

# Moody Air Force Base

## Architecture / Engineering Design Guide



**Published: July 2016**

## **INTRODUCTION**

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### **Moody's' Impact**

The local economy benefits from Moody AFB expenditures for salaries, contracts, construction, retirement pay, tuition aid to schools, health insurance payments, and off-installation accommodations for travelers. Moody AFB employed 6,066 military, civilian, and other personnel in fiscal year 2010, with an annual payroll of approximately \$300 million. Through service and construction contracts, including primary and secondary employment and payrolls, it is estimated that the total economic impact of Moody AFB on the city of Valdosta and the local area amounts to approximately \$448 million annually.

### **The Guide**

This guide contains design checklists to be used in developing functional, aesthetically pleasing, reliable, and maintainable facilities and systems constructed by and for the Air Force. The generic guide will help personnel in charge of the planning, designing, constructing, operating, and maintaining Moody Air Force real property.

This contains guidance that applies to all new construction and to major rehabilitation, alterations, and repair of existing facilities and systems. It applies to all facilities constructed on Moody AFB, Grassy Pond recreation area and Avon Park FL installation.

This guide is intended to serve as a convenient guide to be used in the review and checking of plans and specifications for construction projects. This guide should also be utilized in the early planning stages to determine if all Sustainment Repair and Maintenance (SRM) requirements are being considered for the project. Its main usefulness is to identify and highlight the most prevalent omissions and discrepancies in facility designs.

A secondary feature of this guide provides a feedback system from the field on "lessons learned." A "lesson learned" is any experience of value having applicability in furthering the goals of the SRM facility program. Lessons may depict successes on innovative techniques, or they may depict deficiencies or problems to be avoided in future designs.

This generic guide is not intended to cover every situation; it is a tool to aid the planner, designer, contractor and maintainer to focus on materials, methods, and system components to enhance Reliability and Maintainability throughout the life of each facility.

The submittal of "lessons learned" from the users, craftsmen, technicians, designers, and construction managers is highly encouraged. This provides a means for continual improvement and refinement, thereby increasing the future value and usefulness of the guide. Handwritten forms and freehand sketches are acceptable.



POC's:  
23D Civil Engineer Squadron  
Base Architect  
Chief, Design & Construction  
Chief, Engineer

23CES/CENMP  
23CES/CENM  
23CES/CEN

Victor C. Bivins  
C. Anthony Payton  
William S. Bryan

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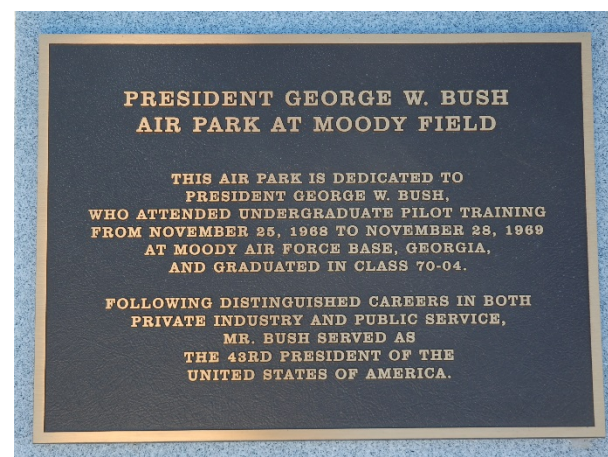
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## 1.0 GENERAL

Moody Air Force Base, Georgia

The following guidance is provided for the design and construction of new facilities and the remodeling of existing facilities on Moody Air Force Base. All engineers and planners shall use this guidance in the preparation of their design documents and shall provide this information to Architect-Engineering firms that are preparing project designs for the base. These guidelines are intended to show the minimum acceptable standards.

### 1.1 Construction Documents

#### 1.1.1. Specifications:

Specifications for each project shall conform to the CSI standard. Designers shall use editing software to manipulate UFC specifications as listed below or use Moody Air Force Base, Specifications Guide.

Specifications shall be based on the Unified Facilities Guide (UFC) specifications. (See web site below.)  
[http://www.wbdg.org/ccb/browse\\_org.php?o=70](http://www.wbdg.org/ccb/browse_org.php?o=70)

**1.1.2. Tri-Service Standard:** Drawings shall conform to Tri-Service Standards.

**1.1.3. Drawing Requirements:** The following are the minimum drawings required for a project

Title sheet, to include:

the title of the project

the project number

index of drawings

Base map vicinity plan

Base map, with the project location and the Civil Engineering, the Contract Management, and the Contracting office locations

Moody AFB title block with the appropriate information

Each specification sheet and/or individual drawing submittal shall be identified by Title. (i.e. "35% Submittal," "65% Submittal," etc.)

Existing and proposed Site Plan (except for projects for interior renovations only)

Demolition drawings (if necessary)

Foundation/footing Plan

Existing and final Floor Plan with Code Analysis

Reflected Ceiling Plan - Include HVAC diffusers and returns, the drop in fluorescent light locations, and

heat detectors, to ensure proper layout of all disciplines

Roof Plan (if necessary)

Elevations

Wall and Building Sections

Elevation Details, Window and Door Schedules

Plumbing Plan and Riser Diagrams

HVAC Plan and Schedules

Mechanical Schedules and Details - Include all set points, flow rates, control and riser diagrams, electrical voltage ratings, current requirements and equipment schedules.

Lighting Plan and Fixture Schedule

Power Plan and Riser Diagrams - Include Communication Systems

Electrical Schedules and Details

Fire Detection/Protection Plan

#### 1.1.4. Drawing Format

All final drawings shall use the CSI format

All drawings should be on 24"x36" standard size or 30"x42" sheets.

Each sheet will be numbered in sequence and referenced in the legend on the cover sheet.

Drawings will be submitted in electronic format in uncondensed form, .PDF files and .DWG files in AutoCAD 2014. The Base Civil Engineer representative will provide guidance regarding file names.

#### 1.1.5 As Builts

Designer shall require one complete set of Contract Documents to remain on site to be updated daily of any conditions that deviate from the original Contract Documents. Electronic CADD and PDF as Built drawings shall be turned over to the owner as part of the close out documents.

## 1.2. EXTERIOR SIGNAGE

The UFC 3-120-01, Air Force Sign Standard establishes guidance for all exterior signs used on Moody AFB. Its purpose is to manage the quality, placement, and number of signs on the installation and to ensure attractive, professional, easy to read,



well maintained, and uniform sign standards throughout the installation. Proper use of signs has a major effect on the appearance of our base and will professionally communicate direction and location of those functions and activities that truly warrant identification. This instruction will specify materials, construction, and methods, to ensure signs are easy to maintain and easy to change.

(ACCI 32-1054 and Moody Supplement must also be used for signage.)

### 1.2.1 General

All exterior signs will be consistent throughout each installation. Do not use moving signs. LED signage can be used if design has been reviewed and approved by the Base Architect.

Location and content of all exterior signs shall be subject to approval of the Base Civil Engineer. The number of signs will be held to a minimum. Site signage must provide clear, consistent, and necessary direction or information. Correctly designed and controlled signs can be a positive aspect of the installation's overall professional image.

Signs shall be designed in accordance with UFC-3-120-01. Lettering shall be Helvetica Medium type style, except Helvetica Regular type style shall be used for subordinate information on building and organization identification signs.

Organization names should normally be shortened to the minimum required to describe the function, for example, "Self-Help Store," not "Civil Engineering Squadron Self-Help Store" or "Moody AFB Self-Help Store."

Signage for facilities that house the command section of an organization should include the number of the squadron preceding the organization, for example, "3rd Flying Training Squadron." Only commonly understood abbreviations will be used.

Monument signs are discouraged but may be authorized and must have approval from the Base Architect. (Figure 1-2d)



1-1a Squadron Identification.

Limit signs to function identification and address, and ensure they are easily readable from the street; avoid miscellaneous emblems, logos, and direct-paint applications.

### 1.2.2 Building Identification Signs:

Building and street address numbers shall be used to identify all facilities.

Two options for building ID signs are signs attached to the building and stand-alone signs.

Use only one sign per building except for customer service facilities or large buildings where more than one function is present.

Street addresses will be displayed only on the main entry door.

For entryway bronze Helvetica letter above entrance. (Figure 1-2c)

All facilities shall be identified with three dimensional numbers mounted on the corner most visible from the nearest primary road.

The numbers shall be non-ferrous material, dark bronze in color. Height of numbers shall be selected based on viewing distance and building size.

Individual Air Force bronze anodized Helvetica style aluminum letters shall be used for identification signs on facility walls.

The use of freestanding building identification signs shall be allowed only when building-mounted signage is not feasible.

If a freestanding sign is required, it shall be designed in accordance with UFC 3-120-01, Chapter 4 – Exterior Identification Signs, Type B3 with the following modifications:

Signs shall be aluminum post and panel design with 3-inch square posts.

Only use ACC and wing decals when using Type B2 signs with decals.

Finish shall be fluoropolymer (Kynar 500) coating, or equal.

Locate organization identification in upper left corner, and street address in lower left corner.

Building number may be included but shall be distinguishable from the street address.



1-2b Dark bronze dimensional numerals identify facility number



1-2c Entry way designation above entrance



1-2d Base Ops free-standing identification sign

### 1.2.3 Other Identification Signage

Additional identification signage may be required on important buildings, such as headquarters, or facilities with significant visitor use (Hospital Administration Moody Field Club, etc.). Base Civil Engineering will evaluate each facility individually.

Individual dimensional letters shall be fabricated from dark bronze non-ferrous material, using uppercase Helvetica Medium type style.

Height of the letters shall be selected based on building size and viewing distance (Figures 1-2e & 1-2f).

Organizations wishing to identify their facilities with a group or squadron patch will be permitted to do so with the approval of the 23 WING.

Patches shall be no larger than four feet at the widest point.

Patches shall be constructed on a raised surface and attached to the facility wall and must present a professionally designed appearance.

Wing/Group level organizations may identify their headquarters buildings with monument type signs or building-mounted plastic letters affixed to the structure.

Identify obscure buildings (well houses, sewage lift stations, etc.) with no more than a building number.

Service or commercial activities (Commissary, BX, snack bars, etc.) shall use building mounted signs with individual letter.

Commercial signature brands may use their signature logos and may display only one sign per building.

Water/POL tanks shall be painted simply in earth tone colors.

The AF symbol with "U.S. Air Force" shall be applied.

No other decals, graphics, or lettering such as shields, mottos, or emblems are authorized.

AAFES/DeCA/Commercial signs shall comply with the following:

Format shall be AAFES logo (where applicable) followed by facility name



1-2e Building Mounted Identification Signage



1-2f Building Mounted Identification Signage

Logo and facility name shall be the same height and positioned on one continuous horizontal line wherever possible

Facility name shall be spelled out completely with individual letters

Logo and letters shall be mounted directly to the building fascia or exterior wall adjacent to the facility's main entrance. The back edge of logo and letters shall be ¼ inch from the face of the wall for fascia.

Logo and letters shall be light or dark bronze anodized aluminum or other non-corrosive material in a light or dark bronze color.

Logo and letters shall be available in even height increments from 2 to 16 inches. Choose appropriate size and color for each facility and location.

The ratio of height to depth of logo and letters shall be approximately 8 to 1.

When night visibility is functionally required, use external flood or spot lights that illuminate both the sign and the adjacent landscape/building



instead of using internally lighted signs, which give a commercial impression.

#### 1.2.4 Information and Motivational Signs

Placement and content of these signs shall be reviewed on an individual basis by the Base Civil Engineer, with an emphasis on maintaining a unified image for the base.

#### 1.2.5 Directional Signs

Directional Signs should follow UFC 3-120-01, Chapter 5 – Direction Signs.

Vehicular directional signs shall be designed in accordance with UFC 3-120-01, Type D2 with the following modifications:

Use white reflective letters on brown background with posts.

Signs shall match construction of existing directional signs at Moody (Figure 1-2g) and shall be constructed of aluminum plate with treated wood 4 x 4 posts. Posts and sign back shall be painted dark brown.

Mounting height shall match height of existing directional signs on base.

Signs shall be located to maintain clear sight lines at intersections, parking lot entrances, etc. (Figure 1-2h)

Install directional signs only where frequently needed to guide visitors and new base personnel. Exception: destinations which might otherwise be difficult to locate.

No more than four entries shall be displayed on each sign.

#### 1.2.6 Street Name Signs

Street name signs shall have a brown background with white letters and brown posts.

