon 900 µm buffered fiber in one minute or less and upon 2.9 mm jacketed cable in three minutes or less total time. The connector shall be installable upon single-mode optical fiber. The connector shall contain a mechanical splice and require one tool kit to assemble. The installation tools used to terminate the connector shall be able to terminate other small-form-factor and single-fiber UniCam Connector designs. The connector shall not require end face polishing in the field. Connector shall have a factory polished single-mode optical fiber stub in the connector ferrule that is bonded in the ferrule micro hole. Ferrule material shall be ceramic. The connector crimp on mechanism shall protect the bare fiber from the ingress of air or waterborne contaminants. Connector shall be consistently capable of insertion losses of 0.2 dB (typical) and shall be 0.5 dB (maximum) when installed in accordance with the manufacturer's recommended procedure and tested in accordance with FOTP-171. Connector reflectance shall be measured at the factory to be less than or equal to -40 dB for super physical contact (SPC) and less than or equal to -55 dB for ultra physical contact (UPC). Strain-relief boot color shall be white for SPC and blue for UPC. Manufacturer shall be ISO 9001 and TL 9000 registered. The manufacturer shall have an in-depth knowledge, and more than 10-year history, of manufacturing and supporting connector technology that does not require epoxy or polishing in the field. No-Epoxy, No-Polish Quick-Mount Single-Mode SC UPC Connector shall be Corning Cable Systems part number **95-200-41 (SPC) or 95-200-42 (UPC).**

LC UniCam® Standard Single-Mode Connector

Primary Applications: Rapid termination of interbuilding and intrabuilding indoor and outdoor optical fiber cables that contain single-mode optical fiber.

2



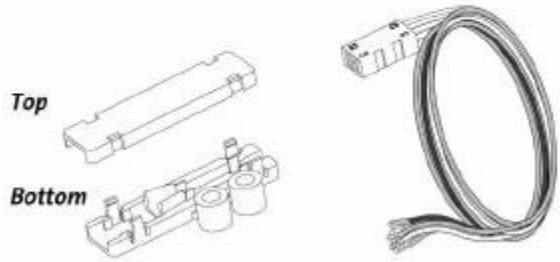
Connector shall be compliant with industry standard ANSI/TIA/EIA-568-B.3. The connector shall comply with TIA/EIA Fiber Optic Connector Intermateability Standard (FOCIS) document, TIA/EIA-604-10. The connector installation shall not require the use of epoxies, adhesives or ovens. The connector shall be installable upon 900 µm buffered fiber in one minute or less. The connector shall be installable upon single mode optical fiber. The connector shall contain a mechanical splice and require one tool kit to assemble. The installation tools used to terminate the connector shall be able to terminate other small-form-factor and single-fiber UniCam Connector designs.

The connector shall not require end face polishing in the field. Connector shall have a factory polished single-mode optical fiber stub in the connector ferrule that is bonded in the ferrule micro hole. Ferrule material shall be ceramic. Connector ferrule shall not move when coupled to another connector. The connector crimp on mechanism shall protect the bare fiber from the ingress of air or waterborne contaminants.

Connector shall be consistently capable of insertion losses of 0.2 dB (typical) and shall be 0.5 dB (maximum) when installed in accordance with the manufacturer's recommended procedure and tested in accordance with FOTP-171. Connector reflectance shall be measured at the factory to be less than or equal to -55 dB for ultra physical contact (UPC). Strain-relief boot color shall be blue for UPC. Manufacturer shall be ISO 9001 and TL 9000 registered. The manufacturer shall have an in-depth knowledge, and more than 10-year history, of manufacturing and supporting connector technology that does not require epoxy or polishing in the field. No-Epoxy, No-Polish Quick-Mount Single-Mode LC Connector shall be Corning Cable Systems part number **95-200-99**.

Indoor Buffer Tube Fan-Out Kit

Primary Applications: Furcation of outdoor and indoor/outdoor optical fiber standed loose tube cables to terminate individual fibers with field-installable connectors.



Furcation Unit

Fan-Out Assembly

Buffer Tube Fan-Out Kit shall be available in 6-fiber and 12-fiber units. Buffer Tube Fan-Out Kit shall not require more fiber optic hardware space than is required to terminate the same quantity of tight-buffered fibers. Buffer Tube Fan-Out Kit furcation unit shall accommodate mounting to fiber optic hardware. Buffer Tube Fan-Out Kit fan-out tubing shall be color-coded per TIA/EIA-598-B for easy fiber identification. Buffer Tube Fan-Out Kit shall be directly installable upon buffer tubes with 2.4-mm and 3.0-mm outside diameters without damaging the buffer tube. Buffer Tube Fan-Out Kit shall not cause additional insertion loss when installed per manufacturer's recommended installation procedure and used over the operating temperature range of 0° to 70°C. Installation of the Buffer Tube Fan-Out Kit to a buffer tube shall be performed without the use of epoxy or an adhesive. Installation procedures shall be included with every Buffer Tube Fan-Out Kit, and an assembly kit shall be available to facilitate the installation of the Buffer Tube Fan-Out Kit.

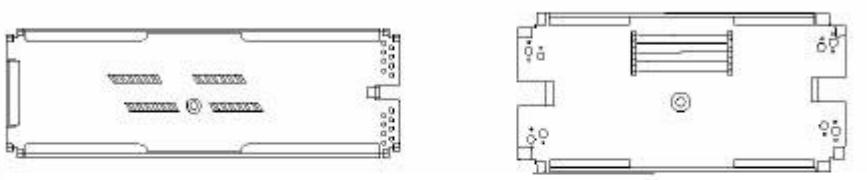
Corning Cable Systems Buffer Tube Fan-Out Kit part numbers are the following:
FAN-BT25-06 Buffer-Tube Fan-Out Kit with (6) 25in color-coded tubes
FAN-BT47-06 Buffer-Tube Fan-Out Kit with (6) 47in color-coded tubes
FAN-BT25-12 Buffer-Tube Fan-Out Kit with (12) 25in color-coded tubes
FAN-BT47-12 Buffer-Tube Fan-Out Kit with (12) 47in color-coded tubes

Splicing Hardware

- **Preformed Splice Cases**
- **Splice Trays**

Splice Trays

Primary Applications: Field splice points, transition splice points and cable termination with pigtails.



Splice Tray shall securely organize and provide physical protection without stress on the fibers for both single-mode and multimode individual and ribbonized fiber splices. Splice Trays shall not induce attenuation of signal at operational wavelengths up to 1550 nm. The metal tray shall consist of a rugged aluminum base and aluminum cover with crimpable metal tabs that provide buffer tube strain-relief on both ends of the tray. A clear polymer compound tray cover shall be available and allow visibility of the fibers for inspection without opening the tray. Additional strain-relief points shall tie-wrap buffer tubes or pigtails to the metal tray. Metal trays shall feature black powder coating for ease of fiber identification and protection. Splice trays shall contain organizers for various splicing methods to include fusion splice, fusion splice with heat-shrink sleeve or mechanical sleeve, and mechanical splice part. Trays shall hold up to 24 single-fiber splices and up to six mass fusion splices. The fusion splice organizer shall be of high-precision molded construction that holds and protects the actual splice thus eliminating the need for extra splice protection parts. Each mechanical splice organizer shall provide a positive holding action for maximum splice protection during installation and operation. Splice Trays shall be fully compatible with Corning Cable Systems LANscape® Solutions Hardware Connector/Splice Housings and splice enclosures to include various lengths and depths for a variety of splicing methods. Splice tray part number shall be selected based on the hardware type used. Splice trays shall be Corning Cable Systems Splice Tray part numbers **SCF-ST-099, SCF-ST-112, M67-048,** or **M67-076**

3.2.12 Traffic

- North Carolina Department of Transportation (NCDOT) Highway Guidelines Consultants.
- North Carolina Department of Transportation (NCDOT) Roadway Design Manual Section 1 and 2.
- North Carolina Department of Transportation (NCDOT) Roadway Standard Drawings
- The ITE and ASTM standards.
- North Carolina Department of Transportation (NCDOT) Signals and Geometric design Manual.
- FHWA – Railroad- Highway Grade Crossing Handbook.
- All North Carolina Department of Transportation (NCDOT) signal plans must be designed by a Professional Engineer (PE) licensed in the State of North Carolina to perform traffic signal design work.
- A traffic control plan is required on North Carolina Department of Transportation (NCDOT) right of way (R/W) on projects of this size in compliance with the Manual of Uniform Traffic Control Devices (MUTCD)
  and Federal Highway Administration (FHWA) policies. Using compliant standards in the traffic control section of the project should be part of the roadway design on any project road affecting traffic.
- All construction and traffic control devices affecting (NCDOT) R/W, shall be pre-approved by the NCDOT Division Engineer located at the Fayetteville, North Carolina division office.

3.2.13 Water Distribution System (Old North Utility Service)

SUMMARY

Old North Utility Services, Inc. (ONUS) shall be the provider of exterior water distribution utility service for

Fort Bragg. Old North Utility Services' goal for Fort Bragg shall be to design a safe and reliable system while minimizing cost. No connection to the water distribution system will be made without a permit from ONUS.

All exterior water distribution system components and appurtenances shall be installed in accordance with the manufacturer's instructions, AWWA, North Carolina standards, and ONUS's standards and specifications.

Contact ONUS for a copy of the latest approved installation standards.

3.2.14 Sanitary Sewer System (Old North Utility Service)
SUMMARY
Old North Utility Services, Inc. (ONUS) shall be the provider of exterior sanitary sewer utility service for Fort Bragg. Old North Utility Services' goal for Fort Bragg shall be to design a safe and reliable system while minimizing cost. No connection to the sanitary sewer system will be made without a permit from ONUS.

All exterior sanitary sewer system components and appurtenances shall be installed in accordance with the manufacturer's instructions, North Carolina standards, and ONUS's standards and specifications.

Contact ONUS can be contacted at (910) 495-1311 for a copy of the latest approved installation standards. dated February 27, 2009.

3.2.15 Remaining Underground Utilities

1. Contractor will show core on cutting taps for gas. Or have inspector on site to insure tap is made full.
2. Tracer wire and tape on all plastic utilities line, Tape 12" to 18" above line and tracer wire will be under piping.
3. Fence out all gas, were it can be done. Need emergency phone numbers for 24 Hour access in order to enter work site at construction fences and gates.
4. Traffic Controller should be a 2070 type for intersections.
5. Fiber optic will be installed with metal shield or tracing wire.
6. Testing of all underground utilities will be done by a qualified and licensed tester. DPW test and verification forms can be obtained by calling the individual in item 16 below.
7. Point of Contact is Robert Mullen, Office Phone Number 910-396-4634 ext.476 (if needed).

3.2.16 Energy Considerations (Download Energy Program)

- The intent of this program is to increase Energy Security on Fort Bragg while being committed to purchasing and consuming energy in the most efficient, cost effective, and environmentally responsible manner possible. It is the intent of this program to require immediate and sustained action, otherwise Fort Bragg will continue on an irrevocable path of ever increasing demands on limited energy resources and diversion of funds that could be used for other critical mission requirements. Improving energy efficiency should translate into millions of dollars of avoided costs for Fort Bragg and help move our nation towards energy independence.

- This program will address all building criteria that can affect the use or misuse of energy. Each appendix is intended to be used as a specification or guide to help you understand the Laws, processes and technologies that have been tested, implemented and approved here at Fort Bragg.

3.3 Fort Bragg Guide Specifications

Under construction at this time

3.3.1 Notes to Designers

Under construction at this time. See 3.3.2 for detailed specifications.

3.3.2 Detailed Specifications

01005 General and Special Provisions

01330 Notes

01330 Submittal Procedures

01451 Contractor Quality Control

02111 Excavation and Handling of Contaminated Material

02115A Underground Storage Tank Removal

2120 Transportation And Disposal Of Hazardous Materials

02220 Demolition

02226 Removal and Salvage of Historic Building Materials

02231Clearing and Grubbing

02522 Ground Water Monitoring Wells

02525N Extraction Wells

02547 Bituminous Pavement With Base Course

02921 Erosion Control And Turf Seeding

02936 Turf-Bermuda Grass Seeding

08702 Builders Hardware

096813 Carpet Tile

13210 Above Ground Fuel Oil Storage Tanks

13280A Asbestos Hazard Control Activities

16721 Fire Detection And Alarm System

3.4 MILCON Transformation RFP Fort Bragg Specific Requirements

The MILCON Transformation RFP (TRFP) is a standardized template for all MILCON Requests for Proposal (RFPs). Initially,the RFP will be used for barracks, apartments and dormitories; battalion and brigade headquarters; company operations facilities; offices; dining facilities and eating establishments; and vehicle maintenance facilities. Eventually the process will expand to essentially all building types. The Transformation RFP has the potential to greatly reduce construction costs and timelines by using performance-based requirements to maximize industry flexibility in meeting Army requirements, and providing a consistent contracting mechanism throughout the Army.

Each Installation is allowed to have one chapter, Chapter 6, that addresses Installation specific and project specific requirements. The intent of Fort Bragg's Chapter 6"is to help potential contractors build

high performance buildings consistent with Fort Bragg's vision, by incorporating the institutional knowledge of the installation staff about what works and what does not at the lowest possible cost, e.g. Table T, MILCON TRFP Architectural Colors and Materials. Fort Bragg's Chapter 6 also includes information on which LEED points are achievable at low/no additional first cost. This will enable bidders to meet the LEED-NC Silver requirement of the Transformation RFP without additional design effort or research, and therefore help control design and operational costs. In addition, the Bragg document includes procedures that must be followed on Fort Bragg to ensure lawful operation. This will also save time and money during construction by avoiding shut downs due to regulatory compliance issues. Of the 109 provisions in Fort Bragg's Chapter 6, 103 of them are based on Federal and State statutes, regulations, or Memoranda of Understanding.

Fort Bragg's Chapter 6 is presented below in the same format as found in the TRFP. These requirements apply only to MILCON TRFP projects. All other sections of this IDG are preferences for MILCON TRFP projects unless otherwise stated.

FORT BRAGG SPECIFIC REQUIREMENTS

3.4.1 General

The requirements in this paragraph augment the requirements indicated in Paragraphs in 3 through 5.

3.4.1.1 Precedence

If terms of this RFP are deemed to conflict, Federal, State, and local statutes, regulations, and agreements as well as UFC series of criteria shall supersede industry standards and criteria.

3.4.2 APPROVED DEVIATIONS

The following are approved deviations from the requirements stated in Paragraphs 3 through 5 that only apply to this project.

3.4.3 FUNCTIONAL PREFERENCES

3.4.4 SITE PLANNING AND DESIGN

3.4.4.1 Site Structures and Amenities:

3.4.4.1.1 Dumpster Screening - The dumpster enclosure design should utilize the same building materials and characteristics as the adjacent buildings. Dumpster locations shall conform to Department of Defense Force Protection Construction Standards.

3.4.4.1.2 Vending Area - Exterior covered vending areas to accommodate [ ] GFGI vending machines appropriately distributed throughout the complex.

3.4.4.2 Site Functional Requirements

3.4.4.2.1 Site Planning Objectives - Contractor shall site plan and design construction projects that minimize adverse effects to natural habitats.

3.4.4.2.2 Work Area Limits - Prior to commencing construction activities, the Contractor shall mark the areas that need not be disturbed under this contract, including but not limited to important ecological features and wetlands. Isolated areas within the general work area which are not to be disturbed, including but not limited to important ecological features and wetlands, shall be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

3.4.4.2.2.1 Section 02231FB of the Installation’s Unified Facilities Guide Specifications regarding clearing and grubbing is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.4.2.3 Contractor shall create and implement an Erosion and Sedimentation Control (ESC) Plan for all construction activities associated with the project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit OR local erosion and

sedimentation control standards and codes, whichever is more stringent. The Plan shall describe the measures implemented to accomplish the following objectives:

- Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.

  Prevent sedimentation of storm sewer or receiving streams.
- Prevent polluting the air with dust and particulate matter.
- Comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program.

3.4.4.2.4 Contractor shall implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year 24-hour design storm.

3.4.4.2.4.1 Section 02921FB of the Installation's Unified Facilities Guide Specifications regarding erosion control is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.4.2.5 Landscaping - Contractor shall plant native trees, shrubs and grasses. Theme tree emphasis should favor the longleaf pine tree in support of natural ecosytem integrity, environmental sustainability and the red-cockaded woodpecker endangered species recovery efforts. Contractor shall meet the requirements of LEED Water Efficiency Credits 1.1 and 1.2, Water Efficient Landscaping. Contractor shall not plant invasive and/or exotic species (plant materials) in the Landscape Plan. In addition, on previously developed or graded sites, the Contractor shall restore or protect a minimum of 50% of the site area (excluding the building footprint) with native or adapted vegetation and provide a vegetated open space area adjacent to the building that is equal to the building footprint. Turf seeding shall comply with all state statutes and regulations as set out in the Installation's Section 02921FB of the Uniform Facilities Guide Specifications.

3.4.4.2.6 Pavement. Contractor shall reduce the environmental impact of materials through the use of recycled and biobased content products, recycling construction waste, and eliminating the use of ozone depleting compounds.

3.4.4.2.7 Contractor shall provide secure bicycle racks and/or storage (within 200 yards of a building entrance) for 5% or more of all building users (measured at peak periods), and, provide shower and changing facilities in the building, or within 200 yards of a building entrance, for 0.5% of Full-Time Equivalent (FTE) occupants.

3.4.4.2.8 Contractor shall provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.

3.4.5 SITE ENGINEERING

3.4.5.1 Existing Conditions

[A three dimensional digital topographic and utility survey for this site has been prepared by the Government and included as a part of this RFP. Any discrepancies which are found in the Government furnished survey shall be brought to the immediate attention of the Government for clarification] [The OFFEROR shall provide a three dimensional digital topographic and utility survey for the site as part of their design and construction. The survey shall provide survey control points and a coordinate system, based either on state plane coordinates or base coordinates, and shall identify horizontal and vertical datums used.]

[Fire flow test for this site has been done by the Government and is included as part of this RFP.] [The OFFEROR shall be responsible for the fire flow test used in his design and construction.]