Each sign plate will have a height of 6 inches, and length will be dependent upon the number of letters used, with a maximum length of 30 inches.

Street name letters and numbers will be 4-inch upper case.

The bottom of each sign will be mounted no more than seven feet above the ground.

There shall be a street name sign for each street at intersections.



1-2g Directional Sign



1-2h Street sign at intersection

#### 1.2.7 Graphics

To reduce visual clutter, do not use super graphics, poorly designed signs, and outdated information.

Design graphics to function – define entrances, identify building numbers, and conceal clutter.

Use graphics to relate buildings to each other instead of making a building prominent.

Avoid using high-color contrasting bands and stripes on new buildings or painting structural columns and beams.

Limit unique signing to high-visibility locations where highlights are required to support the architectural theme.

Except for painted masonry and metal buildings, identification signage should only be located in adjacent landscaped space at eye level rather than being attached to walls or fascia.



### 1.2.8 Regulatory Signs

Posts for all regulatory signs shall be galvanized steel.

Exception: Signposts at Grassy Pond Recreational area may be preservative-treated wood (Figure 2-2i).

All posts and sign backs shall have brown finish to match building identification and directional signage.

Traffic regulation signs (Figure 1-2k) shall be designed in accordance with the Manual of Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration.

Base warning signs shall comply with UFC 3-120-01.

Parking regulation signage shall comply with UFC 3-120-01. Where post-mounted signs are used, posts shall be located to avoid vehicle damage. Handicapped accessible parking spaces shall be identified with a post mounted international symbol of accessibility in compliance with the Architectural Barriers Act. Reduce the number of parking signs by strictly limiting reserved parking, including temporary reserved parking.

Reserved parking signs shall comply with AFI 31-204 Moody Sup 1, including paragraph 4.8.2.1 and 4.8.3.4.

Work area and personnel safety regulation signs shall comply with OSHA requirements and applicable Air Force regulations.

Condense and consolidate information to minimize the number of signs.



2-2i Sign posted at Grassy Pond



2-2j Parking sign at Grassy Pond



2-2k Examples of Regulatory signs

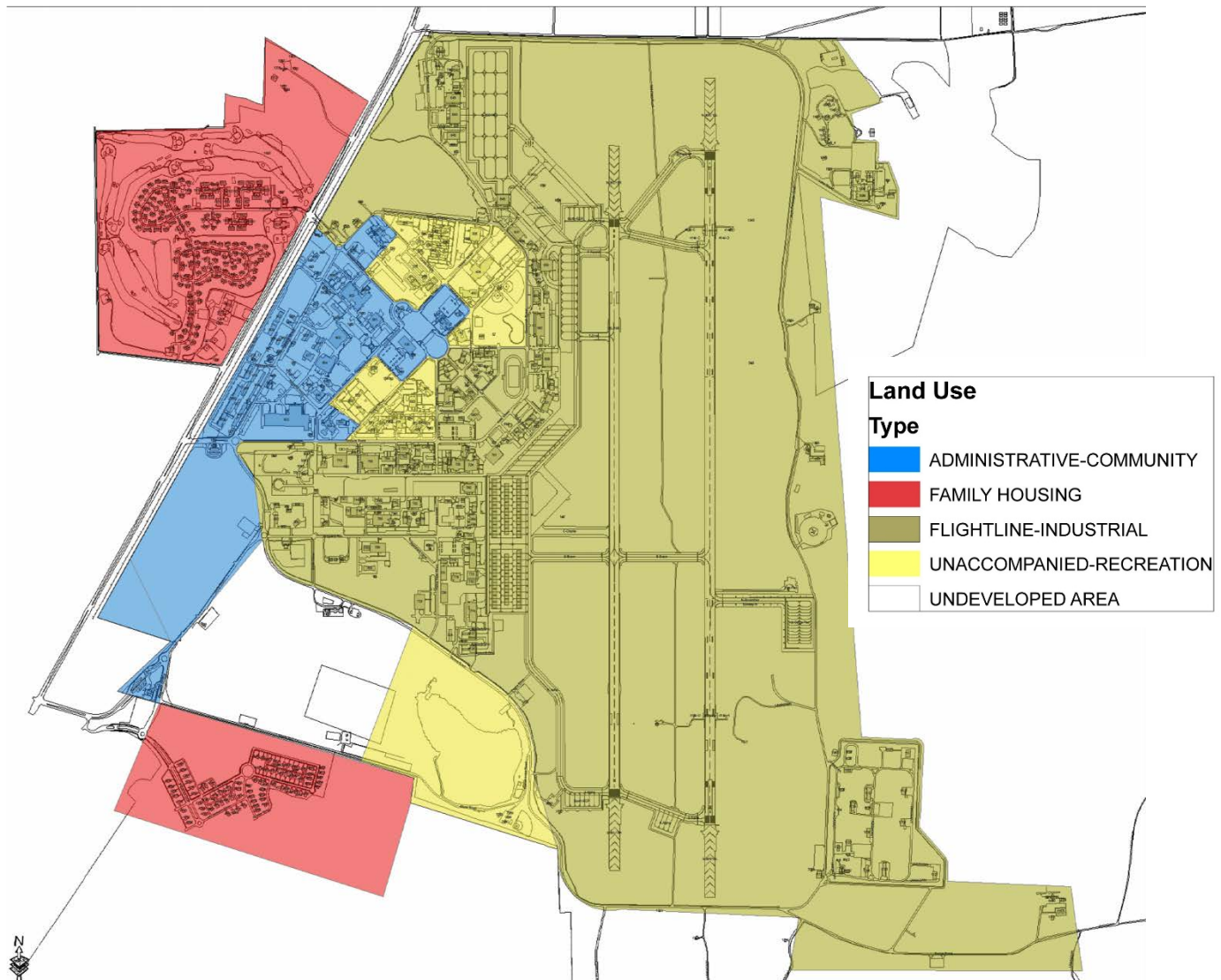
## 2.1 Visual Areas

The *Moody Architectural/Engineering Design Guide* organizes the physical environment of the base into six visual areas. There are three zones within the main cantonment area of the base: **Admin/Community**, **Unaccompanied Housing**, and the **Flight Line/Mission Area**.

The **Family Housing** zone is separated from the rest of the base by Bemiss Road. The **Open Space** zone includes undeveloped land on the east side of the base. **Grassy Pond** is a recreational area located 27 miles southwest of the base.

Each area is defined by land use and the proposed palette of building materials.

Design recommendations for each area are coordinated to allow facilities to harmonize with the immediate surroundings, as well as support the overall design goals for the base.



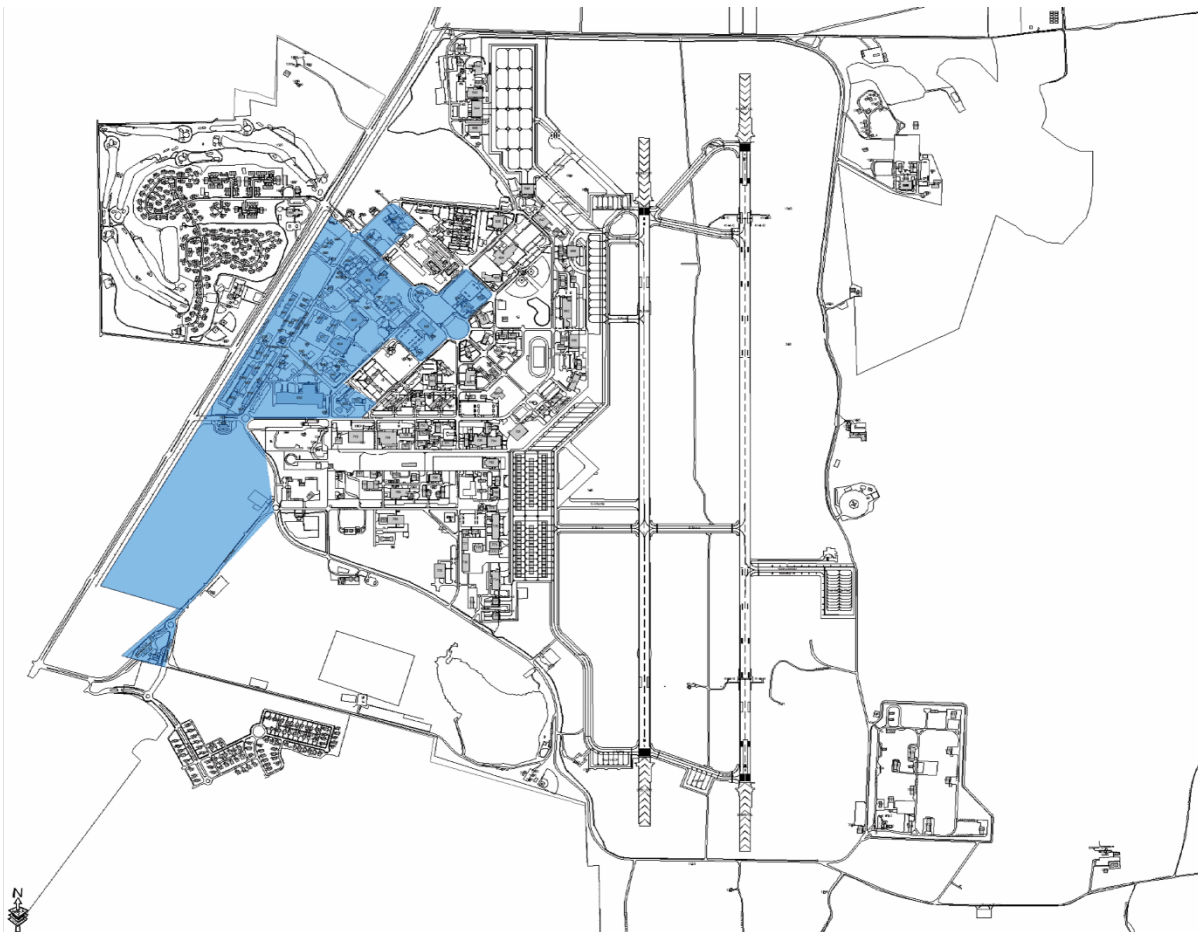
### 2.1.1 Admin-Community Area

The Admin-Community Area is the core of the cantonment area. Facilities in this zone include headquarters buildings, community center, shopping, recreation, medical and worship facilities. Located near the north gate, it is a public-oriented area and the first image of the base for most visitors

A variety of materials and colors exist on the buildings in this zone. There are different colors of wood siding, some stucco buildings or stucco used as accent with other materials, and approximately six different colors of brick. Most buildings have sloped roofs with either dark bronze metal roofing or asphalt shingles. An effort has been made to renovate many of the flat roofs with sloped roofs, but a few flat roofs remain.

Because there is such a variety of materials and colors existing within this zone it is necessary to have guidelines that will create overall visual unity rather than small-scale compatibility between adjacent buildings.

To establish a unified image for the area, future facilities will be designed with sloped roofs, dark bronze metal roofing, and brick shall match adjacent structures and shall be approved by the Base Architect during design.



2.1.1 Administrative-Community Visual Area

The medical buildings create a small campus within the Admin-Community area. These buildings stand out as a group from the surrounding structures due to the use of burnt orange/tan brick, wide stucco fascia's and similar precast concrete accents.

### **2.1.2 Site Planning**

Focus on pedestrian circulation. Provide safe, convenient paths linking administrative areas with popular destinations.

Site new facilities in accordance with the Moody AFB General Plan.

### **2.1.3 Building Form**

Maximum height for all buildings is two stories unless a variance is requested.

Building entrances should be easily visible from the street and parking areas.

Arrange building forms to create easy pedestrian flow from adjacent structures.

### **2.1.4 Roofs**

Dark bronze standing seam metal roofs with minimum 3:12 pitch.

### **2.1.5 Exterior Walls**

Split faced CMU, scored CMU and brick with off-white mortar. All color shall be approved by the Base Architect during design.

Brick detailing such as soldier courses, reveals and special brick shapes are encouraged.

### **2.1.6 Trim**

Metal fascia and gutters shall match metal roof color.

Downspouts typically shall match color of adjacent wall surface or roof color.

### **2.1.7 Doors and Windows**

Aluminum operable windows shall be double insulated, blast resistant and anodized dark bronze.

Primary entrance shall be storefront, blast resistant and shall be dark bronze anodized.

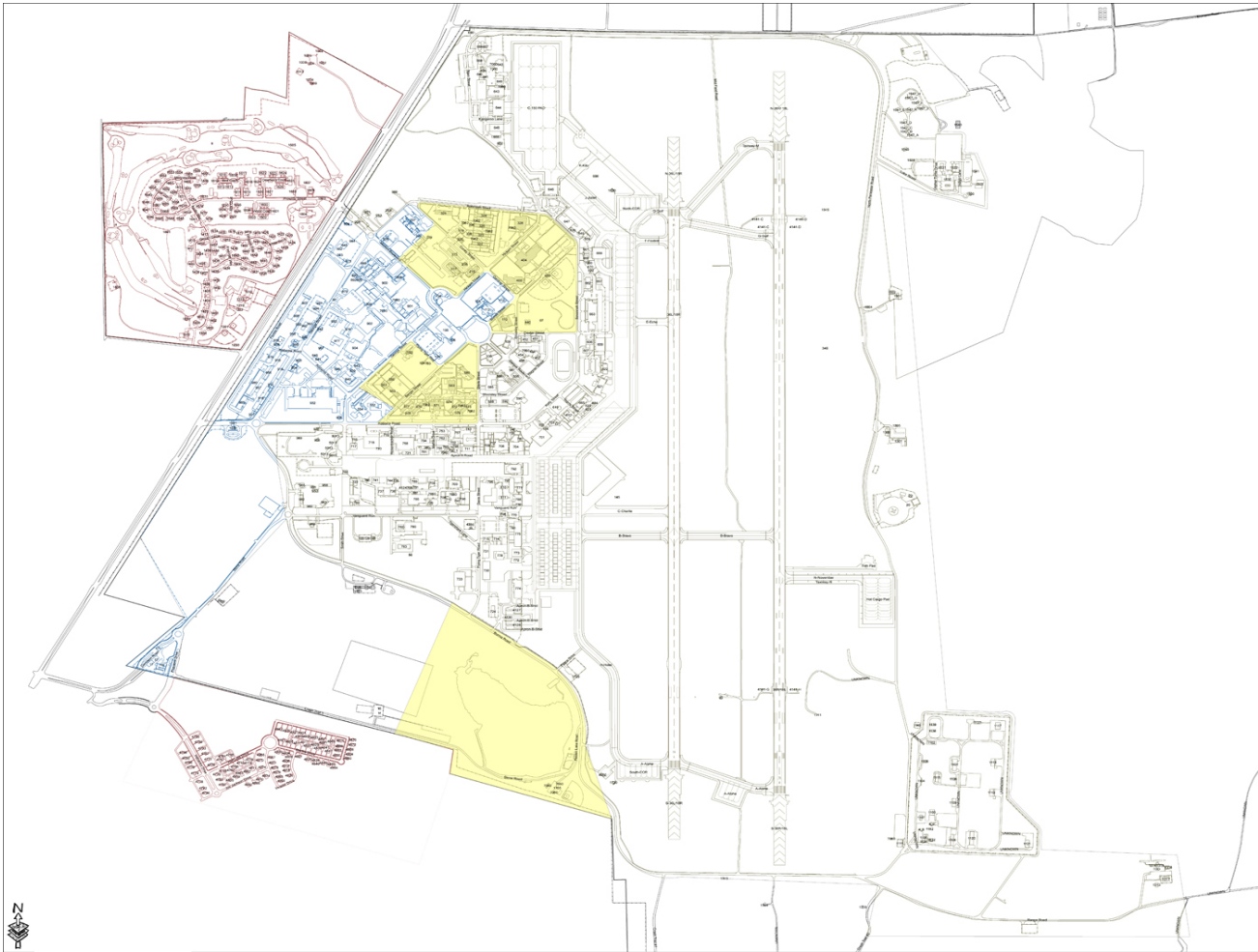
Secondary doors shall be hollow metal; color shall match adjacent wall surface.

## **2.2 Unaccompanied-Recreation Areas**

There are two Unaccompanied-Recreation areas on base that are separated by the Admin-Community zone. The North Unaccompanied Housing area is defined by Coney Street, Burrell Street, and Robinson Road. The South Unaccompanied Housing area is defined by Robbins Road, Davis Street, George Street, and Schrader Street. Facilities in these areas include Airman Living Quarters, Visiting Officer's Quarters, Visiting Enlisted Quarters,

Fitness Center, recreation fields, Dining Hall, and Bowling Center.





2.2a. Unaccompanied-Recreation Visual Area

Most buildings in this visual area are constructed of red brick with dark bronze metal roofs. Some of the dormitories have concrete exterior stairs with a beige stucco finish. A few buildings such as the Housing Office and Linen Exchange building are brick that has a range of colors from cream to dark brown and large beige stucco fascia's. One building in the North Unaccompanied Housing area is beige brick with a low sloping asphalt shingle roof.

### 2.2.1 Site Planning

Focus on pedestrian circulation. Provide safe, convenient paths linking living areas with popular destinations (Figure 2.2.2c).

Site new facilities in accordance with the *Moody AFB General Plan*.

### 2.2.2 Building Form

Maximum height for all buildings except dormitories is two stories. Dormitories may be three stories (Figure 2.2.2b).

Building entrances should be easily visible from the street and parking areas.

Arrange building forms to create pedestrian spaces such as arcades and courtyards.

Walkways shall be provided to allow appropriate pedestrian traffic to adjacent facilities.

### 2.2.3 Roofs

Dark bronze standing seam metal roofs with minimum 3:12 pitch (Figure 2.2.2d).

### 2.2.4 Exterior Walls

Red brick with off-white mortar. Brick color shall match the dormitory at 7251 Woolsey Street (Figure 1.2.2a).

Brick detailing such as soldier courses, reveals and special brick shapes is encouraged.

### 2.2.5 Trim

Metal fascia and gutters typically will match metal roof color.

Downspouts shall match color of adjacent wall surface or roof color.

## 2.2.6 Doors and Windows

Aluminum windows and storefront shall be dark bronze anodized.

Secondary doors shall be hollow metal; color shall match adjacent wall surface.



2.2b Dormitory, Berger Street



2.2c Convenient, well-lit paths encourage pedestrian circulation.



2.2d Red brick and dark bronze metal roof on the Library/Education Center

### 2.3 Flight Line-Industrial Area

The Flight Line-Industrial visual area comprises the largest developed area on base. It consists of facilities adjacent to the runways and aprons, including Knights Way and Werewolf Run. Facilities in this zone range from relatively small storage, training, and operations buildings, to large warehouses and hangars. The Weapons Storage Area, southeast of the main runways, is also included in this visual area.

A variety of building materials exist in the area. Materials on the buildings near the southern end of the flight line are a mixture of metal panels, exposed aggregate concrete panels, concrete masonry units, and tilt up precast panels. Some older buildings use high-maintenance wood siding as an exterior finish.

The C-130 complex, located west of the runways, and the 71<sup>st</sup> Air Control Squadron, sited east of the airfield, use a similar palette of materials but are distinctive in their detailing. Beige split-face concrete masonry is the dominant wall material, with light brown ribbed concrete masonry units used as accents. The buildings in the C-130 area use beige metal wall panels above the masonry base. Dark bronze metal roofing is the standard for all the buildings.



2.3a Flight Line-Industrial Visual Area

The buildings in the Weapons Storage Area are metal storage buildings and bermed facilities.



### 2.3.1 Site Planning

Site buildings in functional groups.

Use building forms, landscaping, and masonry enclosures to screen outdoor storage/equipment areas from primary streets.

Eliminate on-street parking where possible.

Avoid locating parking between the building and the primary street.

### 2.3.2 Building Form

Use simple, functional forms for industrial /operational buildings.

Except on completely utilitarian structures, building entrances should be easily identifiable from the street and from parking areas.

On more people-oriented facilities, arrange building forms to create pedestrian spaces.

### 2.3.3 Roofs

Dark bronze standing seam metal roofs with minimum 3:12 pitch. Lesser pitch may be used on large buildings with approval of the Base Architect.

For new roofs or major roof replacement projects, meet or exceed the following Solar Reflectance Index (SRI) for a minimum of 75% of the roof surface: SRI  $\geq$  78 for low slope roofs ( $\leq$  2: 12); SRI  $\geq$  29 for high slope roofs ( $\geq$  2: 12). (Ref: Cool Roof Rating Council; and LEED for New Construction v.2.2, SS Credit 7.2) Comply with published ACC and base architectural policies regarding roofing.

### 2.3.4 Exterior Walls

Predominant wall material shall be split-face concrete masonry units. Color shall match “Moody Tan” by Scruggs Concrete Co. (Figures 2.3b, 2.3c).

Other concrete masonry textures may be used as accents. Color shall match “Brown” by Scruggs Concrete Co. (Figures 2.3b, 2.3c).

Pre-finished metal wall panels may be used on hangars and large industrial buildings with approval of the Base Architect. Metal buildings shall have a split face concrete masonry base with the height proportional to the building size, but not less than four feet high. Color of metal panels shall match adjacent buildings as approved by Base Architect (Figures 2.3a, 2.3b, 2.2.3c).



2.3b Rescue Squadron Building 663



2.3c Wash Rack in C-130 Building 642

### 2.3.5 Trim

Metal fascia and gutters shall match metal roof color.

Downspouts shall match color of adjacent wall surface or color of metal roofing (Figure 2.3d).

### 2.3.6 Doors and Windows

Aluminum windows and storefront shall be dark bronze anodized (Figure 2.3a).

Secondary doors shall be hollow metal, color shall match adjacent wall surface.



2.3d Buildings in the C-130 Complex use concrete masonry base with beige metal wall panels above, and dark bronze metal roofing.





2.3e Building 730. Downspout color matches roof color.

## 2.4.4 Family Housing

### 1.2.4a Family Housing Visual Area



2.4a

The Family Housing Visual Area is separated from the main base by State Highway 125 (Bemiss Road). Facilities include family housing, the golf course, recreational facilities, and ball fields. The absence of operations and administrative functions in the Family Housing area helps create the character of a private-sector suburban neighborhood.

Moody Family Housing is privatized. All non-housing facilities built within this zone must follow the guidelines for construction within the Admin/Community zone.

The majority of the housing units are one story brick with gently sloping asphalt shingle roofs, a small section of houses is two story with brick base and vinyl siding. Six different colors of brick, from light gray to red, create variety within the area. Light colored vinyl siding is used on many units as a secondary wall material. Many homes have carports with wood columns and pitched asphalt shingle roofs. The recreational facilities are beige concrete masonry with brown concrete masonry accents and a dark bronze metal roof.

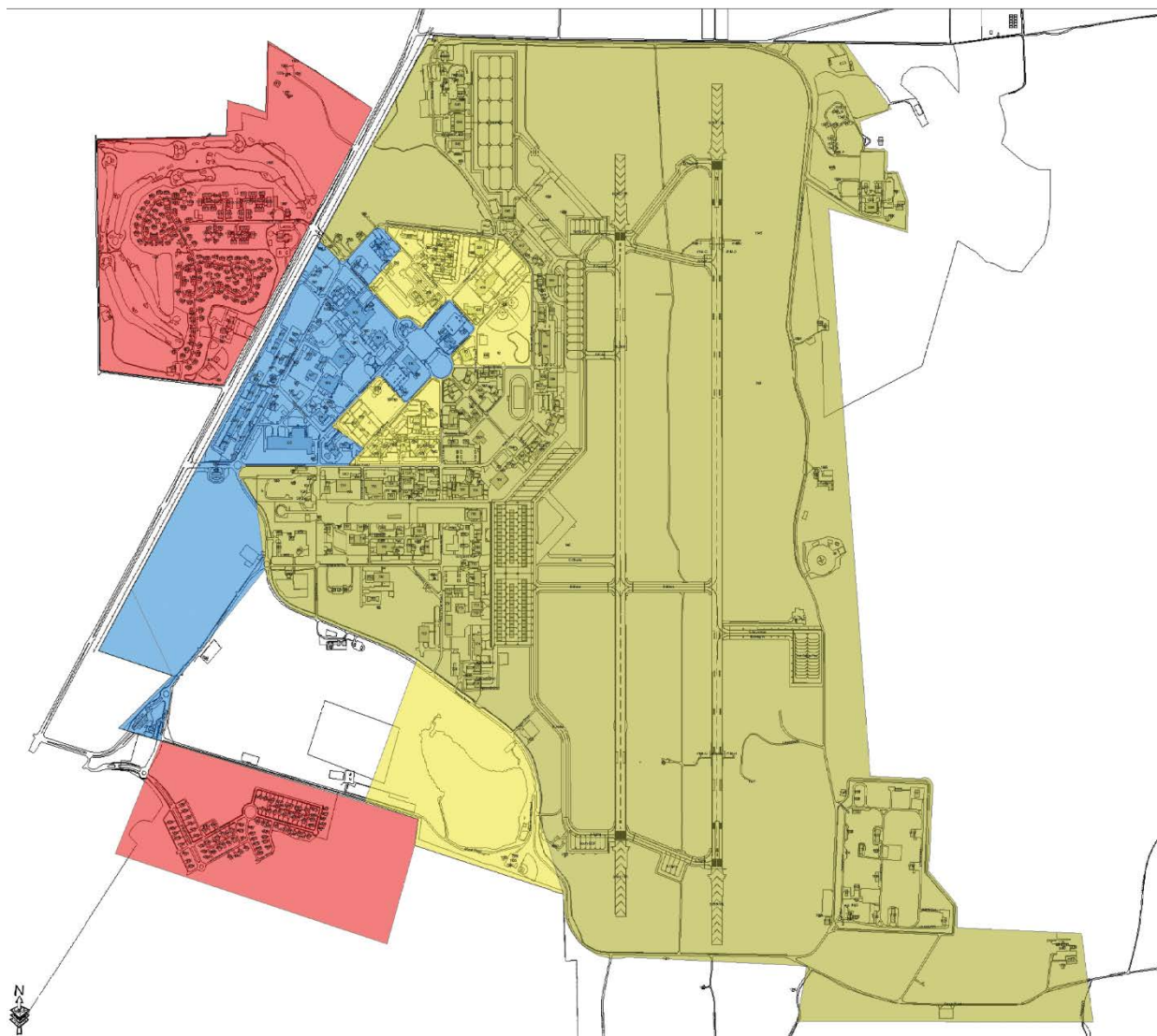
Both areas are managed by an independent contractor.