3.4.5.2 Base Utility Information

Topography-Maps [ ], Capacities [ ]

Electrical Service-Maps [ ], Capacities [ ] [Electrical service on this installation is privatized. Contact [ ] for electrical service information.]
Communications Service-Maps [ ], Capacities [ ] Sanitary Sewer Service-Maps [ ], Capacities [ ] [Sanitary sewer service on this installation is privatized. Contact [ ] for sanitary sewer service information.] Storm

Drainage Service-Maps [ ], Capacities [ ] [Storm drainage service on this installation is privatized. Contact [ ] for storm drainage service information.] Water Service-Maps [ ], Capacities [ ] [Water service on this installation is privatized. Contact [ ] for water service information.] Cable TV Service- Maps [ ], Capacities [ ] [Cable TV service on this installation is privatized. Contact [ ] for cable TV service information.] Local Telephone Service- Maps [ ], Capacities [ ] [Local telephone service on this installation is privatized. Contact [ ] for local telephone service information.]

3.4.5.3 Cut and Fill

3.4.5.4 Haul Routes

3.4.6 ARCHITECTURE

See Appendix F for photos of surrounding buildings

3.4.6.1 Architectural Review Board

In the event of an irreconcilable difference between Contractor and the Installation regarding any exterior condition, including but not limited to landscaping, building exterior, and site planning, Contractor shall submit a summary in writing of the issue to the Chair of the Architectural Review Board. The Chair shall then convene the Installation Architectural Review Board for final resolution of the issue.

3.4.7 STRUCTURAL DESIGN

3.4.7.1 Recycled Content, Building Exterior, Core, and Shell

Contractor shall use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project. The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value. Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in this calculation. Only include materials permanently installed in the project.

3.4.7.2 Regional Materials

Contractor shall use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost) of the total materials value. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value. Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. Only materials permanently installed in the project. Furniture may be included, provided it is included consistently in provisions throughout this subsection.

3.4.7.3 Certified Wood

Contractor shall use a minimum of 50% of wood-based materials and products, which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood building components. These components include, but are not limited to, structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes. Only include materials permanently installed in the project. Furniture may be included, provided it is included consistently in provisions throughout this subsection.

3.4.8 THERMAL PERFORMANCE

3.4.8.1 Heating, Ventilating, and Air Conditioning

Contractor shall meet the current ASHRAE Standard 55-2004, Thermal Environmental Conditions for Human Occupancy, including humidity control within established ranges per climate zone; and ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality.

3.4.9 PLUMBING

3.4.9.1 Potable Water Use for Sewage

Contractor shall reduce potable water use for building sewage conveyance by 50% through the use of water conserving fixtures (water closets, urinals) or non-potable water (captured rainwater, recycled

greywater, and on-site or municipally treated wastewater with the exception that waterless urinals shall note be used in UEPH living modules.

3.4.9.2 Potable Water Use Reduction

Contractor shall employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 2005 fixture performance requirements. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the building); water closets, urinals, lavatory faucets, showers, and kitchen areas.

3.4.10 SITE ELECTRICAL SYSTEMS

3.4.10.1 Exterior Lighting

Contractor shall meet the requirements of LEED-NC 2.2 Sustainable Sites Credit 8, Light Pollution Reduction.

3.4.11 FACILITY ELECTRICAL SYSTEMS

3.4.11.1 Interior Lighting

Contractor shall achieve a minimum of daylight factor of 2 percent (excluding all direct sunlight penetration) in 75 percent of all space occupied for critical visual tasks. Provide automatic dimming controls or accessible manual lighting controls, and appropriate glare control. Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences and provide lighting system controllability for all shared multi-occupant spaces to enable lighting adjustment that meets group needs and preferences.

3.4.11.2 Controllability of Systems

Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences and provide lighting system controllability for all shared multi-occupant spaces to enable lighting adjustment that meets group needs and preferences.

3.4.12 HEATING, VENTILATING, AND AIR CONDITIONING

3.4.12.1 Permanent Monitoring Systems

Contractor shall install permanent monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements. Configure all monitoring equipment to generate an alarm when the conditions vary by 10% or more from set point, via either a building automation system alarm to the building operator or via a visual or audible alert to the building occupants.

3.4.12.2 Moisture Control

Contractor shall establish and implement a moisture control strategy as part of an Indoor Air Quality Management Plan including controlling moisture flows and condensation to prevent building damage and mold contamination that meets the requirements of LEED-NC 2.2 Indoor Environmental Quality, Credit 3.1.

3.4.12.3 PVT Commissioning

PVT Commissioning shall be included in total building commissioning practices as found in Paragraph 6.13.1, incorporated by reference.

3.4.12.4 Operator Training

Operator training shall be included in total building commissioning practices as found in Paragraph 6.13.1 incorporated by reference.

3.4.12.5 Testing, Adjusting, and Balancing

Testing, adjusting, and balancing of heating, ventilating, and air conditioning equipment shall be included in total building commissioning practices as found in Paragraph 6.13.1, incorporated by reference.

3.4.12.6 Heating, Ventilating, and Air Conditioning Products

Contractor shall purchase Energy Star and FEMP-designated products and equipment and include Energy Star purchasing information in appropriate construction documents.

3.4.12.7 Refrigerants

Contractor shall use no CFC-based refrigerants in the building HVAC&R systems.

3.4.13 ENERGY CONSERVATION

3.4.13.1 Building Commissioning

Contractor shall employ total building commissioning practices tailored to the size and complexity of the building and its system components in order to verify performance of building components and systems and help ensure that design requirements are met. This shall include a designated commissioning authority, inclusion of commissioning requirements in construction documents, a commissioning plan, verification of the installation and performance of systems to be commissioned, a commissioning report, and comply with the requirements of LEED-NC 2.2 Energy and Atmosphere, Prerequisite 1.

3.4.13.2 Utilities

Contractor shall develop and implement a Measurement and Verification Plan consistent with LEED-NC 2.2, Energy and Atmosphere Credit 5, Measurement and Verification. All meters must meet advanced metering capabilities and be capable of cumulatively collecting, tracking, and measuring performance on an annual basis.

3.4.13.3 Electrical Systems

Contractor shall design for energy consumption levels 30% below the current ASHRAE standard and comply with LEED-NC 2.2 Energy and Atmosphere, Prerequisite 2.

3.4.13.4 Roofing Materials

Contractor shall use roofing materials having a Solar Reflectance Index (SRI)3 equal to or greater than the values listed in LEED-NC 2.2 Sustainable Sites Credit 7.2 for a minimum of 75% of the roof surface.

3.4.13.5 Energy Conservation Purchasing

Contractor shall purchase Energy Star and FEMP-designated products and equipment as well as inclusion of the Energy Star purchasing information in construction documentation. In addition, Contractor shall establish a whole building performance target that takes into account the intended use, occupancy, operations, plug loads, other energy demands, and design to earn the Energy Star targets for new construction.

3.4.13.6 Energy Cost Reduction

Contractor shall reduce the energy cost budget by 30 percent compared to the baseline building performance rating per the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., (ASHRAE) and the Illuminating Engineering Society of North American (IESNA) Standard 90.1-2004, Energy Standard for Buildings Except Low-Rise Residential. Measures to do so include but are not limited to meeting LEED-NC 2.2 Sustainable Sites, Credit 8; Energy and Atmosphere Prerequisites 1 and 2, Credits 1, 4, 5; Indoor Environmental Quality Credits 6.2, 7.1, and 8.1.

3.4.14 FIRE PROTECTION

3.4.15 SUSTAINABLE DESIGN

3.4.15.1 LEED Sustainable Sites Credits

The following information regarding the project site is provided relative to Sustainable Sites credits:

SS Credit 1 Site Selection: Project site is not considered prime farmland. [Project site is five feet or more above 100-year flood elevation.] [Delineation of 100-year flood elevation is shown on site drawings provided in this RFP.]
[Project site contains no habitat for threatened or endangered species.] [Delineation of threatened or endangered species habitat is shown on site drawings provided in this RFP.] [No portion of project site lies within 100 feet of any water, wetlands or areas of special concern.] [Delineation of water, wetlands and areas of special concern is shown on site drawings provided in this RFP.] Project site was not

previously used as public parkland. SS Credit 2 Development Density & Community Connectivity. Project site [does] [does not] meet the criteria for this credit. SS Credit 3 Brownfield Redevelopment. Project site [does] [does not] meet the criteria for this credit. SS Credit 4.1 Public Transportation Access. Project site [does] [does not] meet the criteria for this credit. EA Credit 6 Green Power. 50% of the project's electricity [will] [will not] be provided through an Installation renewable energy contract.

3.4.15.2 Sustainable Design

Contractor shall comply with the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding which is incorporated herein by reference.

3.4.15.3 CID Content and Emission Requirements

In addition to the requirements of 01010 Paragraph 5.3.6.1of this RFP, Contractor shall meet Federal content and emission requirements for interior finishes and components as listed in this subsection throughout the Comprehensive and Structural Interior Design processes. Contractor shall maintain all related documentation, plans, and elevations.

6.15.3.1 Materials Reuse - Use salvaged, refurbished, or reused materials, products and furnishings for at least 5% of total building materials by cost.

6.15.3.2 Recycled Content - Contractor shall use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project. The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value. Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in this calculation. Only include materials permanently installed in the project. These products include but are not limited to: • Construction products such as insulation, concrete, carpet, floor tile, restroom partitions, consolidated and reprocessed paint, structural fiberboard • Transportation products such as parking stops and delineators • Recreation items such as playground equipment, benches and picnic tables • Landscaping products such as plastic lumber timbers and food waste compost • Non-Paper office products such as office furniture, waste and recycling receptacles • Miscellaneous products such as mats and signage 6.15.3.3 Regional Materials - Contractor shall use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost) of the total materials value. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value. Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. Only materials permanently installed in the project. Furniture may be included, provided it is included consistently in provisions throughout this subsection. 6.15.3.4 Certified Wood - Contractor shall use a minimum of 50% of wood-based materials and products, which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood building components. These components include, but are not limited to, structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes. Only include materials permanently installed in the project. Furniture may be included, provided it is included consistently in provisions throughout this subsection. 6.15.3.5 Low-Emitting Materials - All adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of LEED-NC 2.2 Indoor Environmental Quality Credit 4.1, 4.2, 4.3, and 4.4. Contractor shall specify low-emitting materials in construction documents. Contractor shall ensure that low-emitting limits are clearly stated in each section of the specifications where such materials are addressed. 6.15.3.6 Color, Surface and Signage - All signage, both interior and exterior, shall meet regulatory, recycled content specifications and all building colors and surfaces shall conform to the Installation Design Guide specifications. 6.15.3.7 Contractor shall purchase products through the Installation's SSSC from a list provided by designated Installation staff.

3.4.15.4 Applicable Criteria

The Installation Design Guide shall be deemed the Applicable Criteria for purposes of 01010 Paragraph 5.1.4 and the Army Installation Design Standards are deemed the Applicable Criteria for purposes of 01010 Paragraph 5.3.3.

3.4.15.5 Smoking Areas

Contractor shall locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.

3.4.15.6 LEED Registration

Contractor is responsible for the costs associated with registering the project as a LEED project with the USGBC, entering and maintaining documentation required by the registration process, and allowing the Installation staff members designated by the DPW CMD Division Chief access to said documentation online at the USGBC website.

3.4.16 ENVIRONMENTAL

3.4.16.1 Environmental Adverse Impacts

Contractor shall not impact threatened and endangered species, their habitats, or wetlands without approval from the designated authority. The Contractor shall design, use and promote construction practices that minimize adverse effects on the natural habitat.

3.4.16.1.1 All threatened and endangered species and their habitats shall be adequately protected and preserved throughout the term of the Contract. The Contractor is responsible for coordinating with the DPW Project Manager and the Contracting Officer to obtain all applicable State and Federal laws and regulations. The Contractor shall not take any corrective or remedial actions unless directed to do so in writing by the Contracting Officer Representative.

3.4.16.1.2 The Contractor shall not enter, disturb, destroy, or allow discharge of contaminants into any wetlands and shall minimize and/or avoid wetland and stream impacts. The Contractor is responsible for coordinating with the DPW Project Manager and the Contracting Officer to obtain all applicable State and Federal laws and regulations. The Contractor shall not take any corrective or remedial actions unless directed to do so in writing by the Contracting Officer Representative. The Contractor is responsible for all costs associated with mitigation of damage to wetlands, including but not limited to restoration, replacement, or creation, resulting from Contractor's actions.

3.4.16.2 Stream Crossings

Stream crossings shall allow "natural" flow conditions to facilitate aquatic movements when moving materials or equipment and shall not violate water pollution control standards of the Federal, State, and local governments or impede state-designated flows.

3.4.16.3 Groundwater Monitoring Wells

Contractor shall protect all groundwater monitoring wells at construction sites with known contaminated areas. The groundwater monitoring wells shall not be re-located, tampered with, or damaged during construction activities.

3.4.16.3.1 Ground-Water Monitoring

Section 02526FB of the Installation’s Unified Facilities Guide Specifications regarding the installation, decontamination and protection of ground-water monitoring wells is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.16.4 Tree Removal and Merchantable Trees

The Contractor shall provide a Tree Removal Plan in the Environmental Protection Plan that includes the number of trees to be removed by tree species and dbh. A tree (vegetation) removal plate shall indicate trees to be removed and retained in the design plans. The Contractor is also responsible for notifying the Fort Bragg Project Manager if merchantable trees are scheduled for removal. Merchantable tree sales shall be conducted by the local DPW Natural Resource Division in coordination with USACE District authorities.

3.4.16.5 Plan Review

The Cultural and Biological Resources Plans shall be reviewed by the Installation’s designated Point of Contact for each Plan’s respective program area.

3.4.16.6 NEPA-Related Mitigation

Contractor shall be responsible for the costs associated with any mitigation activities identified and required by NEPA analysis.

3.4.16.7 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. The Contractor shall, at a minimum, manage and store hazardous waste in compliance with 40 CFR 262. The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. The Contractor shall segregate hazardous waste from other materials and wastes, shall protect it from the weather by placing it in a safe covered location, and shall take precautionary measures such as berming or other appropriate measures against accidental spillage. The Contractor shall be responsible for storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations. When transported on a motorized vehicle, all hazardous waste shall be listed on a Uniform Manifest and delivered to a Treatment Storage Disposal Facility in accordance with 40 CFR 262. In addition, the Contractor shall transport Contractor generated hazardous waste off Government property in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. The Contractor shall dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the Contracting Officer and the Facility Environmental Office. Cleanup and cleanup costs due to spills shall be the Contractor's responsibility. The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility.

3.4.16.8 Contaminated Materials

Section 02111FB of the Installation’s Guide Specification for Construction regarding the excavation and handling of contaminated material is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.16.8.1 Section 02120FB of the Installation’s Guide Specification for Construction regarding the transportation and disposal of hazardous material is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.16.9 Chemicals and Chemical Wastes

Chemicals shall be dispensed ensuring no spillage to the ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action shall be performed and documented. This documentation will be periodically reviewed by the Government. Chemical waste shall be collected in a container compatible with its chemical and physical hazardous characteristics. It shall comply with 40 CFR 262.34. Collection drums shall be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes shall be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

3.4.16.10 Spill Prevention Control and Containment

Fuel dispensing sites shall be required to have a hardstand with sufficient capability for run-off to meet all Federal and State requirements.

3.4.16.10.1 Fuel and Lubricants - Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Contractor provided fuel tanks shall not exceed 2,000 gallons per tank and 10,000 per facility. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations.

3.4.16.11 Spill Response

The Contractor shall, immediately, notify the Fire Department in the event of a hazardous spill. Subsequent calls shall include the DPW Environmental Compliance Branch and Contracting Officer. Notification to the Fire Department must be by the first person on-scene that identifies the hazard – this may or may not be the designated POC. The Fort Bragg Fire Department and DPW Environmental Compliance Branch are responsible for any off-post notifications. The contractor shall provide a Spill

Response Plan for review and it shall include a list of reporting channels and telephone numbers. All supervisors on-site must be trained in the execution of the Spill Plan.

3.4.16.11.1 Contractor shall meet all Federal level of training and OSHA requirements for operations within a Hazardous Waste Clean Up area.

3.4.16.11.2 Contaminated Soil - Contaminated soil is prohibited at the Installation landfill. Contaminated soil may be used as fill dirt on the site of origin for the contaminated soil with the written approval of the Environmental Compliance Branch and the Contracting Officer. Any contaminated soil shipped off-site shall be listed on a Uniform Hazardous Waste Manifest and said Manifest must be signed by the designated Environmental Compliance Branch personnel.

3.4.16.12 Non-hazardous Solid Waste Disposal Plan

The Contractor shall provide a Plan that identifies methods and locations for solid waste disposal including clearing debris, identifies the materials to be diverted from disposal and whether the materials will be sorted onsite or co-mingled. The plan shall also include schedules for disposal. Contractor shall recycle and/or salvage at least 50 % of non-hazardous construction, demolition and land-clearing debris.

The Contractor shall identify any subcontractors responsible for the transportation and disposal of solid waste. Licenses or permits shall be submitted for solid waste disposal sites that are not a commercial operating facility. Evidence of the disposal facility's acceptance of the solid waste shall be attached to this plan during the construction. The Contractor shall attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. The report shall be submitted on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and shall be for the previous quarter (e.g. the first working day of January, April, July, and October). The report shall indicate the total amount of waste generated in tons and types of material and total amount of waste diverted in tons along with the percent that was diverted.
3.4.16.12.1 At the Installation's discretion, Contractor shall dispose of land clearing and inert debris at the Installation's Landfill . Tipping fees equivalent to those charged at the nearest municipal landfill site shall be paid by the Contractor at the Installation landfill for all MILCON related debris. Municipal solid waste shall be transported off the Installation to a Subtitle "D" RCRA State permitted landfill.

3.4.16.13 Open Burning

Burning of construction materials or construction debris is prohibited on the Installation. Burning of clearing debris is also prohibited in the Cantonment.

3.4.16.13.1 Contractor shall submit all Recycling and Solid Waste Minimization Plans for review by the Installation Solid Waste and Recycling Manager. Project Review of all plans shall be performed by designated Installation staff to ensure compliance with all local, State and Federal requirements.

3.4.16.13.1.2 As part of the Installation's prevention and recycling program, Contractor shall provide an easily accessible area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.

3.4.16.14 Waste Water Management Plan

The Waste Water Management Plan applies to discharges from the project site to Fort Bragg’s Waste Water Treatment Plant as well as discharges from the project site to any other jurisdiction’s waste water treatment facility.

3.4.16.15 Air Resources

The Installation operates under a Title V Air Permit. The Contractor shall perform a regulatory review and submit it for approval. This shall include all air sources in the project. New sources shall be reviewed for PSD (Prevention of Significant Deterioration) applicability. Each Congressional Appropriation is defined as one project. Additionally, new sources shall be reviewed for NESHAP applicability (National Emissions Standards for Hazardous Air Pollutants). If the Contractor and the Installation Environmental Control Branch (ECB) determine that an air permit is required, the Contractor shall develop the permit application and/or coordinate with ECB on on-going permit applications. Contractor is responsible for all Air Permitting fees to NCDENR. Permits shall be obtained prior to construction of any new sources.

3.4.16.16 Abrasive Blasting

Where possible, all abrasive blasting shall be conducted inside buildings. If conducted outside of buildings, or if vented to the outside, the visible dust must not exceed 20% opacity, as measured by a state-certified opacity reader. Measures will be taken to ensure fugitive dust from abrasive blasting does not migrate off the construction site.

3.4.16.17 Noise (“Sound Intrusions”)

Contractor shall meet all OSHA requirements regarding any noise ("sound intrusions") issues.

3.4.16.18 Cultural Resources

In accordance with the National Historic Preservation Act (NHPA), Native American Grave Protection and Repatriation Act (NAGPRA), Archeological Resources Protection Act (ARPA), 36 CFR, Part 800, historic properties that are eligible for the National Register of Historic Places must be adequately protected. The Installation shall provide information on known historic properties, to include historic buildings, landscapes, structures, cemeteries and archaeological sites that may be affected by the work required in this contract. The Contractor shall protect these resources and shall be responsible for their preservation during the life of the contract.

The Contractor shall take any corrective or remedial actions as directed by the Contracting Officer. If any previously unidentified or unanticipated historic properties are discovered or found by the Contractor during excavation or other activities, the Contractor shall stop work and immediately notify the Contracting Officer and the Cultural Resources Program Manager so that the appropriate authorities may be notified and determination made as to the significance of and what, if any, special disposition of the finds should be made. Upon such discovery or find the Contractor shall cease all activities that may result in impact to or the destruction of these resources and secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; bone, charcoal, or other deposits; pavings, wall, or other constructed features, or any indication of past human activity. The Contractor’s attention is called to FAR Clause 52.236-7, Permits and Responsibilities (Nov 1991). As prescribed in 36.507, the Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, and municipal laws, codes, and regulations applicable to the performance of the work. The Contractor shall also be responsible for all damages to persons or property that occurs as a result of the Contractor’s fault or negligence. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract. Failure to take the appropriate steps to protect any historic property, especially if the property is damaged or destroyed, is a violation of the terms of this contract. The Army will pursue the costs for mitigation of damage to cultural resources (restoration, repair, or replacement) due to the Contractor’s failure to comply with historical and cultural preservation laws, regulations, or programs via deduction from payments otherwise due under this contract or, when deductions are inadequate, by any other means available. Additionally, damage or removal of archaeological resources is subject to prosecution under the Archeological Resources Protection Act. 3.4.16.18.1 Section 02226FB of the Installation’s Unified Facilities Guide Specifications regarding the removal and salvage of historic building materials is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.16.18.2 Standards and Codes - Contractor shall contact and coordinate with the Installation's designated Cultural Resources staff for any construction in the Historic District or viewshed. Exterior colors and materials shall conform to the Installation Design Guide.

3.4.16.19 Integrated Pest Management

In order to minimize impacts to existing fauna and flora, including but not limited to protection of all threatened and endangered species and wetlands/streams, the Contractor, through the Contracting Officer, shall coordinate with the Installation Pest Management Coordinator (IPMC) at the earliest possible time prior to pesticide application. The Contractor shall discuss integrated pest management strategies with the IPMC and receive concurrence from the IPMC through the COR prior to the application of any pesticide associated with these specifications. Installation Pest Management personnel shall be

given the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide.

3.4.16.19.1 Contractor shall be responsible for obtaining any necessary pesticide permits and for complying with any Federal and State laws, as well as Army regulations applicable to the performance of the work, including but not limited to delivery of pesticides, approved for use on the Installation, to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

3.4.16.20 Clean Up

The Contractor shall clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". The Contractor shall, unless otherwise instructed in writing by the Contracting Officer, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area shall be graded, filled and the entire area seeded unless otherwise indicated. All debris cleaned up shall be separated in recycling types (metal, cardboard, pallets, clean wood, cement, blocks, etc) to recycle and divert construction materials from the landfill to the maximum possible.

3.4.16.21 Biobased Products

Contractor shall use biobased such products as designated by the EPA whenever possible.

3.4.16.22 Asbestos Hazard Control

Section 13280FB of the Installation’s Unified Facilities Guide Specifications regarding asbestos hazard control activities is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.16.23 Underground Storage Tank

Section 02115FB of the Installation’s Unified Facilities Guide Specifications regarding underground storage tank removal is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.16.24 Wells

Section 02525FB of the Installation’s Unified Facilities Guide Specifications regarding wells in terms of extraction and monitoring is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.16.25 Aboveground Fuel Oil Storage

Section 13210FB of the Installation’s Unified Facilities Guide Specifications regarding aboveground fuel oil storage tanks is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.16.26 Temporary Environmental Controls

Section 01575N of the Installation’s Unified Facilities Guide Specifications regarding temporary environmental controls is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.17 PERMITS

3.4.17.1 Permitting

Contractor shall coordinate with the designated Fort Bragg Project Manager at the earliest possible time regarding permit requirements, e.g. Fort Bragg is a Title V facility for Air Quality requirements. The Contractor must perform a regulatory review and submit it for approval to the Environmental Compliance Branch (ECB). This must include all air sources in the project. New sources must be reviewed for PSD (Prevention of Significant Deterioration) applicability.

Each Congressional Appropriation is defined as one project. Additionally, new sources must be reviewed for NESHAP applicability (National Emissions Standards for Hazardous Air Pollutants). If the Contractor

and ECB determine that an air permit is required, the Contractor must develop the permit application and/or coordinate with ECB on on-going permit applications. Contractor is responsible for all Air Permitting fees to NCDENR. Permits must be obtained prior to construction of any new sources. New sources may include, but are not limited to, boilers, emergency generators, solvent tanks, painting and de-painting operations, incinerators, pulverizers, engine test-stands, and printing operations. All new boilers shall include low NOx burners.
3.4.17.1.1 The Contractor is required to have an air permit for each type of material that will produce dust and other harmful particulates within the boundaries of the Installation, e.g. concrete, rock crushing, asphalt batch plants. The Contractor shall then comply with the requirements of each permit regarding dust particles and other particulates.

3.4.17.1.2 Contractor is responsible for meeting all State regulatory requirements for any project that includes a boiler fired by either natural gas or distillate oil including insuring that the boiler(s) is/are included in the Installation's Title V Air Permit. In addition, any new boiler installed that is great than 10 million Btu/hr input shall meet 40 CFR Part 60, New Source Performance Standards. The Installation's Title V Air Permit can only be modified and the cost of the Clean Air Permit determined when the Contractor advises the Installation's designated Environmental Branch staff of the emission type, quantity and quality of the type of fuel(s), and expected usage of boilers, generators and other equipment that produce air emissions. It is the Contractor's responsibility to provide this information to the Installation's designated Environmental Branch staff as soon as initially determined in the design process and if any changes or modifications are made during the design process or actual construction. 3.4.17.1.3 Contractor cannot apply for underground or above ground storage tank permits but is responsible for costs associated with acquiring these permits. Contractor shall coordinate acquisition of these permits with the Installation's designated staff from the Environmental Compliance Branch.

3.4.17.2 Permits

Installation permits, e.g. Title V - Air Permit, cannot be changed unilaterally by the Contractor. Contractor shall coordinate any changes or modifications through the Installation's designated Environmental Branch staff.

3.4.18 DEMOLITION

3.4.18.1 Construction and Waste Management

For any construction that involves building demolition within the construction footprint, the Contractor is responsible for demolition, surveys for asbestos and abatement of that asbestos, hazardous materials surveys and proper disposal for lights/ ballasts and other items in the existing facilities as required by Federal, State, and local statutes, ordinances, agreements and as described in this RFP. At least 50% of all non-hazardous construction, demolition, and land-clearing debris shall be recycled and/or salvaged. Contractor shall develop and implement a construction and waste management plan that, at a minimum, identifies the materials to be diverted from disposal and sorted onsite.

3.4.18.2 Demolition Guide

Section 02220FB of the Installation’s Unified Facilities Guide Specifications regarding demolition is incorporated by reference. Contractor shall follow the provisions of this Section when applicable.

3.4.19 ADDITIONAL FACILITIES

3.4.19.1 ADA - COFs

(This Section for Company Headquarters Facilities Only) Section 3.2.1.4 of this RFP supersedes Section 01012, Design After Award, Attachment D regarding waiver of the Americans with Disabilities Act requirements in Company Headquarters Facilities.

3.4.19.2 ADA - Combined Battalion/COFs

(This Section for Combined Battalion - Company Operations Facilities Only) Paragraph 3.2.1.4 of this RFP supersedes Section 01012, Design After Award, Attachment D regarding waiver of the Americans with Disabilities Act requirements in Company Headquarters Facilities.

3.4.19.3 Living Space - UEPH

(This Section for UEPH Buildings Only) The Contractor shall provide 388 gross square feet of individual living space per barracks occupant.

3.4.19.4 ADA - UEPH

(This Section for UEPH Buildings Only) Contractor shall make 2 percent of the UEPH apartments adaptable dwelling units but shall not convert modules into an ADA compliant module.

3.4.19.5 Furnishings - UEPH

(This Section for UEPH Buildings Only) To provide maximum flexibility of use for occupants, Contractor should provide a 36" x 36" table with two chairs rather than a built-in counter.

3.4.20 SECURITY

3.4.20.1 Zoned Paging - Battalion HQ

(This Section for Battalion Headquarters Buildings Only) Contractor shall provide a zoned paging system shall be provided throughout the facility and integrated with the telephone system that is capable of mass notification in the event of an emergency and includes such areas as SCIF and conference rooms with direct interface with SCIF vehicles and the Command Group.

3.4.20.2 UFC - Battalion HQ

(This Section for Battalion Headquarters Buildings Only) Battalion Headquarters shall be identified at a minimum as an Inhabited Building or Primary Gathering facility dependent upon normal occupancy per UFC and Contractor shall provide provisions in the design and construction to attain the 22 standards identified within the Transformation RFP.

3.4.20.3 Generators - Battalion HQ

(This Section Applies to Battalion Headquarters Buildings Only) Battalion Headquarters shall be provided a emergency backup electrical generation source with fuel supply to meet the requirements of Table 5, 3.2.4.4 including but not limited to providing sufficient chiller and pump capacity to provide 100 percent cooling to the server/communications rooms. The use of portable tactical generators is not appropriate for this application and is prohibited by the Installation's Title V Air Permit. Fuel sources for generators shall be propane or diesel fuel. Installation of underground storage tanks is prohibited by agreement between Fort Bragg, EPA and NCDENR. Contractor shall obtain a permit from NCDENR Spill Control Section for fuel storage aboveground in excess of 16K. The contractor is responsible for obtaining the permit and providing the original to ECB prior to construction/startup.

The Contractor shall perform a regulatory review and submit it for approval to the Environmental Compliance Branch (ECB). This shall include all air sources in the project. New sources shall be reviewed for PSD (Prevention of Significant Deterioration) applicability. Each Congressional Appropriation is defined as one project. Additionally, new sources shall be reviewed for NESHAP applicability (National Emissions Standards for Hazardous Air Pollutants). If the Contractor and ECB determine that an air permit is required, the Contractor shall develop the permit application and/or coordinate with ECB on on-going permit applications. Contractor is responsible for all Air Permitting fees to NCDENR. Permits shall be obtained prior to construction of any new sources.

3.4.20.4 Zoned Paging - COFs

(This Section Applies to Company Operations Facilities Only) Contractor shall provide a zoned paging system shall be provided throughout the facility and integrated with the telephone system that is capable of mass notification in the event of an emergency and includes such areas as SCIF and conference rooms with direct interface with SCIF vehicles and the Command Group.

3.4.20.5 UFC - COFs

(This Section for Company Operation Facilities Headquarters Buildings Only) Company Operation Facilities Headquarters buildings shall be identified at a minimum as an Inhabited Building or Primary Gathering facility dependent upon normal occupancy per UFC and Contractor shall provide provisions in the design and construction to attain the 22 standards identified within the Transformation RFP.

3.4.20.6 UFC - UEPH

(This Section for UEPH Buildings Only) UEPH buildings shall be identified at a minimum as an Inhabited Building or Primary Gathering facility dependent upon normal occupancy per UFC and Contractor shall provide provisions in the design and construction to attain the 22 standards identified within the Transformation RFP.

3.4.20.7 Mechanical Room - UEPH

(This Section for UEPH Buildings Only) Contractor shall design and construct all mechanical, electrical, and communications rooms to be accessed without entering a living module and with separate access key cards for mechanical/electrical rooms and communications rooms.

3.4.20.8 Electronic Door Locks - UEPH

(This Section for UEPH Buildings Only) The Contractor shall provide the living module common door and the living module main entry door with electronic door locks with key card access.

3.4.20.9 Charge of Quarters - UEPH

(This Section for UEPH Buildings Only) Contractor should provide Charge of Quarters with telephone and computer access similar to that found in a hotel lobby/reception area and front office.

3.4.20.10 Zoned Paging - UEPH

(This Section for UEPH Buildings Only) Contractor shall provide a zoned paging system shall be provided throughout the facility and integrated with the telephone system that is capable of mass notification in the event of an emergency and includes such areas as SCIF and conference rooms with direct interface with SCIF vehicles and the Command Group.

3.4.20.11 Arms Room Vault ICIDS System

Contractor shall install the necessary conduit, electrical power, and wiring, to support installation of an ICIDS system in the Arms Room. The Government shall install the signal devices and equipment necessary to activate the system.

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Colorways

Khaki
Barracks USASOC Khaki
Company Operation USASOC Khaki
Soldier Community Center Khaki
Neutral Almond
Barracks Neutral Almond
Child Development Neutral Almond
Dining Neutral Almond
Military Operations Neutral Almond
Soldier Community Center Neutral Almond
Transient Quarters Neutral Almond
Youth Center Neutral Almond
Warm Gray
Administration Warm Gray
Battalion Warm Gray
Brigade Warm Gray
Soldier Support (Basic) Warm Gray
Soldier Support (Enhanced) Warm Gray
Blue Gray
Battalion Blue Gray

Company Operations Blue Gray
Scaled Drawings
Force Protection
Bollards

TABLE A EXISTING PREDOMINANT ARCHITECTURAL ELEMENTS BY DISTRICT

FUNCTIONAL DISTRICTS		OLD POST		THE DIV	SMOKE BOMB HILL	THE HILLTOP	IND. DIST	VAUGHN HILL				SOUTH DIST	THE AIRFIELD		HOUSING DISTRICT				GREEN RAMP	THE RING			
		OLD POST	RESI					TRG	HSG	CMTY FACADM	SPT/STG		ADM & GEN SERV	HGR/SPT BLDG	NORTH	SOUTH	EAST	WEST		CHILD DEV CTR	SCH	CMTY FAC	COMM
EXTERIOR MATERIALS	WOOD					✔ (BRKS)																	
	STUCCO		CREAM		BROWN										✔	✔							
	CONCRETE			✔	NATURAL		✔				CRM		CREAM						CREAM	ACCENT BAND	CMU	✔	✔
	BRICK	RED			TAN	BROWN			RED	RED		TAN			✔	RED	RED	RED		BROWN/ TAN			
	METAL			✔		✔ (BRKS)	✔							CREAM	✔	✔	✔	✔	CREAM		CURTAIN WALL		
	SPLIT FACE MASONRY												CREAM										
ROOFING	SHINGLES (G,B,T,R)	RED										DARK BROWN			B	T	G	✔	TAN				
	METAL			✔			✔							✔					TAN	GREEN/ BRONZE			
	CLAY TILE		RED																				
ROOF TYPE	MANSARD																						
	FOLDED PLATE																				✔		
	HIP																			8/12			
	GABLE	6/12	6/12		✔ (NEW CONST)	6/12	✔					4/12	SHED	✔	3/12	3/12	3/12	3/12	2/12				
	FLAT			✔	✔			✔	✔	✔	✔		✔								✔	✔	✔
WINDOWS	WOOD		CREAM														✔						

	METAL (ALUMINUM)	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	WHITE	✔	✔	
	OPERABLE											✔	✔	✔	✔	✔	✔	✔					
	SKYLIGHTS											CLERESTORY											
	WINDOW GLAZING	✔	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	FILM	CLEAR	FILM	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	
DOORS	METAL PANEL			✔	✔			✔	✔	✔	✔	✔	✔	✔					✔	✔	✔	✔	✔
	METAL FLUSH																						
	WOOD	✔	CREAM												✔	✔	✔	✔					
	W/GLASS OR SIDELIGHTS		✔	✔		✔		✔				✔	✔	✔		✔		✔		✔	✔	✔	✔
DESIGN ELEMENTS	DORMERS	✔																					
	ROOF OVERHANG	1'-0"	2'-0"	1'-0" TO NONE	✔ (ADM.)	2'-0"	2'-0"	2'-0"	2'-0"	1'-0"		3'-0"	2'-0"	2'-4"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	3'-4" AVG	3'-4" AVG	
	BRICK ACCENTS											✔			✔					✔			✔
	CONCRETE BANDS/ ACCENTS	✔		✔	✔	PHY. FIT. BLDG	✔	✔	✔	✔					STUCCO ACCENT						✔	✔	
	SMALL SCALE		✔		✔ (ADM.)					✔					✔	✔	✔	✔		✔		✔	
	LARGE SCALE	✔		✔	✔ (BRKS)	✔	✔	✔	✔		✔	✔	✔	✔							✔		✔
	BALCONY																						
	BREEZEWAY				✔																✔		✔
	HANDRAILS	✔																					
	COLUMNS						✔										✔			CONCRETE			✔
	DETAILED						✔					✔				✔		✔		✔	✔		
	COVERED ENTRY		✔		✔	✔	✔														✔	✔	✔
	WALL-MOUNTED SIGNAGE		OFFICER									✔	✔	✔	✔	✔	✔	✔					
	WALL-MOUNTED LIGHTING				✔	✔														✔	✔		
	QUOIN	✔																					
	ADA RAMP					✔						✔	✔							✔	✔	✔	✔

✔= EXISTING FEATURE	RESI = RESIDENTAIL	DIV = DIVISION	IND = INDUSTRIAL	DIS = DISTRICT	TRG = TRAINING	HSG = HOUSING	CMTY = COMMUNITY	FAC = FACILITIES	ADM = ADMINITRATION
SPT = SUPPORT	STG = STORAGE	SERV = SERVICES	GEN = GENERAL	HGR = HANGAR	BLDG = BUIDLING	DEV = DEVELOPMENT	CTR = CENTER	SCH = SCHOOL	COMM = COMMERCIAL

TABLE B
FORT BRAGG RIGHTS-OF-WAY (ROW)

ALL AMERICAN FREEWAY	340'
NORTH CAROLINA HWY 13	300'
BRAGG BOULEVARD	200'
NORTH CAROLINA HWY 210	200'
SECOND STREET	150'
BASTOGNE DRIVE	110'
HONEYCUTT ROAD	110'
GRAVE STREET	110'
BUTNER ROAD	100'
LONGSTREET ROAD	100'

If a road is not designated above, the ROW shall be 70-feet.