## 2.5 Undeveloped Visual Area

The Undeveloped visual area includes more than 5,500 acres of land located east of the runways, and a small land area south of the runways. With the exception of the Grand Bay Weapons Range, which occupies 450 acres, the land is managed as a fish and wildlife conservation area by the Georgia Department of Natural Resources. A large portion is wetlands, the largest inland waterfowl resting area in south-central Georgia. This land is primarily used for outdoor recreation such as hunting, fishing and camping.

Significant future development in the Undeveloped Area is not anticipated. Industrial or mission-related buildings constructed within the zone should conform to the standards established for the Flight Line-Industrial Area (refer to Section 1.9.0).

Areas indicated in **white** below, represent Undeveloped Visual Areas.



2.2.5a Undeveloped Visual Area



## 2.5.1 Grassy Pond

Owned by Moody AFB, Grassy Pond Recreational Area is located approximately 27 miles southwest of the base. Its 489 acres of land is available for outdoor recreational activities such as camping, canoeing, mountain biking, and hiking. There are two lakes; Grassy Pond and Lot Pond, which cover approximately 217 and 44 acres, respectively (Figure 2.5b).

The overall image of the area is that of a well-maintained state park. Existing rental cabins and pavilions are constructed of wood frame with painted plywood siding, wood trim, and asphalt shingle roofs (Figures 2.5b, 2.5c). Modular buildings with vinyl siding are also used as cabins. The concessions/administration building is a prefabricated metal building with a large adjacent wood deck overlooking Grassy Pond.

Existing picnic shelters are log frame construction with asphalt shingle roofing (Figure 2.5c). Exterior walls of recently constructed restroom facilities are beige split-face concrete masonry with dark bronze metal roofing and trim. Asphalt paving is located in high traffic areas, but most vehicular circulation is on gravel or crushed limestone roads.



2.2.5b Main lodge and play area at Grassy Pond



2.5c Lakeside screened pavilion



2.5d Entrance road to Grassy Pond recreation area

Facilities design and site planning shall enhance the “state park” image of the area. Site buildings to take advantage of views and prevailing breezes. Minimize impact on the natural environment.

## 2.5.2 Cabins and Pavilions

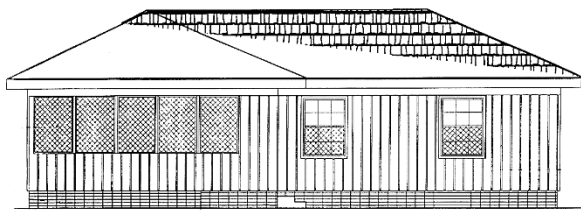
For economy and compatibility with the existing rustic context (Figure 2.5e), rental cabins and outdoor pavilions shall be constructed using wood siding, wood trim, and asphalt shingle & metal roofing. Base Civil Engineering design guidance for cabins requires use of simple hip roof forms, with screened porches, double-hung windows, and board and batten wood siding (Figure 2.5f).



2.5e Rental cabins



2.5g Restroom facility



2.5f Rental Cabin – Prototypical Elevation

### 2.5.3 Picnic Shelters

New shelters shall be similar to existing log frame structures with brown asphalt shingle roofs (Figure 2.5g). It is recommended that exposed wood be finished/treated to allow wood to appear as if unfinished. Stain is preferable to paint. If painting is required, exposed wood should be painted dark brown to blend with the natural landscape.

### 2.5.4 Permanent Buildings and Restrooms

Future concessions administrative buildings and public restroom facilities will be constructed of split-face concrete masonry and dark brown metal roofing to match the existing restrooms in the park. Use simple hip or gabled roof forms with 3:12 pitch. Metal fascia and gutters shall match roof color; downspouts shall match adjacent wall color (Figure 2.5h).



### **3.0 CIVIL**

#### **3.1 Curb and Gutter, and Sidewalk:**

Unless directed otherwise by Base Civil Engineering, specify valley gutter (rollover curb) where site conditions do not require a vertical curb face for drainage capacity.

Where adding to or patching existing curb, match existing curb type.

Standard sidewalk design, provide 5' wide and 4" thick sidewalks, unless directed otherwise by base Civil Engineering.

All valleys, gutters, and sidewalks shall be Class "A" Portland cement concrete and meet Georgia DOT specifications, construction standards, and details.

The Portland cement concrete valleys, gutters, and sidewalks shall meet a minimum of 3000 psf compressive strength at 28 days.

#### **3.2 Asphalt and Airfield Pavements:**

The asphalt for roads, streets, and parking lots shall meet Georgia DOT specifications.

For primary streets that are asphalt use 6" granite aggregate base (Group 2 under GA DOT) and 4" pavement.

For secondary streets use 6" aggregate base (Group 2 under GA DOT) and 2" pavement.

For parking lots use 6" aggregate base and 2" pavement.

Do not use dolomite limestone for concrete aggregate. Aggregate must be Group 2, GA DOT.

To allow for drainage, provide a minimum of 1% slope on asphalt pavement, and 0.5% slope on concrete pavement.

Pavement markings shall follow Military Traffic Management Command (MTMC).

Standard street design, provide 12' wide lanes.

Provide 90 degree parking and 9'-6" x 18'-6" parking spaces. Aisle widths shall be 25'.

When this is not feasible and angled parking must be used, the angle of the parking shall be 60 degrees with an aisle width of 16'.

Airfield pavements shall be designed according to Unified Facilities Criteria (UFC).

#### **3.3 Site Design**

The areas in-between and around buildings need to be as well thought out as buildings. Well-designed outdoor spaces help create friendly, inviting, walkable communities. Site selection and design are important to achieve compatibility with the Base General Plan. The following guidelines will help contribute to this compatibility.

Coordinate with Base Civil Engineering personnel during the initial programming phase of the project for force protection/anti-terrorism requirements.

Moody AFB will be developed in a manner which maximizes mission accomplishment, optimizes use of existing facilities, and provides the most efficient, safe, pleasant, and professional surroundings possible.

#### **3.4 Site Work**

Sidewalks that can be driven on should be of sufficient thickness to support vehicle loads.

Pole type light fixtures in parking lots should be placed on concrete pedestals to avoid damage to the poles by vehicles.

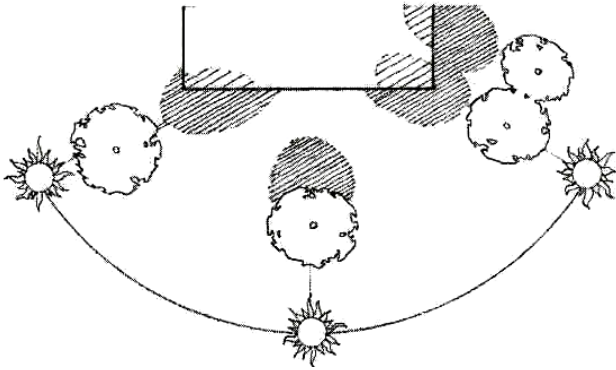
Sodding is to be used for established turf areas.

Ensure that all areas drain satisfactorily away from the facility.

Refuse collection pads with privacy screen are to be sized and provided with necessary access to accommodate the large pickup vehicles and are to be located the correct distance away from the facility.

On gutter less roof lines provide a gravel or crushed stone splash area in the design to prevent mud splatter on lower outside walls.

Site design shall conform to the requirements of ABA.



3-4a Siting of trees to provide adequate shading of buildings and other areas

### 3.5 UTILITY

Use concrete storm drainage pipes in lieu of metal or polyethylene/plastic pipe.

Utilities shall be bored under streets.

Cut sidewalks at expansion joints.

The fill material shall be free from rock, roots, silts, and other debris.

Restore areas disturbed during construction with centipede grass block sod.

Seed with centipede grass for large areas (>0.5 acres)

#### 3.5.1 Site

Locate buildings in supporting common functions such as civil engineering, administrative, or flying functions in complexes in order to share a common infrastructure of roads, parking, utilities, and security.

Where possible, integrate new buildings into existing groupings.

After positive drainage away from buildings has been developed, use existing or natural grades and contours to avoid excessive cut and fill operations.

Sites shall allow minimum setbacks from other structures such as buildings, roads, and parking. Keep setbacks consistent with buildings and other structures in the area.

Refer to DOD Minimum Antiterrorism Standards for building setback requirements.

#### 3.5.2 Effective Site Planning and Design

Site buildings in accordance with appropriate laws and directives, etc.

Design new buildings to be compatible w/ local architectural standards, etc.

Ensure energy conservation is considered in design.

Provide functional layouts that are logical and satisfy users' needs as well as layouts that are able to accommodate other future users. Anticipate and plan for expansion.

#### 3.5.3 Vehicular Circulation

When existing traffic patterns are changed by new construction proposals, provide adequate traffic alternatives to coincide with the construction for the new project. Locate buildings so that workers can walk between buildings in a functional group. Only encourage driving when walking cannot be accommodated.

Develop streetscapes by providing street lighting, sidewalks, and street trees (Figure 3-3b). Provide curb and gutter at all new pavement. Separate vehicular and pedestrian circulation.

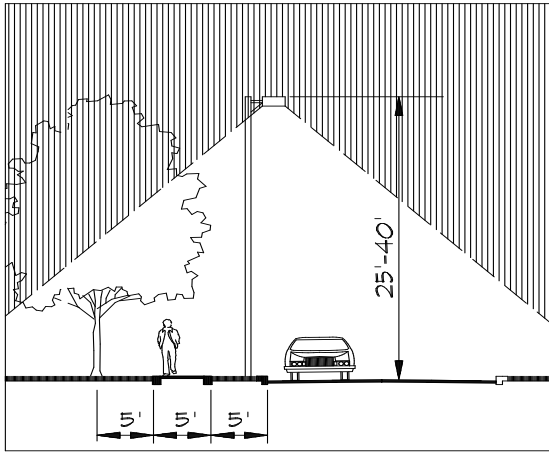
Locate utilities underground where feasible

Provide maintenance vehicle access to building mechanical rooms where feasible. Pavement or reinforced sidewalks are acceptable for vehicle access.

Ensure handicapped access is provided at intersections and crosswalks.

Site design shall comply with USAF Installation Force Protection guidelines. Coordinate requirements with Base Civil Engineering representative prior to the start of a project.

Ensure handicapped access is provided at intersections, crosswalks and wherever ABA require them to be.



3-5b Street lighting and sidewalks improve safety and appearance.

### 3.6 PARKING

Design parking areas to provide a safe, functional layout and reduce the visual impact of parked cars

Use drop-off areas at high-use facilities to decrease close-in parking as required by ATRP.

Curb all parking lots and avoid wheel stops. Use raised parking islands to break up parking areas.

Use size, location, and screening to prevent parking from becoming a dominant feature.