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TABLE C
OLD POST DISTRICT

BUILDING SETBACKS FROM RIGHT-OF-WAY (ROW)		
	COMMUNITY COMMERCIAL SERVICES	ADMINISTRATION/ OPERATION
ARMISTEAD STREET	25' (MIN)	60'
KNOX STREET	25' (MIN)	60'
LONGSTREET ROAD	25' (MIN)	60'
NORMANDY DRIVE	25' (MIN)	60'
RANDOLF STREET	25' (MIN)	60'
REILLY STREET	25' (MIN)	60'
JACKSON STREET	25' (MIN)	45'
WOODRUFF STREET	25' (MIN)	45'

* Match setbacks of existing adjacent permanent administrative buildings but in no case may setback be less than 25' from ROW

** All setbacks shall meet Department of Defense Force Protection Construction Standards

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TABLE D
RING DISTRICT

BUILDING & PARKING SETBACKS FROM RIGHT-OF-WAY (ROW)			
	COMMUNITY & COMMERCIAL SERVICES	ADMINISTRATION/ OPERATION	PARKING AREAS
A STREET	55'		40'
ALL AMERICAN FREEWAY	250'	250'	75'
BASTOGNE DRIVE	55'		
BUTNER ROAD	55'	55'	
WOODRUFF STREET	30'		
FIFTH STREET	55'		
FIRST STREET	55'		
HONEYCUTT ROAD	55'	55'	55'
JACKSON STREET	30'	30'	
KNOX STREET	55'	55'	55'
LONGSTREET ROAD	55'	55'	40'
MACOMB STREET	30'	30'	30'
NORMANDY DRIVE	55'	55'	40'
REILLY STREET	75'	75'	75'
SECOND STREET	55'	55'	40'
SEDGEWICK STREET	55'	55'	40'
SOUTH LUCAS AVENUE	55'	55'	

* All setbacks shall meet Department of Defense Force Protection Construction Standards

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TABLE E
DIVISION DISTRICT

BUILDING & PARKING SETBACKS FROM RIGHT-OF-WAY (ROW)				
	TROOP HOUSING	COMMUNITY & COMMERCIAL SERVICE	ADMINISTRATIONS/ OPERATION	PARKINGS AREAS
ARDENNES	60'	35'	35'	15'

GRUBER ROAD	110'	60'	60'	25'
LONGSTREET ROAD		60'	60'	
SIDE ROADS	50'	50'	50'	40'

* All setbacks shall meet Department of Defense Force Protection Construction Standards

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TABLE F
VAUGHN HILL DISTRICT

BUILDING & PARKING SETBACKS FROM RIGHT-OF-WAY (ROW)					
	TROOP HOUSING	CMTY & COMM SRV	ADM/ OPER	WHSG IND & VHL MTN	PARKING AREAS
ARDENNES	250'	35'	35'		15'
GRUBER ROAD	250'	60'	60'	60'	25'
SIDE ROADS	30'	30'	30'		25'
GRAVE STREET				50'	50'
LONGSTREET ROAD				50'	

* All setbacks shall meet Department of Defense Force Protection Construction Standards

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TABLE G
SMOKE BOMB HILL DISTRICT

BUILDING & PARKING SETBACKS FROM RIGHT-OF-WAY (ROW)					
	TROOP HSG	CMTY & COMM SRV	ADM/ OPER	WHSG IND & VHL MTN	PGK AREAS
ALL AMERICAN FREEWAY	500'	250'	250'	100'	75'
REILLY STREET	500'	85'	85'		150'- TRP HSG 50'- OTHER
GRUBER ROAD	100'	100'	100'		50'
KEDENBERG STREET	100'	25'	25'		15'
BASTOGNE / IRWIN		100'	100'		100'

DRIVES EXTENSION					
SIXTH STREET		25'	25'	50'	15'
SONTAY ROAD		25'	25'	50'	15'
KNOX STREET		100'	100'		50'
BUKER STREET				50'	25'
NINTH STREET				50'	25'
SIDE STREETS	100'	25'	25'		15'

* All setbacks shall meet Department of Defense Force Protection Construction Standards

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TABLE H SOUTH DISTRICT

BUILDING & PARKING SETBACKS FROM RIGHT-OF-WAY (ROW)						
	TROOP HOUSING	CMTY & COMM SRV	ADM/ OPER	WHSG IND & VHL MTN	PARKING AREAS	MESS HALLS
REILLY STREET	300'	180'	180'		115'	
CANOPY LANE	300'	180'	180'		180'	
ELEVENTH STREET					30'	
CHICKEN ROAD		125'	125'		80'	
YADKIN ROAD		125'	125'		125'	
ESSAYONS	50'	80'	50'		80'	
SIDE / ACCESS ROADS	50'	30'	125'		100'- MESS HALL 30'- OTHER	50'
						200'

* All setbacks shall meet Department of Defense Force Protection Construction Standards

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TABLE I AIRFIELD DISTRICT

BUILDING & PARKING SETBACKS FROM RIGHT-OF-WAY (ROW)			
	COMMUNITY &	ADMINISTRATION/ OPERATION	AIRFIELD OPERATIONS

	COMMERCIAL SERVICES		
SIMMONS ENTRANCE BLDG. (A STREET)	100'	100'	100'
B STREET	50'	75'	100'
C STREET	50'	75'	100'
D STREET	50'	75'	100'

* All setbacks shall meet Department of Defense Force Protection Construction Standards

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TABLE J
REQUIRED PARKING SPACES

FACILITY	NUMBER OF PARKING SPACES
Administration, headquarters, and Office Buildings	60 percent of assigned personnel
Bakeries	38 percent of civilian employees, largest shift
Bank and Credit Union (when not included in a community shopping center)	2 percent of authorized customers served
Cafeteria, Civilian (when not included in a community shopping center)	15 percent of seating capacity
Central Food Preparation Facilities	38 percent of military and civilian food service operating personnel, largest shift
Chapels	30 percent of seating capacity
Child Development Centers	8 percent of children, 80 percent of staff
Commissary Stores, Food Sales (when not included in a community shopping center)	2.5 percent of authorized customers served
Community Shopping Center (including such elements as Main Exchange, Miscellaneous Shop, Restaurant, Commissary Stores, Food Sales, Bank, Theater, Post Office)	4 percent of authorized customers served
Enlisted Personnel Dining Facilities, for: Basic and Recruit Training, Advanced Individual Training, Service Schools, Recruit Reception Stations Permanent Party, Garrison (including Army Table of Organization and Equipment (TOE) and Table of Distribution and Allowances (TDA) units) Support Units, Construction Battalions, Weapon Plants, Personnel Transfer and Overseas Processing Centers	38 percent of military and civilian food service operating personnel, largest shift, plus 8 percent of enlisted personnel (patron parking to be served during a meal period)
Exchanges, Main (when not included in a community shopping center)	2.5 percent of authorized customers served
Family Housing	2 spaces per living unit
Field House (combined with Football and Baseball Facilities)	1 percent of military strength served
Fire Station: One-Company Two-Company	 7 spaces 10 spaces

Guard Houses, Military Police Stations	**30 percent of guard and staff strength**
Gymnasiums (if only one at an Army installation)	**1 percent of military strength served**
Gymnasiums, Area (regimental)	**38 percent of civilian employees, largest shift**
Libraries **Central** **Branch**	 **1 space for each 500 SF (46.m2) gross area of floor area** **8 spaces**
Maintenance Shops	**38 percent of assigned personnel, largest shift**
Schools, Dependent **Without Auditorium** **With Auditorium**	 **2 spaces per classroom** **2 spaces per classroom, plus 15 percent of auditorium seats**
Service Clubs	**2 percent of enlisted personnel or officer strength served**
Swimming Pools	**20 percent of design capacity of the swimming pool**
Temporary Lodging Facilities	**100 percent of bedrooms**
Theaters (when not included in a community shopping center)	**25 percent of seating capacity**
Unaccompanied Enlisted Personnel Housing	**100 percent of living suites**
Warehouses	**1 space for each 500 SF (46.5m2) gross area of office area, plus 1 space for 4 persons assigned to storage activities**

This table provides standard minimum parking requirements. If parking needs are greater than these minimums, units should provide supporting data for additional parking to DPW who will review and advise accordingly.

THEME TREES BY DISTRICT

	OLD POST	DIVISION	SMOKE BOMB HILL	EAST DISTRICT	INDUSTRIAL DISTRICT	VAUGHN HILL	SOUTH DISTRICT	THE AIRFIELD	HOUSING DISTRICT	GREEN RAMP	RING
LIVE OAK	✔	✔	✔	✔				✔	✔		
WILLOW OAK						✔					
SCARLET OAK				✔							✔
RED MAPLE	✔		✔							✔	
TULIP TREE					✔					✔	
SWEET GUM							✔				
PECAN									✔		
HICKORY									✔		
SYCAMORE	✔			✔							
MAGNOLIA	✔			✔							
LONGLEAF PINE	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
BRADFORD PEAR	✔	✔		✔							
ARISTOCRAT PEAR	✔	✔		✔							✔
SAVANNAH HOLLY								✔			✔
RED CEDAR		✔									
CRAPE MYRTLE								✔	✔		✔

SAUCER MAGNOLIA	✔								✔		
DOGWOOD	✔						✔		✔		
RIVER BIRCH										✔	

✔= EXISTING FEATURE

TABLE S Predominant Architectural Colors and Materials

		Linden Oaks	OLD POST	DIVISION	SMOKE BOMB HILL	EAST POST	IND DIST	VAUGHN HILL	SOUTH DIST	THE AIRFIELD	GREEN RAMP
WALLS	STUCCO	23617	23617	23617	23617	23617	23617	23617	23617	23617	23617
	CONCRETE/CMU				✔	✔	23617	23617		23617	23617 / TAN
	BRICK	RED	RED	RED	TAN	TAN / RED		RED	TAN	TAN	
	METAL				23617	23617	23617	23617	23617	23617	23617
	SPLIT FACE MASONRY					✔	TAN	TAN	TAN		✔
	BRICK ACCENTS	✔		✔		✔			✔		
	CONCRETE BAND ACCENTS		✔	✔		✔		✔			
ROOFING SYSTEM	SHINGLES	RED	TILE RED	WEATHERED WOOD	WEATHERED WOOD	PATINA GREEN		WEATHERED WOOD	WEATHERED WOOD	WEATHERED WOOD	
	METAL			24084 / 23617	24084 / 23617	24084 / 23617	23617	23617	23617	23617	20040
	CLAY TILE										
	SHED					✔			4/12	5/12	
	HIP										
	GABLE	5/12	6/12	5/12	5/12	5/12	LOW SLOPE	5/12	5/12	LOW SLOPE	4/12
	FASCIA			24084 / 23617	24084	24084	23617	24084	24084	24084	20040
	GUTTERS/DOWNSPOUTS	23617	COPPER	BRONZE ALUM	24084	24084	23617	24084	24084	24084	24084
	DORMERS		✔								
	ROOF OVERHANG	2'-0"	1'-0"	1'-0"	1'-0"	2'-0"		2'-0"	3'-0"		2'-0"
WINDOWS	ALUMINUM	24084	23617	24084	24084	24084	24084	24084	24084	24084	24084
	PUNCH/BAND/SLIT		PUNCH	BAND	SPLIT	PUNCH	PUNCH	PUNCH	PUNCH	PUNCH	BAND
	GLAZING COLOR		CLEAR	SOLAR GRAY	SOLAR GRAY	SOLAR GRAY	SOLAR GRAY	SOLAR GRAY	SOLAR BRONZE	SOLAR GRAY	SOLAR GRAY
DOORS	PANEL		✔								
	FLUSH	✔		✔	✔	✔	✔	✔	✔	✔	✔
	WITH GLASS			✔		✔		✔		✔	
ENTRANCES	HANDRAILS	24084	24084	24084	24084	24084	24084	24084	24084	24084	24084
	COLUMNS	23617	23617					✔			
	COVERED ENTRY	23617			✔	✔		✔	✔		
	PEDESTRIAN LIGHTING	24084	24084	24084	24084	24084	24084	24084	24084	24084	24084
	SIDELIGHTS	24084				✔		✔	✔	✔	
	AWNINGS	20109	20109								

✔= APPLICABLE TO DISTRICT (5 DIGIT NUMBER REFERS TO FEDERAL STANDARD COLORS 595B)

For information about Transformation RFP see Chapter 3.1

> </td

MILCON TRFP ARCHITECTURAL COLORS & MATERIALS

		OLD POST	TRANSFORMATION RFP	COMMENTS
WALLS	STUCCO	23617	23617	Following areas are predominantly light tan brick or metal siding: South Post, Simmons Airfield Smoke Bomb Hill, Green Ramp and East Post. Brick accents are encouraged.
	CONCRETE/CMU		23617	
	BRICK	Red Common Brick	Red Common Brick	
	METAL		✔	
	SPLIT FACE MASONRY		23617	
	BRICK ACCENTS		✔	

	CONCRETE BAND ACCENTS	✔	✔		
ROOFING SYSTEM	SHINGLES	Red shingles	"Cool Weathered Wood" Shingles	Sloped roofs are preferred except where roof dimensions exceed 100 feet. Shed roofs are used only in South Post. Metal roofs are preferred on industrial facilities. All penetrations and objects on roofs shall be colored to match the roof color.	
	METAL ROOF	Red	23617		
	CLAY TILE	✔			
	SHED				
	HIP				
	GABLE	6 in 12	5 in 12		
	FASCIA	23617	24084 Dark Bronze - Aluminum		
	GUTTERS/DOWNSPOUTS	Copper	24084 Dark Bronze - Aluminum		
	DORMERS	✔			
	ROOF OVERHANG	1'-0"	1'-0"		
WINDOWS	ALUMINUM	23617	24084 Dark Bronze - Aluminum	Predominant "Punched" windows. Tinted windows may be solar gray or green. Match fenestration of surrounding area.	
	PUNCH/BAND/SLIT	PUNCH			
	GLAZING COLOR	CLEAR	SOLAR GRAY		
DOORS	PANEL	✔		Entrance doors are Mission Brown or Dark Bronze Storefront. Mechanical room and other exit doors match the wall color.	
	FLUSH		✔		
	WITH GLASS		✔		
ENTRANCES	HANDRAILS	Dark Bronze	24084 Dark Bronze - Aluminum	Handrails attached to the building are dark bronze. Those in the landscape away from the building are Mission Brown.	
	COLUMNS	23617			
	COVERED ENTRY	✔	✔		
	PEDESTRIAN LIGHTING	Dark Bronze	24084 Dark Bronze - Aluminum		
	SIDELIGHTS				
	AWNINGS	Terra Cotta 20109	Mission Brown 20059		

✔= APPLICABLE TO DISTRICT (5 DIGIT NUMBER REFERS TO FEDERAL STANDARD 595B PAINT COLORS. The first digit refers to the finish of the paint i.e. 2 = semigloss, 3 = flat. Colors may appear in tables with any first digit. Viewable at www.chassis-plans.com/paint_fed-std-595.html)

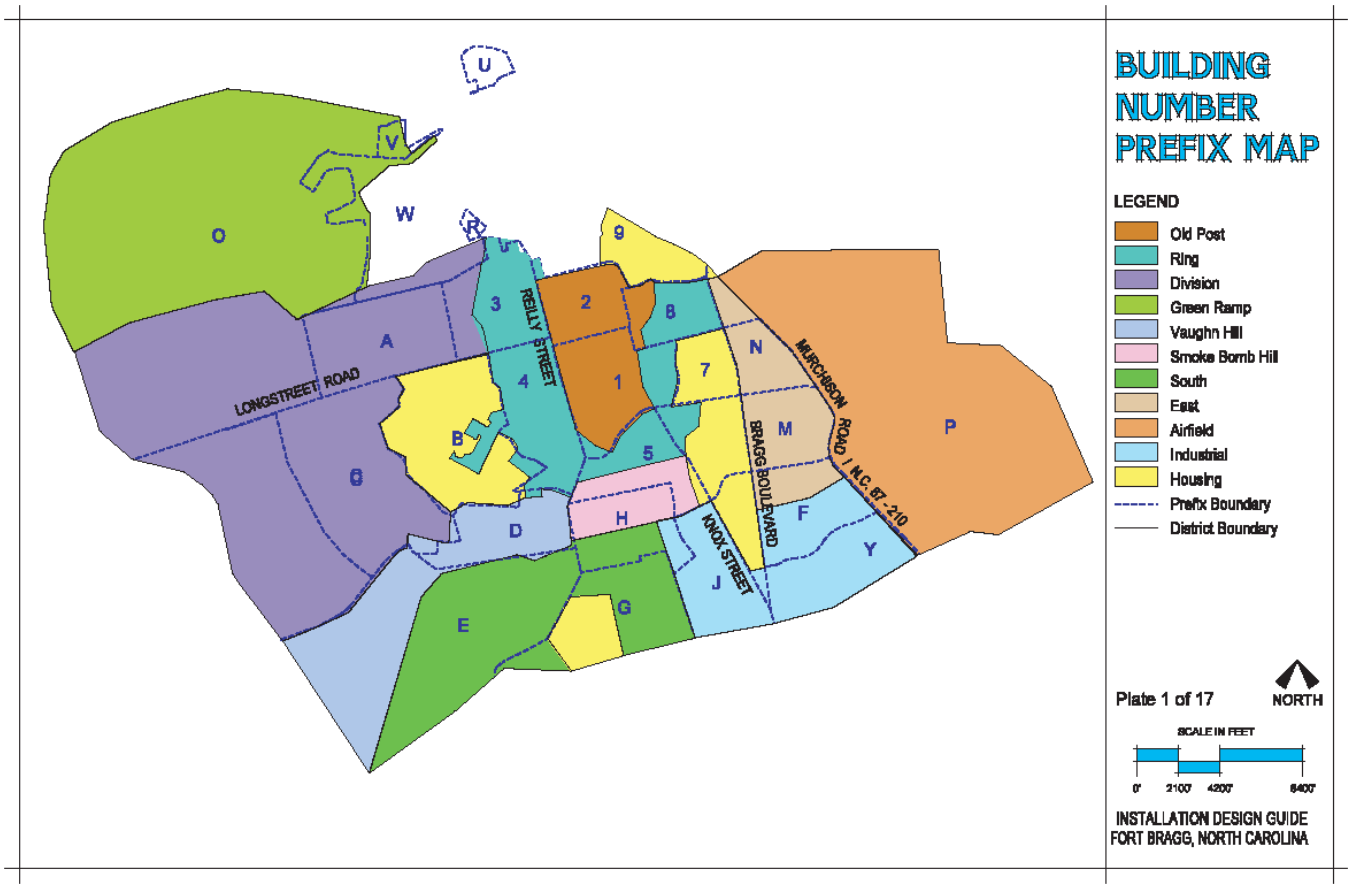
TABLE U Predominant Architectural Colors & Materials for Housing

		HOUSING DISTRICT					
		OLD POST	NORTH	SOUTH	EAST	WEST	Linden Oaks
WALLS	STUCCO	23617	23617	23617	23617	23617	
	CONCRETE/CMU						
	BRICK		RED	RED	RED	RED	
	META		WHITE	WHITE	WHITE	WHITE	
	SPLIT FACE MASONRY						
	BRICK ACCENTS		✔				
	CONCRETE BAND ACCENTS						
ROOFING SYSTEM	SHINGLES	RED	BROWN	TAN	RED	WEATHERED WOOD	
	METAL						
	CLAY TILE	RED					
	SHED						
	HIP						
	GABLE	6/12	3/12	3/12	6/12	5/12	
	FASCIA						
	GUTTERS/DOWNSPOUTS	23617	17925	17925	17925	17925	
	DORMERS						

	ROOF OVERHANG	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"		
DOORS/WINDOWS	ALUMINUM	23617	24084	24084	17925	17925		
	PUNCH/BAND/SLIT	PUNCH	PUNCH	PUNCH	PUNCH	PUNCH		
	GLAZING COLOR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR		
	PANEL	✔						
	FLUSH		✔	✔	✔	✔		
	WITH GLASS			✔				
ENTRANCES	HANDRAILS	24084	24084	24084	24084	24084		
	COLUMNS				17925	17925		
	COVERED ENTRY	✔			✔			
	PEDESTRIAN LIGHTING							
	SIDELIGHTS			✔		✔		
	AWNINGS							

✔= APPLICABLE TO DISTRICT (5 DIGIT NUMBER REFERS TO FEDERAL STANDARD COLORS 595B)

1.



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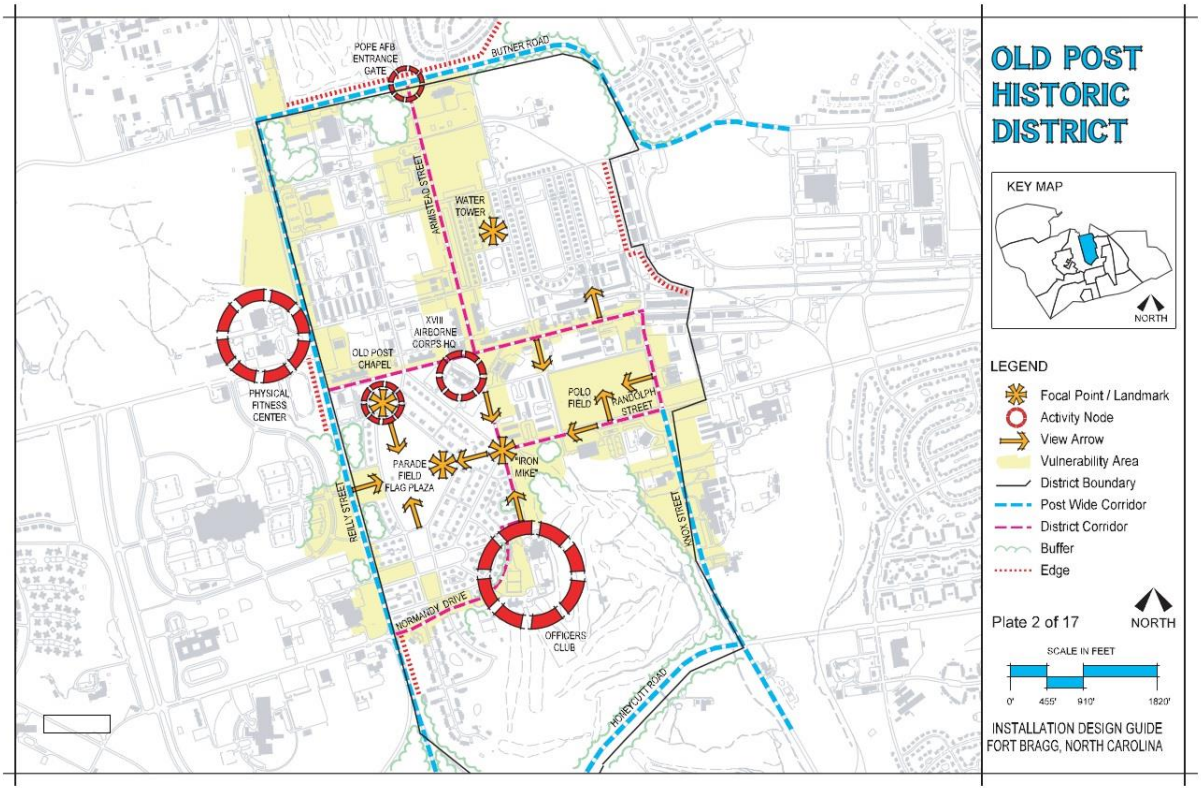
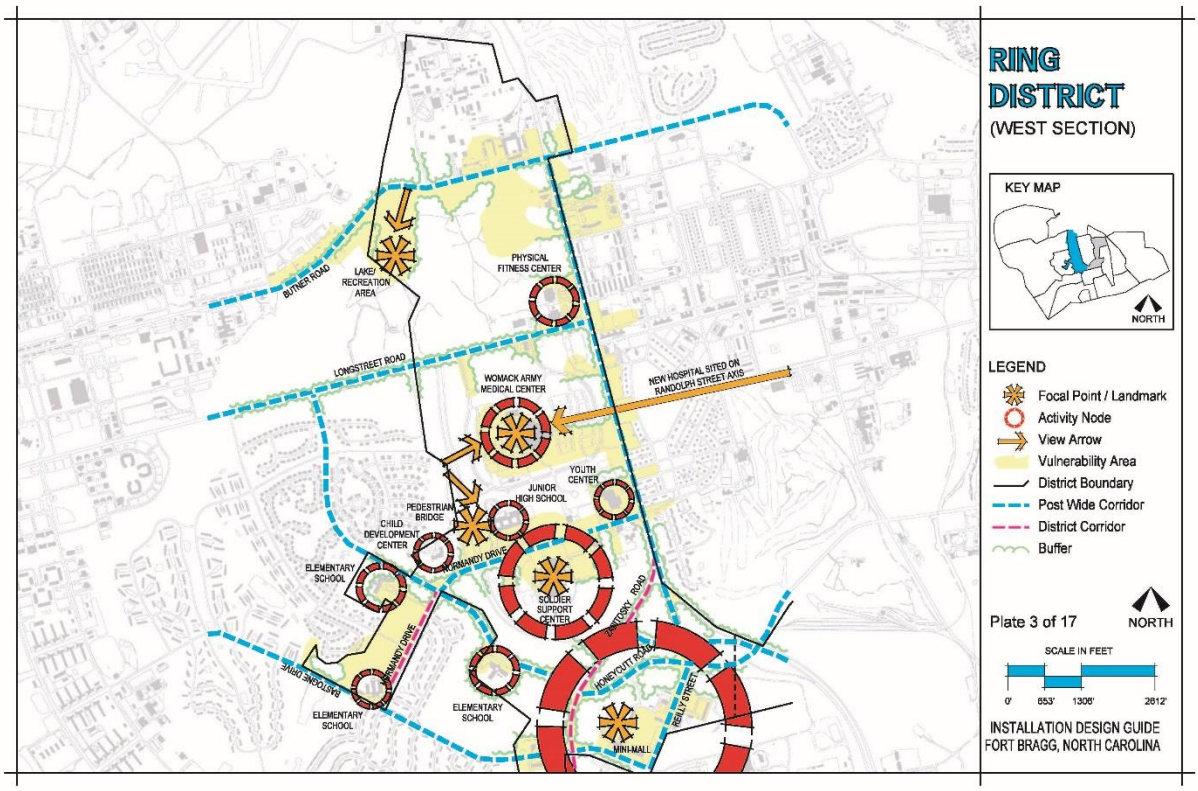
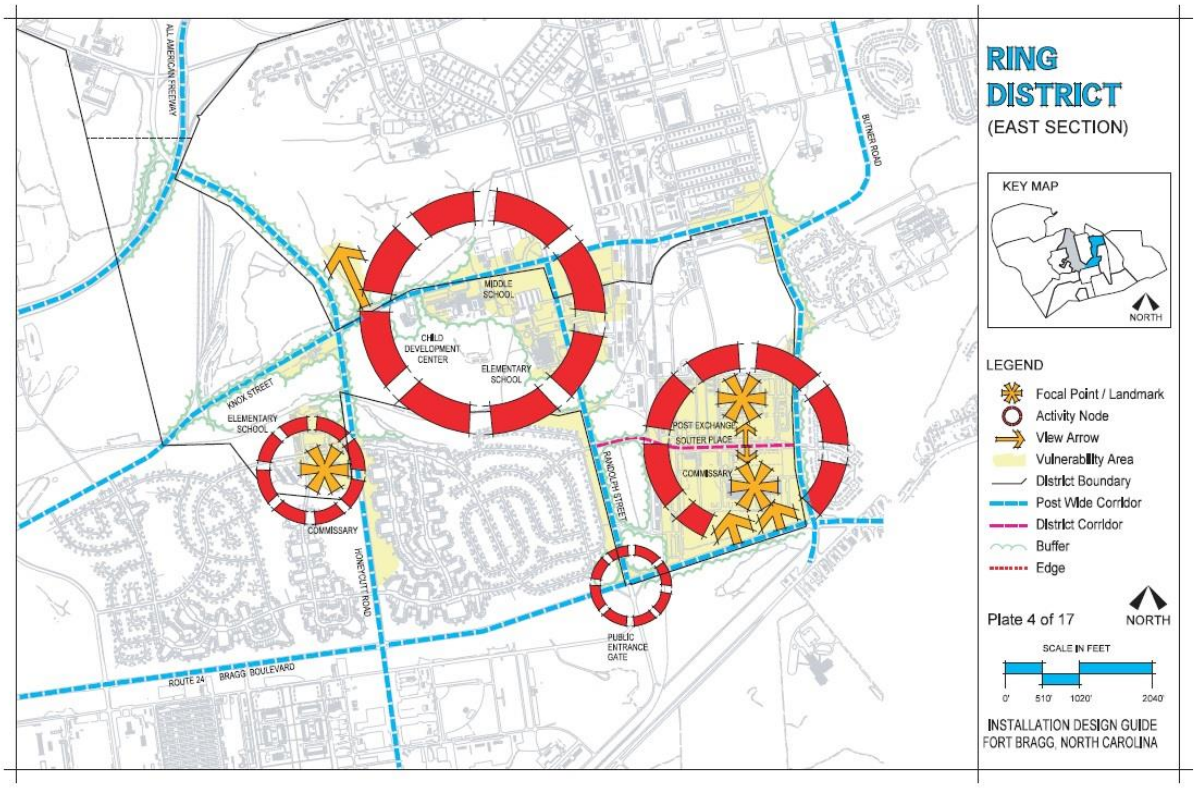
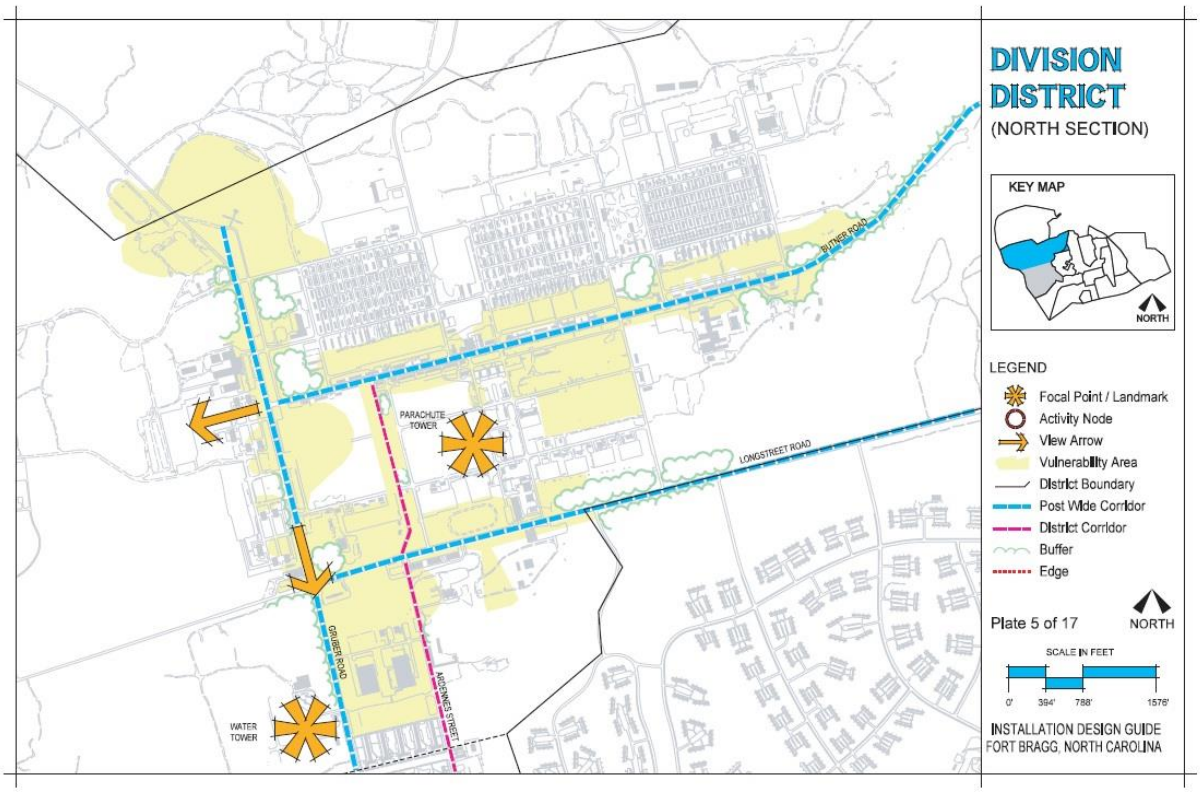
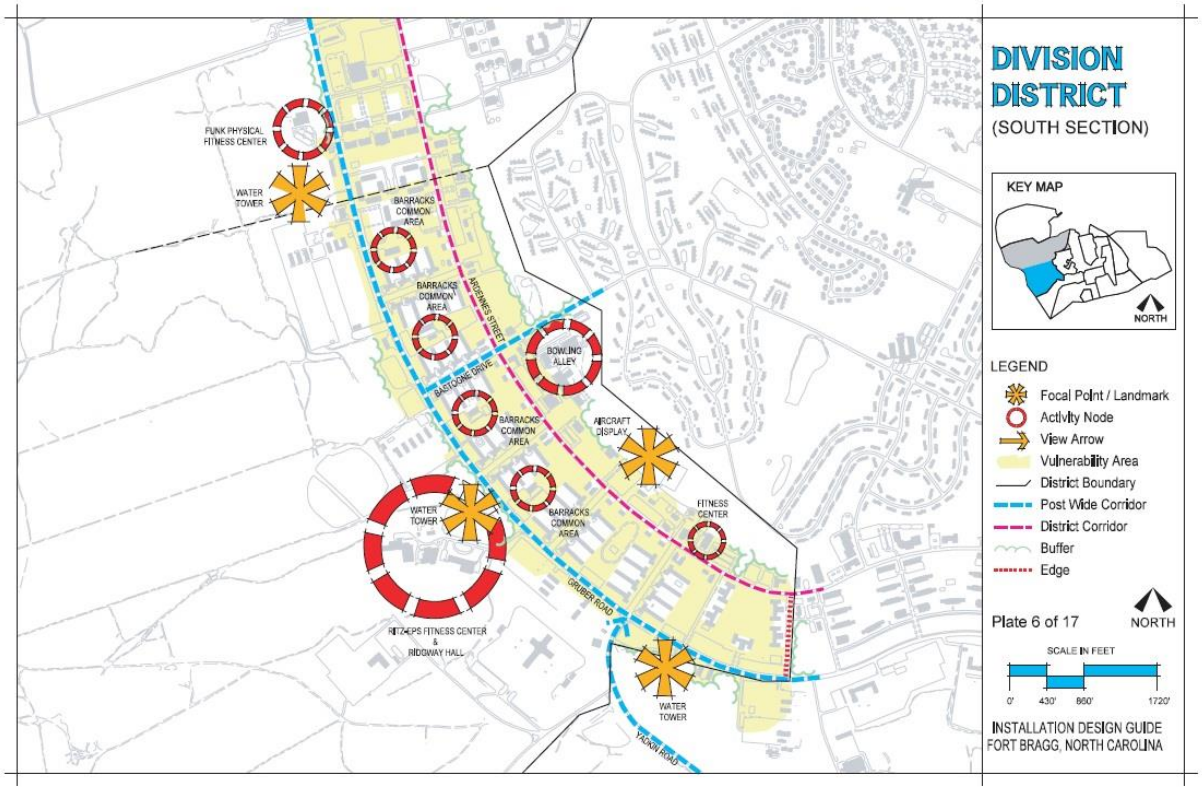