Use consistent angles and stall sizes in all parking areas.

Subdivide large parking areas into lots of 40-50 cars or less, where feasible.

Small parking areas shall be designed to meet ATRP requirements and reduce the negative visual impact and allow opportunity for additional landscaping.

#### 3.6.1 Siting

Site parking areas around the perimeter of building groups. Plan the site to locate parking behind buildings when possible.

Avoid locating parking between a building and the main viewing street (Figure 3-6a).

Avoid letting parking occupy pedestrian spaces between buildings in a group.

Provide safe pedestrian paths from parking to building entrances.

Provide handicap accessible parking spaces and accessible routes to the building in conformance with

ABA. Motorcycle parking shall be provided for each structure, and shall be concrete not asphalt.

Parking areas should be set back from streets. Setbacks a minimum of 20 feet wide will allow adequate space to incorporate planting for effective screening.

Parking shall be as required by the UFC or as follows. Occupied structures shall have a minimum 25 meters to parking, unoccupied structures shall have a minimum 12 meters to parking.

Eliminate on-street parking where possible. Do not locate parking directly in front of buildings or entrances. Locate parking behind buildings.



3-6a Sidewalks leading from parking lot to the main building across the street.



3-6b Parking lot connected by crosswalks and sidewalks to the building across the street.



3-6c Landscaping screens parking lot from adjacent roadway.

#### 3.6.2 Screening

Use buildings, natural topography and landscaping to screen parking from the primary street (Figures 3-6c).

When developing parking areas, try to save as many desirable existing trees and shrubs as possible.

Consider building shape and relationship to other buildings to provide as much screening as possible.

### 3.6.3 Services

Separate service/ dumpster locations from pedestrian circulation. Ensure turnaround space for fire trucks and service vehicles.

Access to dumpsters must be adequate to accommodate a 40' long dump truck with 60' turn radius. Truck cannot back into traffic flow.

Locate dumpsters to remote/hidden areas on site.

## 3.7 PEDESTRIAN CIRCULATION

### 3.7.1 Paths

Provide safe, convenient paths to encourage bicycle and pedestrian circulation.

Use concrete walkways at least 60 inches wide to link facilities and promote pedestrian use.

Design continuous paths linking buildings, courtyards, parks, and other activity nodes.

Provide walkways between buildings with users of organizations that work together.

Provide paths with the roadway or create separate jogging trails. Separate vehicular and pedestrian circulation.

If used exterior water fountains shall be freeze proof. Locate seating areas or stopping points along paths. Illuminate walkways used heavily at night.

Provide walkways on at least one side of every street and between all facilities.

### 3.7.2 Sidewalks

Provide sidewalks on at least one side of every street and between all facilities.

Set sidewalks back an appropriate distance from the curb edge to allow for landscaping and maintenance.

Promote security: Configure paths and design landscaping to permit surveillance of pedestrian circulation routes (Figure 3-7a).

Provide low-maintenance, vandal resistant seating and water fountains at intervals along paths.

Landscape walkways, and provide shade trees along paths.



3-7a Well lighted paths encourage pedestrian circulation.



3-7b Covered walkway connecting the new gymnasium building to the old gym.

### 3.7.3 Special Purpose and Other Lighting

Use architectural lighting of landmark buildings to aid way-finding and accentuate important structures. Coordinate proposed lighting scheme with Base Civil Engineering.

Use of lighted bollards along high-use walkways and for low level path lighting is suggested.

Bollard (cylindrical top-lit post) fixtures should be dark bronze metal finish (Figure 3-7a), extruded aluminum, 36" high, 7" diameter, 70W LED lamp, individually fused, and photo control.

Solar lighting shall be considered in remote areas only.

Paths should be well lit for safety and to promote pedestrian circulation 3.7a.





3.7a Bollard lighting fixtures in Unaccompanied Housing Area.

### 3.7.4 FENCES AND SCREENS

#### 3.7.4.1 Screening

Provide screening around mechanical equipment, storage areas, trash dumpsters and other visually objectionable items. Limit use of screen walls in accordance with UFC 4-010-01 the USAF Installation Force Protection Guide.

Dumpster bollards shall not be placed more than 6' apart.

Mechanical equipment enclosures shall match adjacent building materials (Figures 3.7c); materials other than those that match the adjacent building shall be approved by the Base Architect. Masonry walls are preferred.

The use of open panel block is allowed when enclosing electrical substations, transformers, or switches for proper heat dissipation.

Equipment screens shall allow required clearance for equipment maintenance, removal, and airflow. Provide vehicle access to mechanical equipment areas where necessary. Pavement or reinforced sidewalks are acceptable for vehicle access.

Enclosure walls shall be 6' high, unless the enclosed object is greater than 6' tall, in which case the enclosure walls should be 6" higher than the tallest object being concealed. Enclosure shall be large enough for 2 (two) dumpsters.

Provide concrete slab and 6" diameter concrete filled pipe bollards to prevent damage to walls (Figure 3-7d).

Dumpsters shall be screened with 3-sided masonry enclosures (Figure 3-7d), vinyl or metal panel fence. Slope dumpster pad to provide positive drainage.

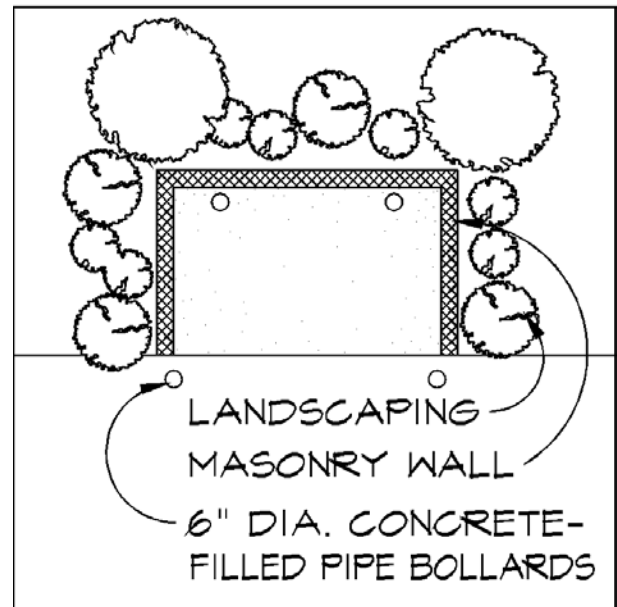
Provide gates for trash enclosures or where accessibility or serviceability is an issue of concern/function.

#### 3.7.4.2 Fences

Use masonry walls or metal panel privacy fences to screen storage areas. Metal fence shall have factory finish with 20-year warranty.



3-7c Screen matches adjacent building in Admin/Community Area.



3.7d Dumpster enclosure, plan view.



3-7e Dumpster enclosure matches masonry of nearby buildings.

Color shall be Brown, Fed. Std. 595b #30051 with semi-gloss finish.

Use of chain link fencing shall be limited to high security functions. Prior approval of Base Architect is required. Fabric or privacy slats shall not be used in chain link fencing.

### 3.7.5 Site components

Develop a coordinated base wide approach to site components. This includes all site furniture, mailboxes, drinking fountains, flagpoles, picnic shelters, newspaper vending machines, planters, smoking receptacles, and other equipment in design plans.

Encourage attention to detail concerning each of these site components. Work to reduce visual clutter, unnecessary signs, receptacles, etc. Include all applicable standards including force protection/anti-terrorism.

The design of site should respond to the local climate and cultural influences.

Site components shall be accessible to the handicapped and comply with the requirements of ABA.

Flag poles should be located in accordance with AFR 900-3.

Morale flags are not allowed in accordance with AFI 84-105.

#### 3.7.5.1 Site Furniture

Site furniture is defined as furniture or other accessories provided in outdoor areas for the comfort or convenience of personnel.

Site furniture includes benches, picnic tables, litter receptacles, ash cans, and bicycle racks.

Furniture shall be comfortable, durable, vandal resistant and easily maintained. Furnishings should be made in such a way as to protect people from burns.

The design of site furnishings should respond to the local climate and cultural influences.

#### 3.7.5.2 Materials and Colors

Unless otherwise noted, metal shall be dark bronze in color.

Furniture colors and materials should complement the surrounding architecture. Limit colorful accents to high-profile sites.



3-7e Benches may be made from wood or recycled materials.



3-7f Trash can/ash receptacles at Commissary entrance constructed of precast exposed aggregate concrete with tan plastic tops.

Tables and benches should be made from wood or recycled materials. Color shall be gray or brown tones (Figure 3-7e).

Trash can/ash receptacles shall be pre-cast exposed aggregate concrete with dark brown plastic tops.

Concrete color shall have beige and brown tones (Figure 3-7f).

Trash receptacles must be easily relocatable and meet placement requirements of UFC 4-010-01 for ATRP.

Use of recycled materials is encouraged where feasible.

Use durable materials which are appropriate for the architectural context and the environment, such as factory finished metals, pre-cast concrete or quality wood.

### 3.7.5.3 Location

Locate tables and benches where they will receive shade in summer months. This is especially important when using metal or concrete furnishings.

Create small seating areas along paths by grouping together picnic tables, benches, trash receptacles, and paving. Develop the surrounding landscape to define the space and provide shade (Figure 3-7g).

Outdoor Seating should provide comfortable benches or seat wall near building entrances and in courtyards. Tables should be limited to informal gathering places such as picnic or dining areas.

Place receptacles and planters on paved sites where they are clear of circulation. All litter receptacles require attached lids. Ash receptacles must match outdoor furniture.

Bollards should be set into paving or placed in sleeves to allow access. Use bollards to enhance pedestrian protection and provide vehicle control.

Bicycle racks should be located near entrances in secure, visible areas. Racks must be on concrete, brick or block pads. Use simple, attractive racks.

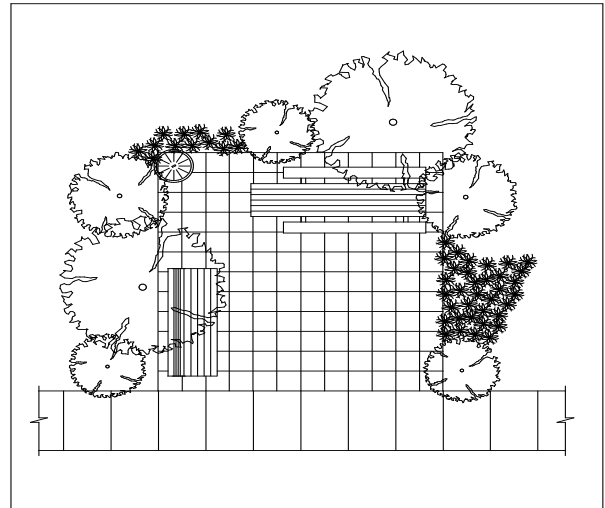
Always install products according to manufacturer's specifications. Use qualified and reputable installers.

### 3.7.5.4 Maintenance

Any finish or furnishing product is only as good as the maintenance it receives. A regular maintenance program is crucial to the longevity of any material used in a facility. In most cases, cleaning and maintenance must conform to manufacturer's instructions to validate warranties.

### 3.7.5.5 Mailboxes

If possible, items shall be finished to match dark bronze metal color of other site furnishings. Neutralize the visual impact of these by developing a base wide standard, as well as painting, concealment, or removal. Locate these items in convenient yet discrete locations.



3-7g Seating areas provide opportunity for socializing along paths.

### 3.7.6 Infrastructure

Components of the installation infrastructure such as street and area lighting and fuel and water storage tanks must be considered when developing facilities.

Reduce visual impact by using proper siting, painting, screening, or concealment. Utilities should be underground whenever possible.

Ensure all applicable standards are followed including force protection/anti-terrorism.

#### 3.7.6.1 Color

New equipment should have a factory-applied color appropriate to the installation standards. Paint existing equipment to match.

#### 3.7.6.2 Screening

Use equipment enclosures, landscaping, and walls to screen mechanical and utility equipment, but maintain required access and clear zones.

#### 3.7.6.3 Lighting

Rectangular shaped luminaries are preferred for high-profile locations such as parking and dark

colored cobra heads for outlying sites such as roads. Use consistent lamp types.

#### **3.7.6.4 Fuel and Water Storage Tanks**

Locate tanks out of view from any major road, main building entrance or significant outdoor space and well screened with a screen wall that matches is parent facility or if there is no parent facility follow the Architecture and Engineering Design Guide.

If tanks cannot be located out of view and well-screened, use a vaulted tank and size the manholes adequately for maintenance and inspection.