OLD POST HISTORIC DISTRICT
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Edge
Plate 2 of 17
NORTH
SCALE IN FEET
0'
455'
910'
1820'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
POPE AFB ENTRANCE GATE
BUTNER ROAD
ARMISTEAD STREET
WATER TOWER
XVIII AIRBORNE CORPS HQ
OLD POST CHAPEL
PHYSICAL FITNESS CENTER
POLO FIELD
RANDOLPH STREET
PARADE FIELD FLAG PLAZA
"IRON MIKE"
REILLY STREET
NOLEN STREET
NORMANDY DRIVE
OFFICERS CLUB
HOKE CUTT ROAD

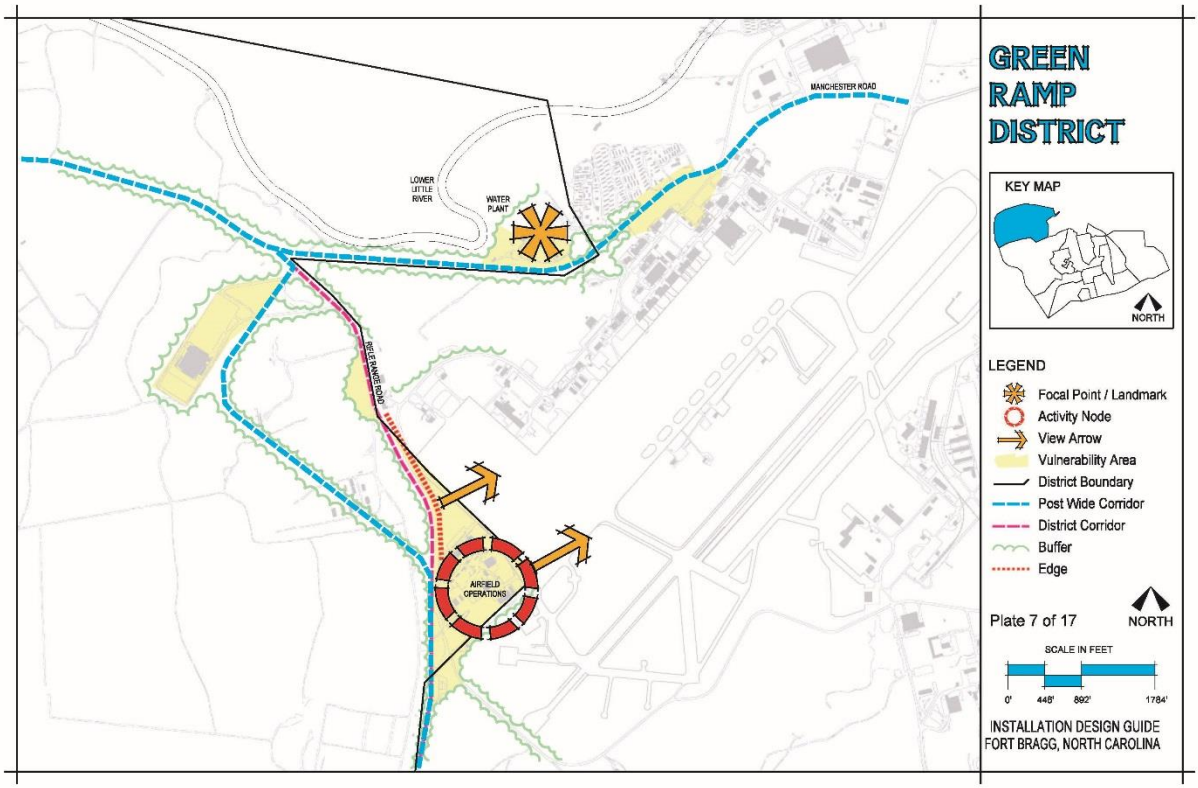
3.

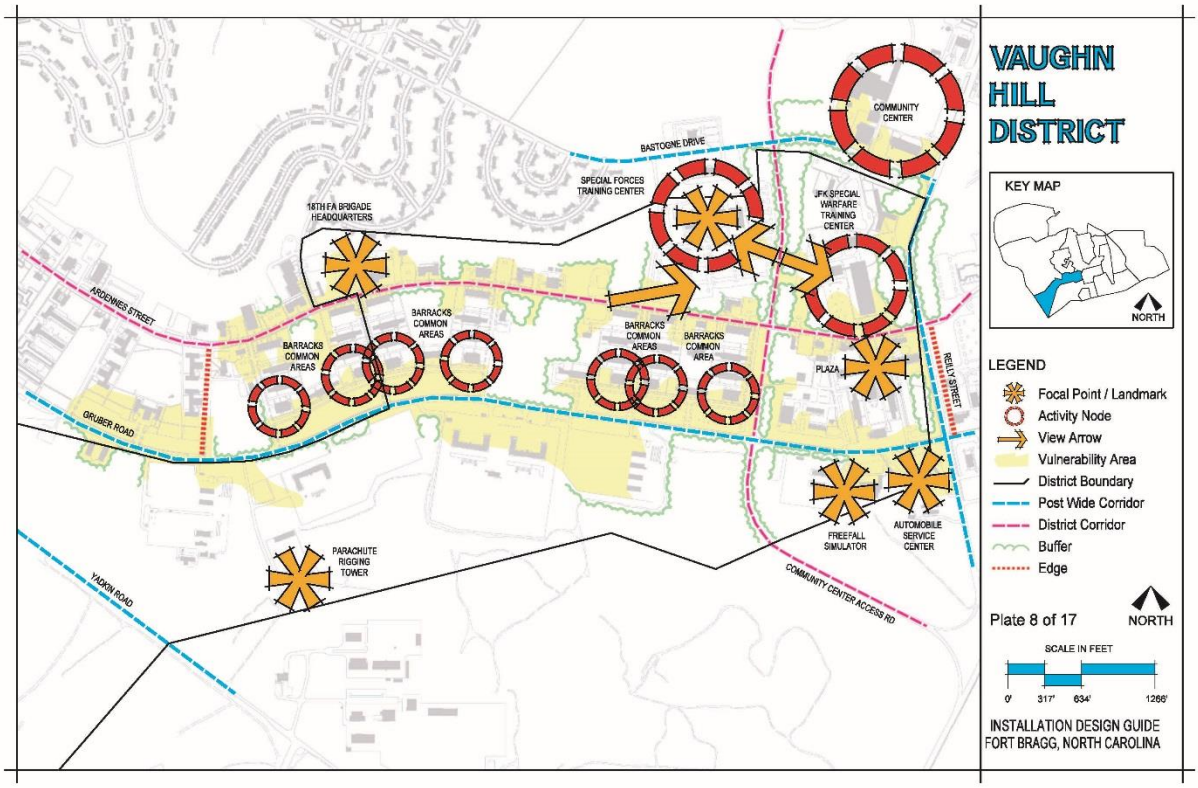

RING DISTRICT
(WEST SECTION)
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Plate 3 of 17
NORTH
SCALE IN FEET
0' 653' 1306' 2612'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
BUTNER ROAD
LAKE/ RECREATION AREA
PHYSICAL FITNESS CENTER
LONGSTREET ROAD
WOMACK ARMY MEDICAL CENTER
NEW HOSPITAL SITED ON RANDOLPH STREET AXIS
YOUTH CENTER
JUNIOR HIGH SCHOOL
PEDESTRIAN BRIDGE
CHILD DEVELOPMENT CENTER
NORMANDY DRIVE
ELEMENTARY SCHOOL
SOLDIER SUPPORT CENTER
DIXITORY ROAD
HONEYCUTT ROAD
REILLY STREET
BASTOGNE DRIVE
ELEMENTARY SCHOOL
ELEMENTARY SCHOOL
MINI-MALL

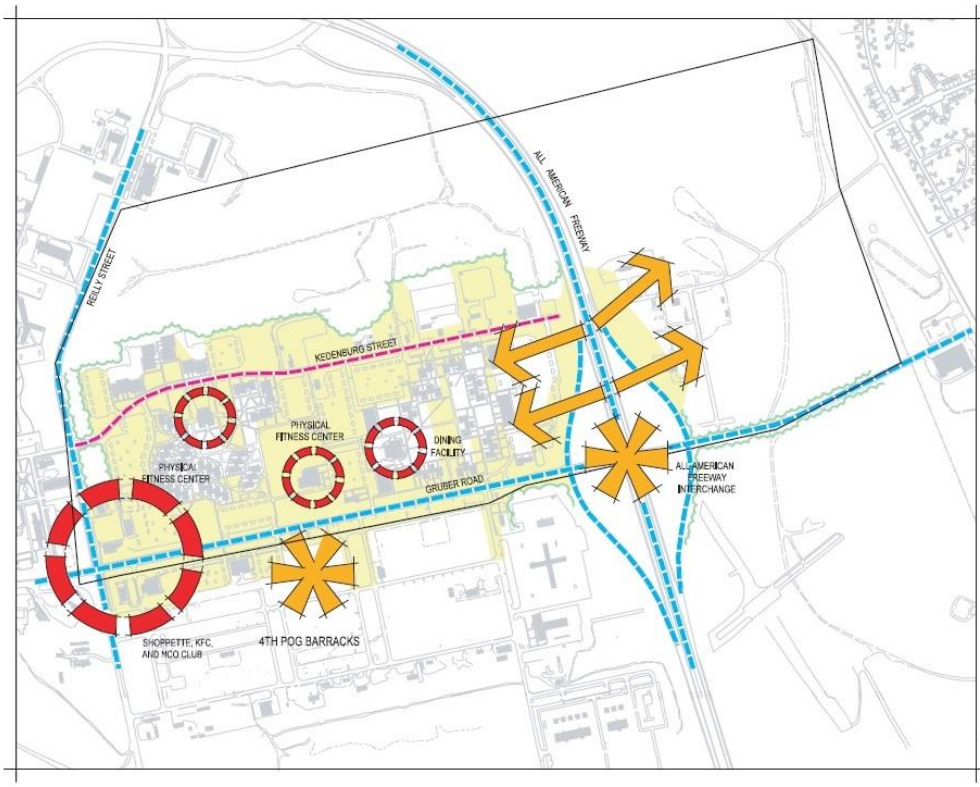

RING DISTRICT
(EAST SECTION)
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Edge
Plate 4 of 17
NORTH
SCALE IN FEET
0' 510' 1020' 2040'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
ALL AMERICAN FREEWAY
BUTNER ROAD
MIDDLE SCHOOL
CHILD DEVELOPMENT CENTER
ELEMENTARY SCHOOL
KNOX STREET
ELEMENTARY SCHOOL
COMMISSARY
HONEYCUTT ROAD
POST EXCHANGE
SOUTER PLACE
COMMISSARY
RANDOLPH STREET
PUBLIC ENTRANCE GATE
ROUTE 24 BRAGG BOULEVARD


DIVISION DISTRICT
(NORTH SECTION)
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Edge
Plate 5 of 17
NORTH
SCALE IN FEET
0'
394'
788'
1576'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
BUTNER ROAD
LONGSTREET ROAD
PARACHUTE TOWER
GRUBER ROAD
ARDENNES STREET
WATER TOWER


DIVISION DISTRICT
(SOUTH SECTION)
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Edge
Plate 6 of 17
NORTH
SCALE IN FEET
0'
430'
860'
1720'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
FUNK PHYSICAL FITNESS CENTER
WATER TOWER
BARRACKS COMMON AREA
BARRACKS COMMON AREA
ARDENNES STREET
BOWLING ALLEY
BASTOGNE DRIVE
BARRACKS COMMON AREA
AIRCRAFT DISPLAY
WATER TOWER
BARRACKS COMMON AREA
FITNESS CENTER
GRUBER ROAD
RITZ-CPS FITNESS CENTER & RIDGWAY HALL
WATER TOWER
YADKIN ROAD


GREEN RAMP DISTRICT
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Edge
Plate 7 of 17
NORTH
SCALE IN FEET
0'
448'
892'
1784'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
MANCHESTER ROAD
LOWER LITTLE RIVER
WATER PLANT
RELEASE RANGE RD
AIRFIELD OPERATIONS


VAUGHN HILL DISTRICT
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Edge
Plate 8 of 17
NORTH
SCALE IN FEET
0'
317'
634'
1266'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
COMMUNITY CENTER
BASTOGNE DRIVE
SPECIAL FORCES TRAINING CENTER
JFK SPECIAL WARFARE TRAINING CENTER
18TH FA BRIGADE HEADQUARTERS
ARDENNES STREET
BARRACKS COMMON AREAS
BARRACKS COMMON AREAS
BARRACKS COMMON AREAS
BARRACKS COMMON AREA
PLAZA
REILLY STREET
GRUBER ROAD
FREEFALL SIMULATOR
AUTOMOBILE SERVICE CENTER
PARACHUTE RIGGING TOWER
YADKIN ROAD
COMMUNITY CENTER ACCESS RD



SMOKE BOMB HILL DISTRICT

KEY MAP

NORTH

LEGEND

- Focal Point / Landmark
- Activity Node
- View Arrow
- Vulnerability Area
- District Boundary
- Post Wide Corridor
- District Corridor
- Buffer

Plate 9 of 17

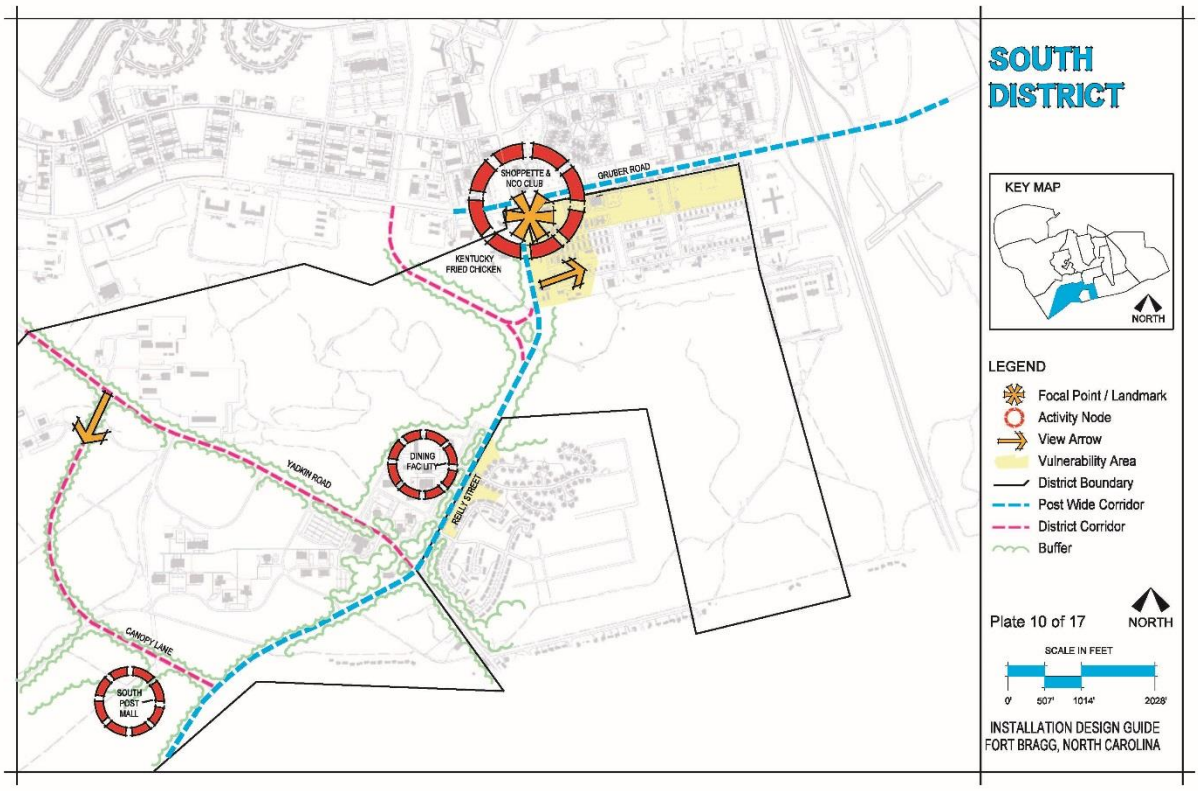
NORTH

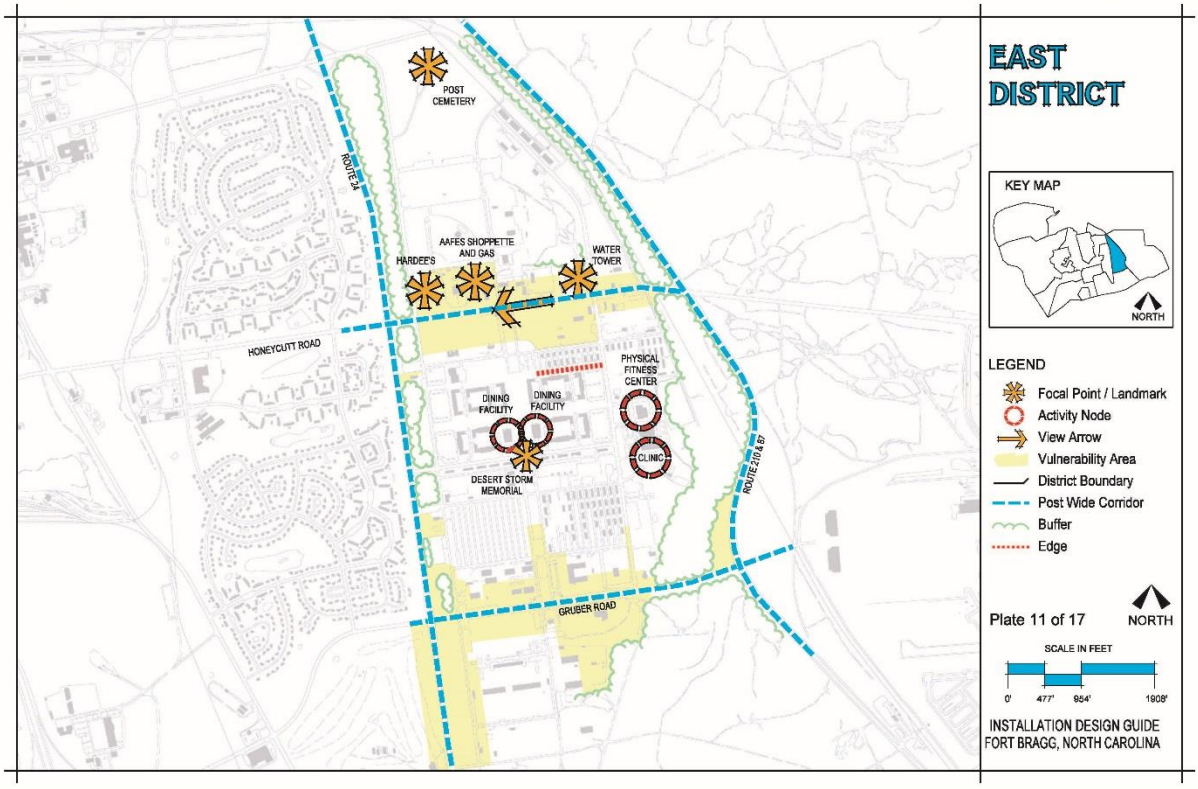
SCALE IN FEET

0' 290' 580' 1160'

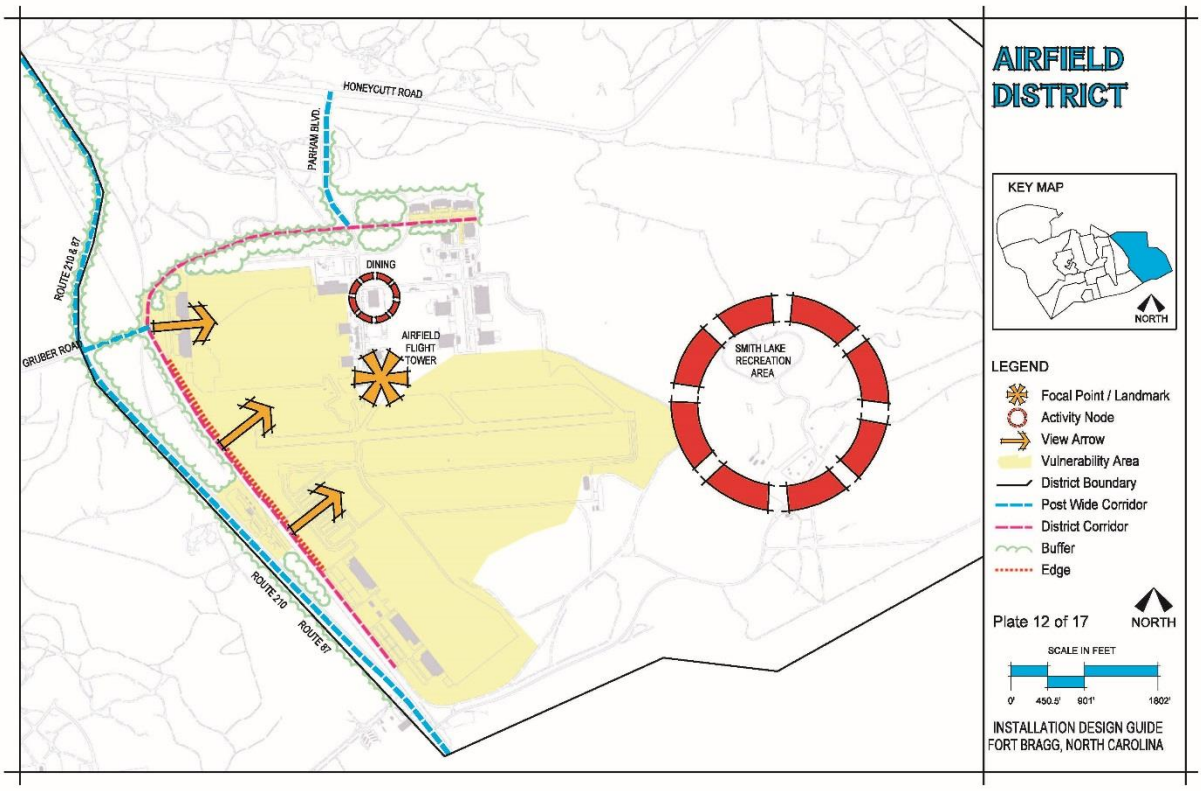
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA

10.

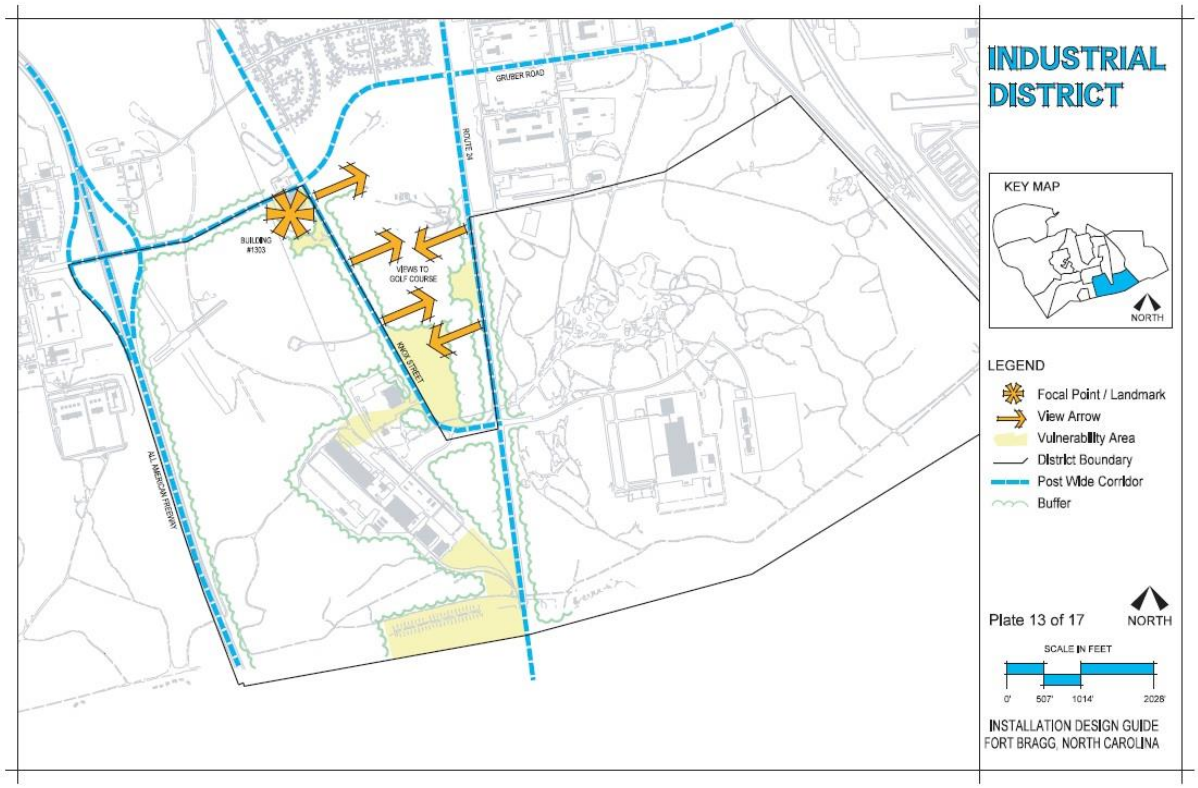

SOUTH DISTRICT
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Plate 10 of 17
NORTH
SCALE IN FEET
0'
507'
1014'
2028'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
SHOPPETTE & NCO CLUB
GRUBER ROAD
KENTUCKY FRIED CHICKEN
DINING FACILITY
YADKIN ROAD
REILLY STREET
CANOPY LANE
SOUTH POST MALL


EAST DISTRICT
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
Buffer
Edge
Plate 11 of 17
NORTH
SCALE IN FEET
0'
477'
954'
1908'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
POST CEMETERY
ROUTE 24
AAFES SHOPPETTE AND GAS
HARDEE'S
WATER TOWER
HONEYCUTT ROAD
PHYSICAL FITNESS CENTER
DINING FACILITY
DINING FACILITY
CLINIC
DESERT STORM MEMORIAL
ROUTE 210 & 87
GRUBER ROAD

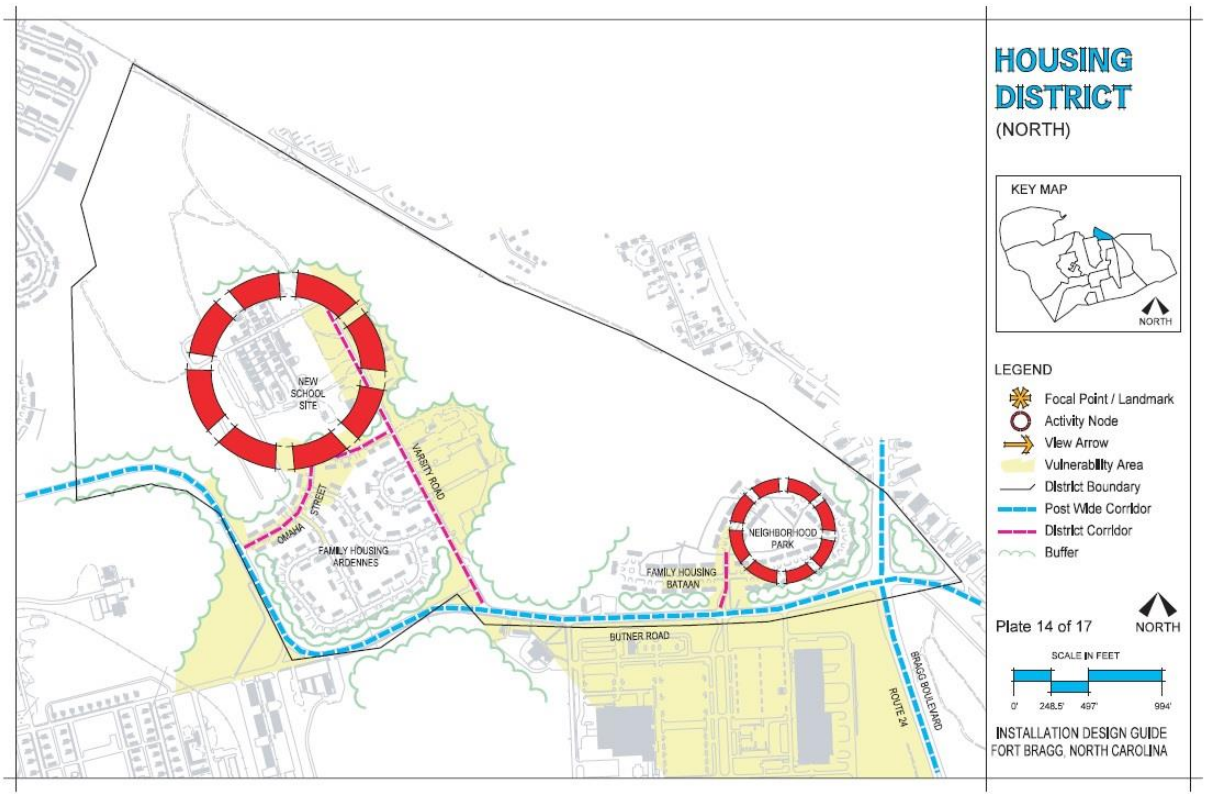
11.


AIRFIELD DISTRICT
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Edge
Plate 12 of 17
NORTH
SCALE IN FEET
0'
450.5'
901'
1802'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
HONEYCUTT ROAD
PARHAM BLVD.
ROUTE 210 & 87
GRUBER ROAD
DINING
AIRFIELD FLIGHT TOWER
SMITH LAKE RECREATION AREA
ROUTE 210
ROUTE 87

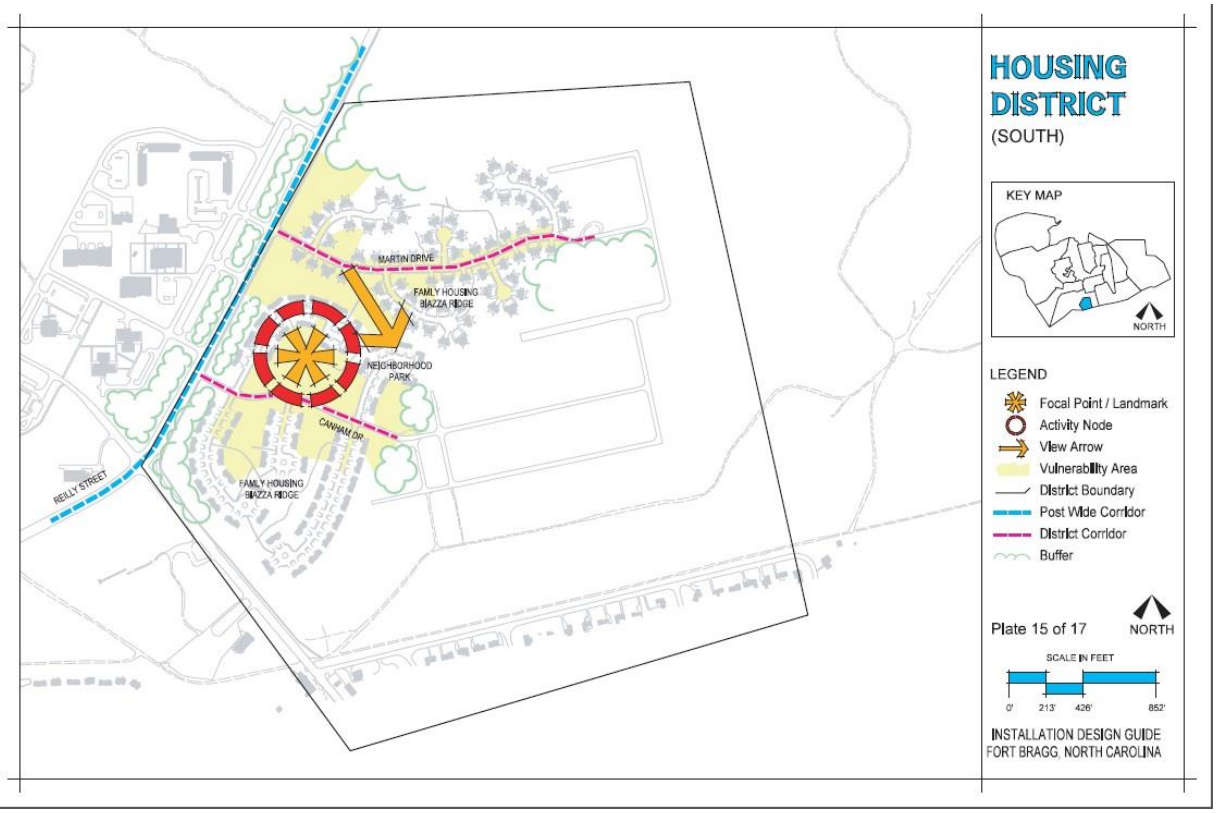
12.