On above ground storage tanks, avoid multiple colors, super-graphics, logos, and glossy finishes. Colors should be consistent with the installation Base Architectural Standards.

Elevated storage tanks may be used to display the AF or Command shield if appropriately sized and proportioned.

Send in a site plan for each tank for approval during the planning phase of the project.

#### **3.7.6.5 Security**

Use quartz lights in secure areas and controlled access points where an instant-on feature is required.

#### **3.7.6.6 Fire Protection**

All facilities must be designed and constructed in accordance with current editions of the following: Unified Facilities Criteria (UFC), applicable ETLs, International Building Code (IBC), and National Fire Protection Association (NFPA) standards.

#### **3.7.6.7 Sewer**

Gravity flow sewers are desired when siting multiple facilities.

#### **3.7.6.8 Efficient Use of Utilities**

Active and passive solar will be considered in new designs.

Water conservation initiatives are encouraged.

Designer shall try to incorporate as much LEED characteristics as possible.

To produce quality lighting use many varieties of LED, fluorescent and high-intensity discharge lighting.

New facilities should be designed and constructed to minimize life cycle costs.

A unified, fully developed landscape allows compatible buildings to look their best and can mitigate the negative visual impact of older, incompatible buildings.

Use landscape to screen unsightly views, define entries, and accentuate outdoor amenities.

Landscape design shall comply with the Moody AFB Landscape Design Guide and Executive order 13148 "Greening the Government through Leadership & Environmental Management", available from Base Civil Engineering UFC 4-010-01, Unified Facility Criteria, DoD minimum antiterrorism standards for buildings.

Use indigenous, low maintenance, adapted trees and shrubs locally recommended for urban or street use that can survive without irrigation after the first season warranty maintenance period.

Landscaping practices should incorporate sound design planning while minimizing the requirement for fertilizers and pesticides.

Use efficient practices such as mulches, efficient irrigation systems (drip irrigation), and reclaimed water. Only grey water may be used for irrigation system, no potable water is allowed for irrigation.

Soften arid landscaping with varied contours and drought-tolerant plantings.

The use of appropriate trees and other landscape plantings adds beauty to the base, promotes energy efficiency, inhibits erosion, reduces noises, and enhances safety.

Landscape planting also supports national policy aimed at enhancing air quality.

Landscape walkways, and provide shade trees along paths. Develop functional rather than purely visual landscapes. Landscaping shall be required for all new facilities.

### **3.8 REGIONAL DESIGN**

#### **3.8.1 Existing Conditions**

Moody AFB is located in USDA Plant Hardiness Zone 8a.

Preserve existing landscape and trees where possible. Use consolidated development areas to help preserve the existing landscape.



Avoid over-planting and allow for natural growth and form of plants.

No irrigation system shall be connected to potable water system.

### 3.8.2 Surface Runoff

Use trees, shrubs, grass, and landscaping to reduce storm water runoff. Terrace steep slopes.

### 3.8.3 Energy Conservation

Use deciduous trees on the South, East, and West sides to shade buildings and circulation routes during the summer but also allow sun in the winter months (Figure 3-8a/b).

### 3.8.4 Street Trees

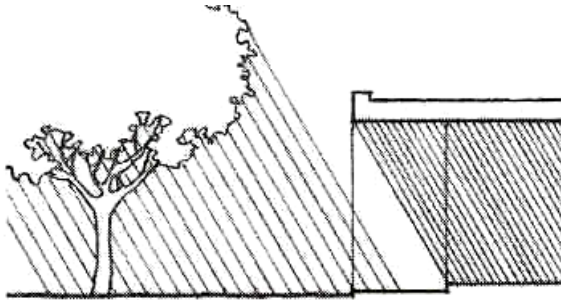
Plant street trees to delineate roadways, reduce pavement temperature and provide shade on sidewalks (Figure 3-8c)

Street trees should be planted so that a mature tree's discipline is inside of the curb to prevent root damage and prevent roots from causing curb damage.

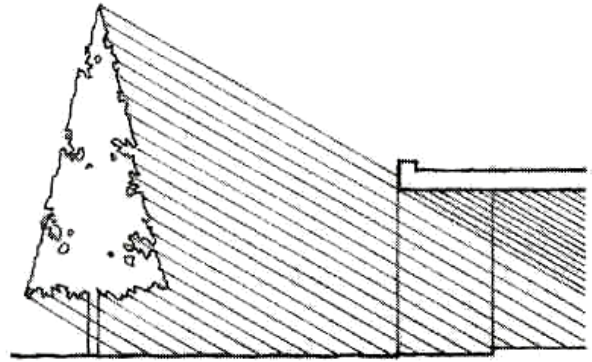
Base wide, a variety of tree species should be used to avoid monoculture. A predominance of one tree type is more susceptible to pest and disease damage.

Coordinate tree species selection with utility lines, signage, visual clearance requirements and other man-made constraints.

Some trees to avoid are Sycamore, Beech, and some Oaks.



2-1a Planting for summer energy conservation.



3-8a Planting for winter energy conservation.



3-8c Street trees and low-maintenance juniper ground cover in median strip.

### 3.8.5 Planting Design

Formal street tree planting design should use trees of the same species spaced at regular intervals.

Provide adequate planting areas. Planting strips shall be a minimum of 10 feet wide for trees. The trunk should be no closer than 5 feet to the sidewalk.

Maintain clear sight lines at intersections, crosswalks, parking lots, and driveways (Figure 3-8d).

### 3.8.6 Parking Lot Landscaping

Landscape approximately 10 percent of the parking area.

Separate parking areas from major streets through the use of natural topography. (Figure 3-8d).

Use a combination of trees and shrubs to provide both a visual screen and shade (Figure 3-8e).

Use trees, shrubs, grass and landscaping to reduce storm water runoff.

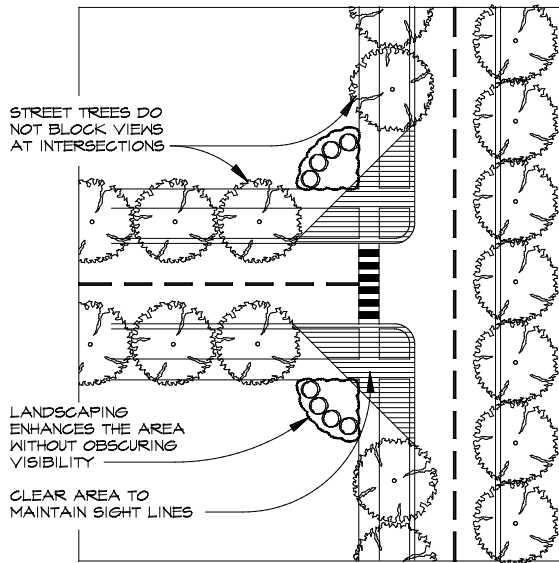
Provide landscaped islands in parking areas to add shade, articulate vehicular circulation, and visually break up large expanses of paving (Figures 3-8g).

Plantings must be low maintenance and suitable for harsh conditions present in parking areas.

At parking lot entrances and intersections, design landscaping to provide clear sight lines when plants reach mature sizes.

Planting must comply with ATFP Policy.

(Ref: UFC 4-010-01)



3-8d Maintain clear sight lines at intersections.



3-8e Parking design at enlisted dormitories incorporates landscaping to define circulation.



3-8f Use of both trees and shrubs provides shade and screens parking from the street.



3-8g Landscaped islands improve the appearance of parking lots while providing shade and directing circulation.

### 3.8.7 Visual Screening

Use landscape to screen unsightly views, control pedestrian circulation, define entries, and accentuate outdoor amenities.

Use landscape materials to screen storage areas and to visually soften long fence lines (Figures 3-8h/i).

Screen family housing from adjacent primary or secondary roadways with planting.

### 3.8.8 Maintenance

Provide planting beds with wide mowing strips. Mowing strips should eliminate hand trimming and edging caused by turf creeping into bedding plants.

Reduce maintenance requirements by using plant materials that maintain the desired height at maturity.

Due to high maintenance requirements, sheared hedges and annual/perennial flowerbeds should be used sparingly. Proposed use of flowerbeds must be approved by the Base Architect.

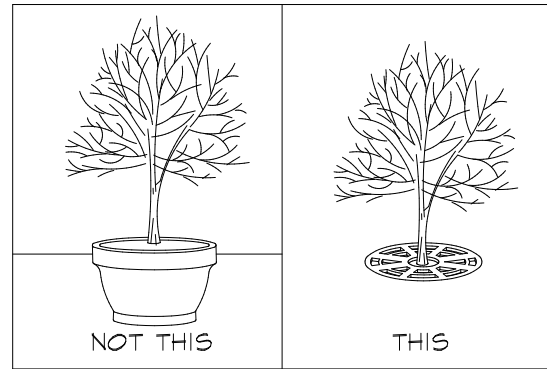


3-8h Landscaping to screen transformers and equipment.





3-8i Dense evergreen plantings visually screen service area.



3-8j Use tree grates in lieu of planters.



3-8j Bradford Pairs tree lined Georgia Street with sidewalks

### 3.8.9 Plant Materials

Preserve existing landscape where possible. Use consolidated development areas to help preserve the existing landscape. Avoid over-planting and allow for natural growth and form of plants.

Use only regionally native plants. Where this is not feasible, use only fully naturalized plant species.

Avoid using plant material that drops large amounts of fruit or seed pods.

Specify centipede grass for turf around facilities. Sod is preferred where economically feasible; otherwise specify sprigging to establish grass near facilities.

Avoid use of many different species on a single project. Successful planting designs can be accomplished by using repetition with occasional contrast.

Select deciduous trees that drop all their leaves early in the fall season rather than those that retain brown leaves most of the winter and continue to be maintenance problems for many months.

### 3.8.10 Landscape Materials

Tree grates should be used in lieu of planters. Where large planting boxes are used at courtyards, incorporate seating into the design (Figure 3-8j).

Test soils prior to designing the planting plan. Identify deficient soils, areas of over compaction, and soil ph. Modify or replace poor soil prior to planting.

Group plants according to water requirements and use mulches to conserve water.

Trees should be the focus of landscape plans; limit formal planting arrangements to appropriate space. Keep trees trimmed, removing dead and dying trees or branches. Remove trees that are too close to structures, sidewalks, and streets.

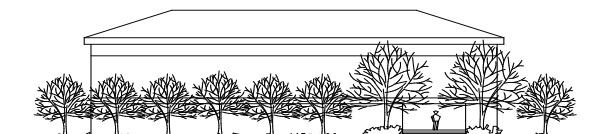
Consult the Base Landscape Development Plan for appropriate landscaping materials.

### 3.8.11 Courtyards and Entrances

Use landscaping to enhance the entry sequence from the street or parking area to the building's main entrances.

Create landscape patterns that accentuate building entrances. Design courtyard landscaping to give building users relief from summer heat.

Provide a landscaped space uncluttered by vehicles in front, at the entrance, and between the main viewing Street and buildings.



3-8k Landscape to accentuate building entry.

### **3.9. STRUCTURAL**

#### **3.9.1 Wind Speed Design**

All structures should be designed for a minimum wind speed of 100 mph.

#### **3.9.2 Roof Live Load**

Design structures for a minimum 20-psf roof live load.

#### **3.9.3 Wind Rating**

Design all roofs to meet UL-90 wind rating.

#### **3.9.4 Seismic Zone 1**

All structures, mechanical equipment, and piping & ductwork supports shall be designed for seismic zone 1.

#### **3.9.5 Foundation**

If foundation investigation is not required for a structure, design the structure foundation for soil with a load bearing capacity of 2800 psf.

#### **3.9.6 Materials**

Use low maintenance durable materials that are integrally colored and textured when exposed as exterior finish as previously noted.

Use of precast-autoclaved aerated concrete (PAAC) is acceptable as structural element only.

#### **3.9.7 Code Compliance**

Projects must conform to the latest edition of the following codes.

International Building Code -- Where the Code and the NFPA Life Safety Code differ, use the more stringent.



## 4.0 ARCHITECTURAL

The buildings and the areas around them provide not only places of work and relaxation but also reflect a sense of pride in where we work. Each facility is suitable for its users, technically sound, compatible with its environment, and built with long-lasting materials and details.

Designs for new construction and renovation shall incorporate robust, low maintenance, integrally colored materials and economical construction techniques without compromising high quality, architecturally pleasing, professional, military appearance. Ensure that the exterior details respond to the building's use, location, and importance on base.