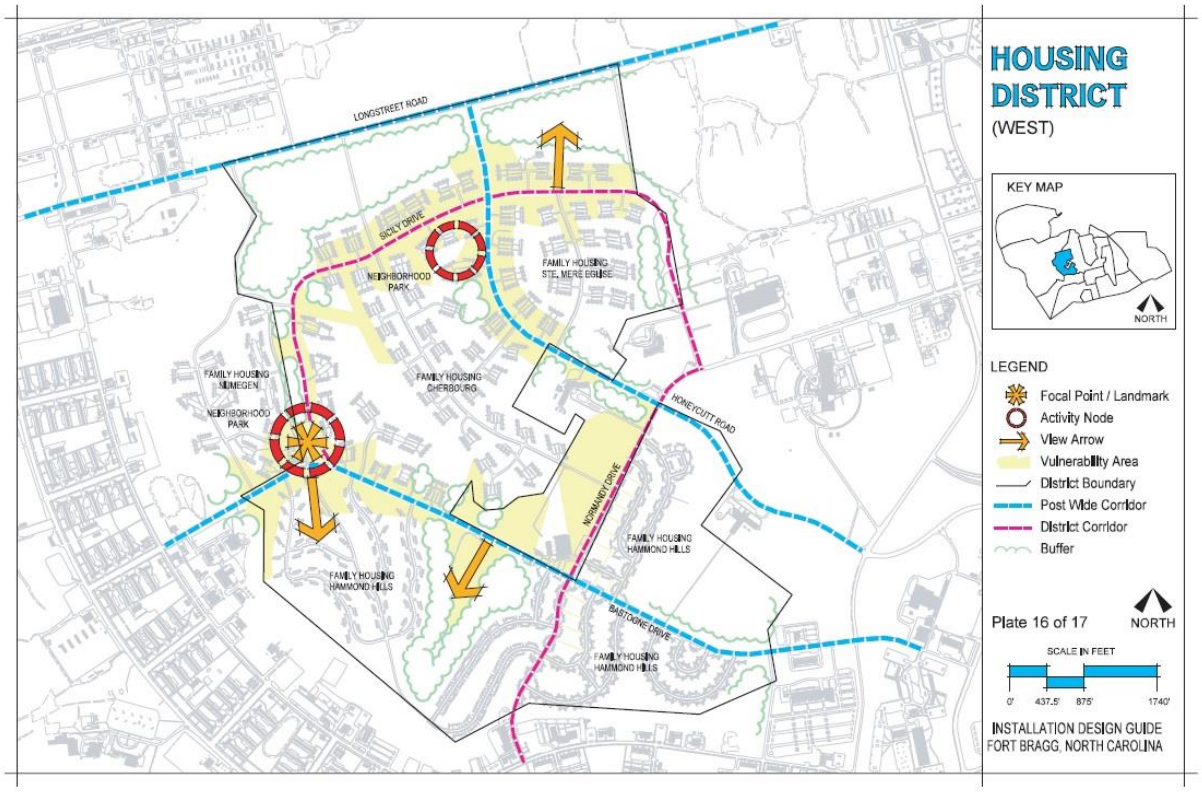

INDUSTRIAL DISTRICT
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
Buffer
Plate 13 of 17
NORTH
SCALE IN FEET
0'
507'
1014'
2028'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
GRUBER ROAD
ROUTE 24
BUILDING #1333
VIEWS TO GOLF COURSE
MACE STREET
ALL AMERICAN FREEWAY

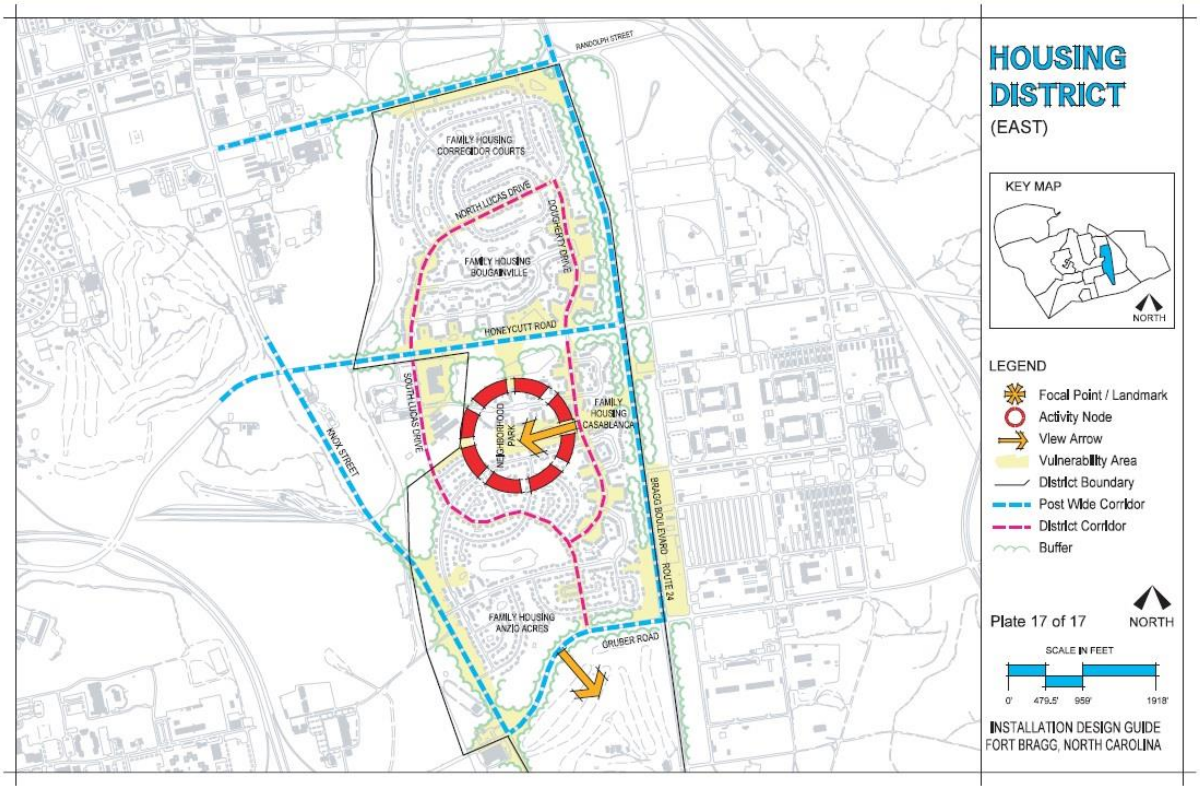
13.


HOUSING DISTRICT
(NORTH)
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Plate 14 of 17
NORTH
SCALE IN FEET
0' 248.5' 497' 994'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
NEW SCHOOL SITE
VARSITY ROAD
OMAHA STREET
FAMILY HOUSING ARDENNES
NEIGHBORHOOD PARK
FAMILY HOUSING BATAAN
BUTNER ROAD
BRAGG BOULEVARD
ROUTE 24

14.


HOUSING DISTRICT
(SOUTH)
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Plate 15 of 17
NORTH
SCALE IN FEET
0' 213' 426' 852'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
MARTIN DRIVE
FAMILY HOUSING BIAZZA RIDGE
NEIGHBORHOOD PARK
CANNHAM DR
REILLY STREET
FAMILY HOUSING BIAZZA RIDGE

15. 
HOUSING DISTRICT
(WEST)
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Plate 16 of 17
NORTH
SCALE IN FEET
0' 437.5' 875' 1740'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
LONGSTREET ROAD
SICILY DRIVE
NEIGHBORHOOD PARK
FAMILY HOUSING STE. MERE EGLISE
FAMILY HOUSING NIMEGEN
NEIGHBORHOOD PARK
FAMILY HOUSING CHERBOURG
HONEYCUTT ROAD
NORMANDY DRIVE
FAMILY HOUSING HAMMOND HILLS
FAMILY HOUSING HAMMOND HILLS
BASTOGNE DRIVE
FAMILY HOUSING HAMMOND HILLS
16.
17.


HOUSING DISTRICT
(EAST)
KEY MAP
NORTH
LEGEND
Focal Point / Landmark
Activity Node
View Arrow
Vulnerability Area
District Boundary
Post Wide Corridor
District Corridor
Buffer
Plate 17 of 17
NORTH
SCALE IN FEET
0' 479.5' 959' 1918'
INSTALLATION DESIGN GUIDE
FORT BRAGG, NORTH CAROLINA
RANDOLPH STREET
FAMILY HOUSING CORREGIDOR COURTS
NORTH LUCAS DRIVE
DOUGHERTY DRIVE
FAMILY HOUSING BOUGAINVILLE
HONEYCUTT ROAD
SOUTH LUCAS DRIVE
NEIGHBORHOOD PARK
FAMILY HOUSING CASABLANCA
KNOX STREET
BRAGG BOULEVARD ROUTE 24
FAMILY HOUSING ANZIO ACRES
GRUBER ROAD

Colorways

Khaki
- Barracks USASOC Khaki
- Company Operation USASOC Khaki
- Soldier Community Center Khaki

Neutral Almond
- Barracks Neutral Almond
- Child Development Neutral Almond
- Dining Neutral Almond
- Military Operations Neutral Almond
- Soldier Community Center Neutral Almond
- Transient Quarters Neutral Almond
- Youth Center Neutral Almond

Warm Gray
- Administration Warm Gray
- Battalion Warm Gray
- Brigade Warm Gray
- Soldier Support (Basic) Warm Gray
- Soldier Support (Enhanced) Warm Gray

Blue Gray
- Battalion Blue Gray
- Company Operations Blue Gray

Manufacturer Color Match to Federal Standard Paint Colors

Blue Gray Colorway

Federal Standard 37886	Benjamin Moore	“Winds Breath”	OC-24
	Duron	“Subtly Natural”	CWO52W
	Sherwin Williams	“Shoji White”	7042
Federal Standard 35630	Benjamin Moore	“Gray Owl”	OC-52
	Duron	“Jogging Path”	8662W
	Sherwin Williams	“Lattice”	2102
Federal Standard 36173	Benjamin Moore	“Sea Haze”	2137-50
	Duron	“Dusty Miller”	8634M
	Sherwin Williams	“Hearthstone Brown”	2109-20
Federal Standard 24084	Benjamin Moore	“Hearthstone Brown”	2109-20
	Duron	“Timber Trail”	8746N
	Sherwin Williams	“Baronial Brown”	1056
Federal Standard 20059	Benjamin Moore	“Midsummer Night”	2134-20

	Duron	“Burnt Hickory”	8816N
	Sherwin Williams	“Kohl”	1028

Khaki Colorway

Federal Standard 37886	Benjamin Moore	“Winds Breath”	OC-24
	Duron	“Subtly Natural”	CWO52W
	Sherwin Williams	“Shoji White”	7042
Federal Standard 33690	Benjamin Moore	“Philadelphia Cream”	4C-30
	Duron	“Coast Pointe”	8202W
	Sherwin Williams	“Warm Patina”	1401
Federal Standard 20475	Benjamin Moore	“Lenox Tan”	HC44
	Duron	“Balsam Bark”	8224M
	Sherwin Williams	“Croquet Tan”	1141
Federal Standard 24084	Benjamin Moore	“Hearthstone Brown”	2109-20
	Duron	“Timber Trail”	8746N
	Sherwin Williams	"Baronial Brown”	1056
Federal Standard 20059	Benjamin Moore	“Midsummer Night”	2134-20
	Duron	“Burnt Hickory”	8816N
	Sherwin Williams	“Kohl”	1028

Warm Gray Colorway

Federal Standard 37886	Benjamin Moore	“Winds Breath”	OC-24
	Duron	“Subtly Natural”	CWO52W
	Sherwin Williams	“Shoji White”	7042
Federal Standard 37150	Benjamin Moore	“Baby Fawn”	OC-15
	Duron	“Estate Greige”	8682 W
	Sherwin Williams	“Accessible Beige”	7036
Federal Standard 26521	Benjamin Moore	“Versatile Gray”	6072
	Duron	“Pewter Works”	8763M
	Sherwin Williams	“Newtrino”	1029
Federal Standard 24084	Benjamin Moore	“Hearthstone Brown”	2109-20
	Duron	“Timber Trail”	8746N
	Sherwin Williams	"Baronial Brown”	1056
Federal Standard 20059	Benjamin Moore	“Midsummer Night”	2134-20
	Duron	“Burnt Hickory”	8816N
	Sherwin Williams	“Kohl”	1028

Neutral Almond

Federal Standard 37886	Benjamin Moore	“Winds Breath”	OC-24
	Duron	“Subtly Natural”	CWO52W
	Sherwin Williams	“Shoji White”	7042

Federal Standard 37769	Benjamin Moore	"Elephant Tusk"	OC-8
	Duron	"Burma Buff"	**8201W**
	Sherwin Williams	"Linen Cloth"	**1150**
Federal Standard 20460	Benjamin Moore	"Sag Harbor Gray"	**HC-95**
	Duron	"Tavern Taupe"	8763M
	Sherwin Williams	"Khaki Shade"	**1127**
Federal Standard 24084	Benjamin Moore	"Hearthstone Brown"	2109-20
	Duron	"Timber Trail"	8746N
	Sherwin Williams	"Baronial Brown"	**1056**
Federal Standard 20059	Benjamin Moore	"Midsummer Night"	2134-20
	Duron	"Burnt Hickory"	8816N
	Sherwin Williams	"Kohl"	**1028**

Interior Colors and Materials All numbers are Fed Std color nos. B = Basic
E= Enhanced

ITEM		NEUTRAL ALMOND	KHAKI	WARM GRAY	BLUE GRAY	COMMENT
Conc Floor	B	Clear seal	Clear seal	Clear seal	Clear seal	
	E	polish	polish	polish	polish	
Carpet 2'x2' squares preferred.		J&J Applause 6488 WellDone	JJ Festival III 9473 Renaisance	J&J Link 1641 Internet	none	
		Shaw 62409 Business Savvy	J&J Function 602D Circle	J&J Emotion 5933 Tickled Pink	ShawWebsiteBL 60279 Lichen	Includes a light and dark carpet
VCT		51830 Cottage Tan	123 Wheat Mannington Essentials	259 Olivia Mannington Essentials	Mannington Inspirations 419 Tweed Medley	
		51858 Sandrift White	107 Bisque Mannington Essentials	131 Oyster White Mannington Essentials	Mannington Inspirations 200 Navy	Include a light and dark tile

Sheet Vinyl/Linoleum		85714 Asian Tan	86501 Seagate Beige	86676 Mushroom	85701 Granite Gray	Sanitary – Armstrong Corlons
		Armstrong Marmorette	Armstrong Marmorette	Armstrong Marmorette	Armstrong Marmorette	Sustainable -Armstrong Marmorette
Vinyl Base		80 Fawn	45 Sandalwood	63 Burnt Umber	38 Pewter	Johnsonite
		None	None	None	None	
Ceramic Tile Floor		DK 156 Brownstone Range	Mottled Medium brown DK50	Dapple Gray DK328	DK114 Mottled Light Gray	Daltile
		DK235 Marble	Canvas D137	DK325 Marble	6544 Mt Ash Gray	Daltile
Ceramic Tile Floor Grout		Laticrete 35 Mocha	Laticrete 35 Mocha	Mapei 09 Gray	Mapei 19 Pearl Gray	
Quarry Tile		T02 Red Flash and 0Q81 Red Suretread	QT05 Adobe Brown	T02 Red Flash and 0Q81 Red Suretread	T02 Red Flash and 0Q81 Red Suretread	Daltile
Quarry Tile Grout		Mapei 09 Gray	Mapei 09 Gray	Mapei 09 Gray	Mapei 09 Gray	
Epoxy Coating		Almond/taupe	Tan	Warm Gray	Blue Gray	With speckles
Drywall		27769	33690	37150	33630	Eggshell
		27769	33690	37150	33630	Eggshell
		20460	20475	26521	26173	Eggshell

Drywall Accent Wall						
CMU Wall		27769	33690	37150	33630	Semi-gloss
		27769	33690	37150	33630	Eggshell
Paneling		Fruitwood	Oak	Mahogany	Walnut	
Accent wall						
Ceramic Tile Wall		K165 Almond	Canvas 0137 gloss	D136 Fawn	K776 Ice Gray	Daltile Gloss
				Majorca		Daltile Gloss
CT Wall Grout		85 Almond	61 Parchment	44 Bright White	88 Silver Shadow	Laticrete
CT Base Grout		Same as floor grout	Same as floor grout	Same as floor grout	Same as floor grout	
Acoustic Wall		Taupe	Tan	Warm Gray	Blue Gray	Fabric texture
		Taupe	Tan	Warm Gray	Blue Gray	Fabric texture
Acoustical Clg		Omni directional	Omni directional	Omni directional	Omni directional	Square edge
		Omni directional	Omni directional	Omni directional	Omni directional	Reglet, GO only
Solid Ceiling		27886	27886	27886	27886	Flat except Kit &Toilet
		27886	27886	27886	27886	Flat
Trim/Moulding		20460	20475	26521	26173	Semi-gloss
Painted Door		20460	20475	26521	26173	Semi-gloss

Door Stain		Walnut	Minwax 209 Natural (oak)	Minwax 225 Red Mahogany		
Wall Covering						Roller Paint
						Recycled
Wall Cabinets		Fruitwood	Oak	Mahogany	Walnut	
Door Hardware		Brushed Stainless	Brushed Stainless	Brushed Stainless	Brushed Stainless	626 finish
Countertops		Nevemar Smoky White S-7-27T	Nevemar Wintergreen MR5-6T	WilsonArt Nebula 4634-60	Nevemar Aluminite AM6-1T	Plastic Laminate
		Nevemar Botan Allusion AL-5-2T	Nevemar Woodvine S-5-52T	WilsonArt 4550-01 Grande		Solid surface or PLAM
Cabinet Hardware		Polished Chrome	Polished Chrome	Polished Chrome	Polished Chrome	Surface Mount
		Brushed stainless	Brushed stainless	Brushed stainless	Brushed stainless	Surface Mount
Toilet Partitions		Metpar - Indian smoke	Metpar 899-58 Desert Beige	Metpar 6916-58 Fog	Metpar 6916-58 Fog	MetPar Plastic Laminate
						Solid Plastic
Toilet Fittings And accessories		Polished chrome	Polished chrome	Polished chrome	Polished chrome	
		Brushed Stainless	Brushed Stainless	Brushed Stainless	Brushed Stainless	

Window Blinds		Alabaster	Alabaster	Alabaster	Alabaster	Tempered Aluminum
		Alabaster	Alabaster	Alabaster	Alabaster	Tempered Aluminum
Electric Panels Conduit		Paint to match wall color	Paint to match wall color	Paint to match wall color	Paint to match wall color	Where exposed to public
		Paint to match wall color	Paint to match wall color	Paint to match wall color	Paint to match wall color	Where exposed to public
Electric Faceplates		Bone	Bone	Bone	Bone	
		Brushed Stainless	Brushed Stainless	Brushed Stainless	Brushed Stainless	
Water Cooler		Taupe	Tan	Warm Gray	Blue Gray	Fabric texture
Interior Signs		Brown/white letters	Brown/white letters	Brown/white letters	Brown/white letters	
		System 2/90	System 2/90	System 2/90	System 2/90	
Bulletin/Tack Boards		Taupe	Tan	Taupe	Taupe	
		DK Bronz Alum	DK Bronz Alum	Clr Anod Alum	Clr Anod Alum	Frame
Interior Glass Partitions		Clear	Clear	Clear	Clear	
HVAC Grilles		Wall – brushed aluminum	Wall – brushed aluminum	Wall – brushed aluminum	Wall –brushed aluminum	
		Clg -white	Clg -white	Clg -white	Clg -white	