Facilities should be designed with consideration for both the inside functional requirements and the influence of the site.

### 4.1 INTERIOR SIGNS

#### 4.1.1 General

Signage should be designed as an integral component of the building interior design.

Signs should coordinate with the facility color scheme and must be consistent throughout the facility.

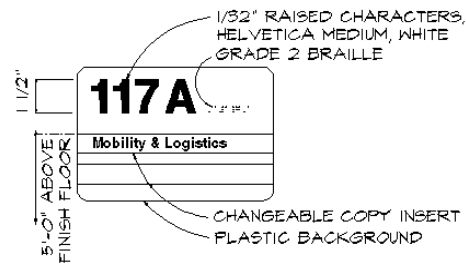
Neutral colors or brushed metals are preferred in most buildings.

To avoid a cluttered appearance, the number of signs should be reduced to the minimum required to guide visitors through the building.

Taping of signs on doors, walls, or windows is prohibited.

Interior signs shall comply with the Architectural Barriers Act (ABA).

Interior room identification signs shall comply with UFC 3-120-01, Office Identification Type BB2, with the addition of grade 2 Braille adjacent to the room number to comply with ABA requirements (Figure 4-1a).



4-1a Interior room identification sign

#### 4.1.2 Information Signs

Provide a building directory with changeable letter board in the entry lobby of large buildings and buildings frequently used by visitors.

Bulletin boards shall be mounted in office common areas and break rooms. Posting of notices and temporary information signs should be limited to bulletin boards.

Avoid complicated building directories. Use easels for the temporary display of posters and announcements. Designate a central point of contact to control the placement of signs and bulletins.

#### 4.1.3 Regulatory Signs

Regulatory signage shall comply with OSHA, ADA/UFAS and applicable Air Force regulations. Where allowable, provide signs that are compatible with room number signs by using similar dimensions, colors, and 60-inch mounting heights.

#### 4.1.4 Directional Signs

Signs used to direct visitors to important areas may be ceiling hung or wall mounted.

Wall mounted signs shall be similar to room identification signs, and shall be mounted with centerline 60 inches above the floor.

Ceiling hung signs shall have 3-inch minimum height lettering. Text and arrows pointing up or left shall be left justified. Text and arrows pointing right shall be right justified.

Directional signs should usually indicate room numbers, except for high priority destinations such as "Billeting" or "Pass Office."

#### **4.1.5 Identification Signs**

Signs for identification of rooms and permanent spaces shall comply with UFC 3-120-01.

Dark plastic backgrounds with white room number lettering in Helvetica Medium type style.

Background color shall be coordinated with the interior design.

Signs shall be mounted on the wall adjacent to the latch side of the door. Where this is not possible, as at pairs of doors, sign shall be mounted on the nearest adjacent wall, outside the door swing area.

Permanent room number signs shall have 1½-inch high numbers raised 1/32 inch and Grade 2 Braille to comply with ABA requirements (Figure 4-1a).

Identification of signs for permanent public spaces such as restrooms and stairs shall have 1 to 1½-inch high uppercase letters raised 1/32 inch, and Grade 2 Braille to comply with ABA requirements.

The international symbol of accessibility shall appear on signs that identify accessible facilities.

Signage identifying office name or occupant title should be limited to those areas frequently used by visitors. These signs should be integrated with the room number into one sign by using interchangeable inserts for the office name/occupant title (Figure 4-1a). Lettering should be upper and lower case Helvetica Regular type style.

## **4.2 ARCHITECTURAL**

### **4.2.1 Design Criteria**

Facility design shall comply with the latest editions of the International Building Code; applicable NFPA Standards; applicable national codes; applicable Engineering Technical Letters (UFC's); and Air Force Instructions.

A Fire Department Design Analysis is required for all designs and must address the fire protection requirements of the project as required by this UFC. Summarize the fire protection design analysis and submit with the first design submission separate from other disciplines.

Where applicable, discuss the following minimum fire protection provisions (include required vs. provided)

a. Building code analysis (i.e., type of construction, height and area limitations, and building separation or exposure protection.

b. Classification of occupancy.

c. Compliance with UFC 3-600-01 and National Fire Codes.

d. Requirements for fire rated walls, fire rated doors, fire dampers with their fire-resistive ratings, smoke compartmentation, smoke barriers.

e. NFPA 101, Life Safety Code.

f. Analysis of automatic sprinkler systems and suppression systems and protected areas, including hydraulic analysis of required water demand.

g. Water supplies, water distribution, location of fire hydrants.

h. Smoke control methods and smoke control systems.

i. Fire alarm system (the type of alarm system and location of the fire alarm equipment).

j. Fire detection system (the type of detection system and location of detectors).

k. Standpipe systems and fire extinguishers.

l. Interior finish ratings.

m. Connection to and description of base fire alarm reporting system.

n. Identify the various occupancies and hazardous areas associated with the facility.

o. Coordination with security and antiterrorism requirements.

p. Fire Department access.

Note: when directed by the sensible fire protection engineer (FPE), projects with little or no fire protection considerations may not require a fire protection design analysis.

Final Design Submission. The project FPE must review the final design submission of plans and specifications and certify in writing that the design is in compliance with this UFC and all applicable criteria. This certification letter must be submitted with the final submission.

Design should comply with the Architectural Barriers Act (ABA).

Project design shall comply with the USAF Installation Force Protection Guide.

Designers shall meet with Base Civil Engineering personnel at the start of a project to discuss applicable requirements.

Buildings and sites should be aesthetically attractive, convenient to users, technically sound, compatible with the surrounding environment, and designed and built with long lasting materials and details.

A professional military image is to be maintained throughout Moody AFB as facilities are constructed or modified. Use of temporary facilities should be strictly controlled.

#### **4.2.2 Architectural Review**

Each facility design project will include an architectural review by the Base Architect as part of the 35% Preliminary Design Submittal review process.

The cover letter accompanying the submittal must identify any items that do not comply with the Architecture/Engineering Design Guide.

Self-help Projects: Designers of self-help projects should schedule a meeting with Base Civil Engineering to discuss requirements prior to starting a project or ordering materials.

#### **4.2.3 Additions**

In conformance with MAFB policy, when the floor area of an addition is less than 25% of the existing building floor area, the addition should be designed to match the existing building, unless otherwise instructed by the Base Architect.

Evaluate the need for sprinkler protection of additions for both new and existing structures.

Where a high maintenance existing finish such as paint occurs, provide a low maintenance, integrally colored material in compliance with the Architecture /Engineering Design Guide.

When the floor area of the addition is equal to 25% or more of the existing building floor area, the addition and the original building are required to comply with the Architecture/Engineering Design Guide.

Whether large or small, additions should not appear as obvious add-ons. Match form, massing and scale to make the addition and the original structures appear as parts of a new, unified whole.

Install advanced meters on all new construction and renovation projects exceeding \$200K, and connect to base EMCE. (Ref: EP Act 2005 and DODI 4170.00)

Provide programmable thermostats with lockout capability in facilities/ areas where EMCS is not applicable, i.e. HVAC < or equal to 10 tons.

When new sloping roofed buildings are sited among existing flat profiled buildings, steps shall be taken to develop some secondary flat forms to relate the new to the old.



Figure 4-2a



4-2b BLDG 590 addition

### 4.3 FORCE PROTECTION/ANT-TERRORISM

Coordinate and integrate force protection/anti-terrorism elements such as walls, windows, blast protection, and fences with base and building architecture as well as good architectural practices.

During facility site design, use landscaping, bollards, planters, and other site amenities as barriers.

Setbacks and other site restrictions shall be governed by the UFC Standards.

### 4.4. SITE PLANNING

Once the site has been selected, address every aspect of site planning early in the process, including building siting, relationship of interior spaces to the site, pavement, landscaping, pedestrian access, signage, service equipment, infrastructure, and other barriers.

#### 4.4.1 General

All site planning shall be in conformance with the Moody AFB General Plan.

Use of sites that force building functions into basements, third floors, or uneconomical shapes such as curves, diagonals, or long rectangles is discouraged.

Sites should permit open landscape space around buildings.

When siting new facilities:

Locate facilities in their proper functional area

To reduce traffic congestion and parking problems, avoid overdeveloping an area.

Plan for future expansion of facilities.

Preserve natural features of the existing environment (steep grades, wetlands, streams, & trees for visual relief).

Consider the potential views of the facilities from surrounding streets and buildings.

Avoid creating negative impacts on significant cultural resources.

Consider noise levels and attenuation requirements – avoid locating facilities in incompatible noise zones unless no other options are available.

#### 4.4.2 Environmental Stewardship

Strive for compliance, restoration, and protection of our natural resources.

In undeveloped forest areas, configure the site layout to retain large parcels of wooded habitat by clustering development.



4-4a Utility equipment and trash receptacles located and screened appropriately.

Clustering buildings will reduce the amount of land used to run utilities and vehicles across.

Design facilities to work within the existing topography; preserve as many desirable trees as possible.

#### 4.4.3 Location of Visually Objectionable Items

Avoid letting mechanical systems become form-givers.

Above-ground transformers, mechanical systems, utility equipment, meters, connections, trash



receptacles, etc. shall be discreetly located to the rear or side of buildings and shall be screened with walls and landscaping. (Figure 4-4a)

No such items shall be visible from the main entry or the principal viewing street.

Design these service areas to blend in and integrate with the building design and match adjacent materials in a way that they are not prominent or detectable.

Transformers, sectionalizer and high voltage power switches require a minimum of 10' clear zone for electrical personnel safety per the NEC.

Walls around exterior mechanical equipment need to be a minimum of 7' tall when used with force protection measures.

Configure site to separate service zones from parking and pedestrian spaces. Screen service areas from major streets.

#### **4.4.4 Site Development Pattern**

Arrange buildings in tight groupings, which share parking and encourage people to walk between buildings. Do not let parking dominate.

Relate building forms to each other. Areas between buildings should be designed as exterior pedestrian spaces.

Use building forms, landscaping, and existing topography to enclose outdoor spaces.

Provide site improvements and building forms appropriate to any new, future or existing buildings. Facilities having similar or related functions should be located in the same vicinity.

Tight building clusters should read as one idea with similar details and materials that link them aesthetically and functionally.

Carefully site buildings to provide adequate open space while keeping the distances between buildings in common areas walkable.

#### **4.4.5 Future Development**

Where the possibility of facility expansion exists, the building site plan should show the proposed method of expansion (addition or separate building).

Coordinate location of underground utilities, parking and service areas to minimize impact on future growth.

### **4.5 BUILDING FORM**

Ensure the principle or main view of the building presents a pleasing and uncluttered appearance.

Use permanent low-maintenance exteriors that are compatible with base standards and their natural and manmade environments.

Use materials that do not require painting during their lifetime. Emphasize low life-cycle costs.

Use of simple massing and sloped roof forms is recommended.

Incorporate porches and arcades to create shade.

Do not use basements.

Where feasible, arrange building forms to screen outdoor storage/equipment areas from primary streets.

Minimize use of curves, cants or angles other than 90-degree corners. Use only as clearly justified by the adjacent architecture, building function, or layout.

Integrate solar components with roof or wall forms. Give preference to passive solar applications over active solar applications. Do not let solar components clutter or break the normal building form line.

Exceptions: when collectors do not look like walls or match roof slopes, screen them from view with materials that coordinate with the building material.

Avoid unnecessary reliance on color, and focus on other architectural elements to maintain compatibility.

For prefabricated structures, the design must provide for a sturdy, well-caulked building. Windows, doors, and hardware must be of the best quality.



4-5a Sloped roof forms and simple building massing of 820th Security Forces Group facility



4-5b Sloped roofs and additive forms give human scale to large building masses.



4-5c C-130 Wash Rack: Simple, functional form

Wall panels must have sufficient intermediate supports to limit deflection under maximum design wind loads so as not to destroy weather seals. Where wind-driven rain prevails, provide weather vestibules at main entrances.

## 4.6 ROOFS

### 4.6.1 Form

Use pitched roofs. Generally use a hip or gabled roof.

Overhangs for weather protection and shade are desirable.

Do not design interior valleys or depressions that will form ponds if a roof drain becomes obstructed.

Eave heights may vary as required by interior functional relationships, but do not use more than one pitch angle on a building.

Do not combine two kinds of roof such as flat and sloping roofs on the same building unless it is clearly justified by the influence of adjacent architecture, building function, or layout.

### 4.6.2 Roof Material

Roofs shall be dark bronze standing seam metal with Kynar coating finish.

Exception: Asphalt shingles with minimum 3:12 pitch shall be used for residential structures in the Grassy Pond area. Shingles shall be 3 tab, architectural fungus resistant.

Roof insulation values shall comply with requirements of the “International Energy Conservation Code.”

If a band is desired around the top of a building, provide it with masonry detailing such as projections, soldier course, or stack bond.

Do not combine roofing materials such as metal and shingles on one roof.

For new roofs or major roof replacement projects, meet or exceed the following Solar Reflectance Index (SRI) for a minimum of 75% of the roof surface: SRI > 78 for low slope roofs (< 2: 12); SRI > 29 for high slope roofs (> 2: 12). (Ref: Cool Roof Rating Council; and LEED for New Construction v.2.2, SS Credit 7.2) Comply with published ACC and base architectural policies regarding roofing.

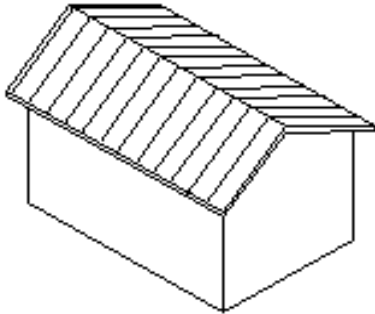
### 4.6.3 Slope

Minimum roof slope should be 3:12. Refer to guidelines for each visual area for specific requirements.

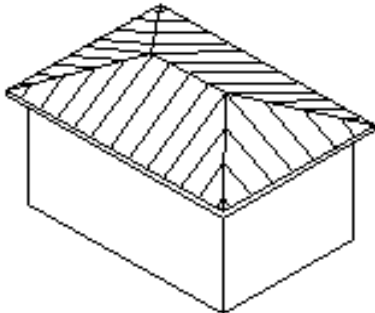
Alternatives: If minimum roof slope requirement cannot be met, slopes as low as 1:12 are accepted for structural standing seam metal.

Flat roofs and interior gutters are prohibited.

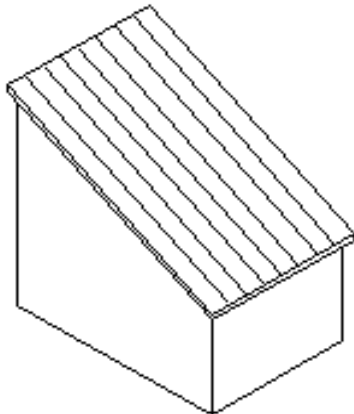
Exception: Very large buildings and hangars may have slopes less than 3:12 with the approval of the Base Architect.



GABLE



HIP



SHED

4-6a Basic roof forms.

#### 4.6.4 Roof Warranties

Use proven, cost-effective roof systems with high durability and weather resistance such as factory finished standing-seam metal or shingle roof.

Roof shall meet a U.L. 90 uplift rating and be designed to meet the 100 M.P.H. wind seismic code as outlined in the I.B.C.

Roof material, finish and workmanship shall be fully warranted for the following time periods:

Metal roof: Fluoropolymer (e.g. Kynar 500) factory finish, 20 years. 20 year non-prorated, no dollar limit water tightness warranty from the manufacturer.

Metal roofs shall be inspected by a third party with expertise in roof inspections. A written report and opinion shall be given to the government.

Fiberglass Reinforced Asphalt Shingles: 20 years

#### 4.6.5 Clearstories

Clerestories may be used where strong functional and economic justification dictates.

General area lighting for warehouses is not considered strong enough functional justification to compensate for the high maintenance of large numbers of skylights on a low slope roof.

Be sure to consider heat load and occupant comfort as part of the proposed design.

#### 4.6.6 Gutters and Downspouts

Gutters may be exposed or integrated into the fascia design.

Downspouts may be exposed. Exposed downspouts shall be factory finished to match adjacent wall color or metal roof color. Detailing to integrate downspouts into exterior wall design is encouraged (Figure 4-6b).

Rain diverters or gutters and downspouts must be provided over building entrances.

In wooded areas, take maintenance into consideration when designing roof drainage.

Ensure overflow scuppers are provided in accordance with applicable codes for parapets.

When possible, downspouts should be inserted into cast iron boots and routed into the underground storm drainage system. As an

alternative, provide concrete splash blocks at grade. Locate splash blocks to avoid conflict with pedestrian walks.



4-6b



4-6c 820th SFG facility incorporates exposed gutters with downspouts recessed into pilasters.



4-6d Roof ventilation.

#### 4.6.7 Rooftop Equipment

Equipment shall not be mounted on the roof.

Exception for Existing Flat Roofs: Rooftop equipment may be used on existing flat (low-slope) roofs only if alternate locations for equipment are economically prohibitive. When used, it must be placed out of view on all sides of the building, and factory-painted dark bronze. Equipment shall be screened if it is not feasible to place the equipment out of view.

If rooftop-mounted equipment is the only option, requests must be submitted to and approved by the Base Architect.

Roof penetrations and exposed flashing shall be factory finished to match the roof color. Any

elements that cannot be factory finished shall be field painted to match the roof color.

Minimize roof penetrations. If locating penetrations on the least visually objectionable side of the roof is not possible, locate to provide a pleasing pattern.

### 4.7 ENTRANCES

#### 4.7.1 Visibility

At least one building entrance must be clearly visible from the main viewing street and the parking area (Figures 4-7a & 4-7b)

Each building entrance must be readily identifiable.

#### 4.7.2 Entry Sequence

Facility design should address the entire entry sequence beginning with vehicular/pedestrian circulation routes and terminating in the building lobby.

Where a front (street) and a back (parking) entrance are required, both entrances should share a common lobby.

#### 4.7.3 Protective Cover

Exterior entrance doors must have at least 3'-0" of protective cover.

Roof overhangs, recesses, colonnades or other integrated elements are encouraged.

Separate elements applied to the exterior walls (example: cantilevered or bracketed canopies or glass roofed vestibules) are discouraged.

### 4.8. FASCIAS AND SOFFITS

Color anodized aluminum in neutral colors is recommended for exterior metals normally associated with walls such as fascia, gutters, downspouts, windows, and building entrances.

#### 4.8.1 Soffits

Soffit material should be factory finished metal or Portland cement plaster. Color may be off-white or may match metal roof color.

An alternate soffit material and color may be used with approval of the Base Architect.

Soffit design should incorporate ventilation for roof/attic spaces. Soffit vents should be used in



conjunction with ridge vents or louvers (Figure 4-6d).

Consider use of deep soffits or roof overhangs to shade exterior walls and windows during summer months (Figure 4-8a).



4-8a Commissary entrance is easily identified from parking lot and street.



4-8b 820th Security Forces Group building entrance.



4-8c Deep soffits and balconies shade dormitories from summer sun.

#### 4.8.2 Fascia and Trim

Fascia material shall be metal, factory finished to match metal roof color.

Exception: Family housing units and residential structures in the Grassy Pond area may use wood fascia and trim. Color shall be approved by the Base Architect.

Do not use wide metal fascia with low slope roofed buildings.

#### 4.9 EXTERIOR WALLS

##### 4.9.1 Materials & Colors (General)

Sustainable facilities containing recycled materials, non-toxic and least-toxic materials, and utilizing energy efficiency, where feasible, shall be designed where cost effective. Protect facilities against environmental deterioration.

Use durable low- or zero-maintenance materials with integral color at most locations to minimize maintenance.

Use materials such as brick, split-face Concrete Masonry Units (CMU), split ribbed CMU, and integrally colored concrete that is textured by use of form liners. (Figure 4-9b)

Brushed, honed, or sandblasted concrete is not acceptable.

Do not use materials that require painting on new buildings, and avoid materials that require painting on renovation projects.

Use of bricks, blocks, or grout containing fly ash or other by products is encouraged.

Use concrete containing fly ash or other recycled materials.

Autoclaved cellular cement should be used where appropriate.

Avoid painting new buildings or using materials that are typically restored by painting, such as stucco, metal fascia, and various kinds of siding on renovations. On metal buildings, select a factory pre-finished material.

If aluminum, hollow metal, and wood are mixed on one building, hollow metal and wood may be painted to match the aluminum color or adjacent

walls. Use one trim color to the greatest extent possible



4-9a Residential structure at Grassy Pond, where wood fascia and trim may be used.



4-9b Examples of acceptable brick and CMU usage on the 23d Security Forces Squadron facility.



4-9c Examples of acceptable CMU usage on the Deployment center facility.

When painting fire exits and secondary doors, they should be painted to match the primary color anodized entrances or painted to match adjacent walls. The objective is to produce a simple, uncluttered appearance. Do not paint over any identification stickers or labels showing listed door fire rating.

For the best appearance, usually two colors should be used on a building.

Metal walls are only acceptable for extremely large buildings such as aircraft hangars and

temporary buildings. Exposed metal stairs are not acceptable in any renovation or new facility.

#### 4.9.2 Materials (by Location/Area)

Acceptable exterior wall finish materials for different areas on Moody AFB are as follows:

##### Admin/Community/Retail Area:

Use Beige and Brown color schemes. Primary exterior wall finish material shall be brown brick with off-white mortar matching the BX, Commissary, Shoppette, and Furniture Store).

Exception: Facilities constructed within the existing medical campus may, with Base Architect approval, use brick matching Boral Brick, 10-852 Tan Wirecut Architectural to match the existing medical facilities.

Accent Material: Cast stone (architectural pre-cast concrete) may be used as an accent material on buildings with existing cast stone detailing. Color of cast stone shall be compatible with brick color and color of existing stucco fascia's. In the medical campus, cast stone should match existing pre-cast concrete elements.

##### Flight Line/Industrial:

Primary exterior wall finish material shall be integrally colored and textured concrete masonry units. Color shall match "Moody Tan" by Scruggs Concrete Co. The primary CMU texture shall be split-face; other textures may be used as accents. (Figure 4-9c)

Exception: Pre-finished metal wall panels may be used on large industrial/hangar buildings in the Flight Line/Mission Area. The following requirements apply to use of metal wall panels:

##### Approval of the Base Architect

Approval request must be submitted during programming phase.

Buildings shall have an integrally colored and textured concrete masonry base in compliance with the previous paragraph.

Height of building bases and water table shall be proportional to building size, but not less than four feet high.



Panels shall be factory finished. Color shall be beige to match adjacent panels as approved by Base Architect.

Panels shall carry a 20-year full replacement warranty on finish and water-tightness.



4-9d Furniture Store in the Admin/Community/Retail Area.



4-9e Admin/Community/Retail area – Shoppette, B554.



4-9f B649 (Flight Line/Mission Area).

Accent Materials: Textured concrete masonry units matching “Brown” by Scruggs Concrete Co.

Undeveloped Area:

Administrative, industrial, or mission-related facilities shall have exterior wall finish materials in compliance with the standards for the Flight Line/Mission Visual Area.

Brighter colors may be used in areas such as child care, medical and off duty areas.

Grassy Pond Area: Unaccompanied-Recreation Area

Refer to other Sections of the Architectural/Engineering Guide for Grassy Pond requirements.

#### 4.9.3 Detailing:

Masonry detailing is encouraged in lieu of applied ornamentation. For example, soldier courses, stacked bond, special sill and water table shapes, reveals, etc. (Figures 3-13a, 3-13b)

Cast stone (architectural pre-cast concrete) may only be used for detailing on buildings that have existing cast stone details. Color and texture shall match existing.

Use anodized colors such as brown tone or gray tone neutral. Coloring trim a contrasting color can produce a cluttered appearance.

Provide weep holes with 3/8” diameter cotton weep rope installed. Cut rope flush with masonry. Rope shall be 100% cotton and shall match mortar color as

#### 4.9.4 Wall Construction:

Wall insulation shall comply with the requirements of the Georgia Power “Good Sense Rule.”

Wall louvers: Exterior metal louvers shall be stormproof and able to withstand wind-driven rain without infiltration. Louvers shall have fluoropolymer (e.g. Kynar 500) coating to match adjacent wall color.

Exterior insulation finish systems may only be used on renovation projects and accents and gable ends. System must maintain a minimum 6” clearance from finish grade. Use of EIFS requires approval of the Base Architect.

Brown brick with off-white mortar, to match the existing Base Exchange, Commissary and Class Six facilities.

Brick detailing such as soldier courses, reveals and special brick shapes is encouraged.

#### 4.10. WINDOWS AND DOORS

##### 4.10.1 Design

Design building fenestration for user comfort and energy efficiency. Reduction of cooling loads is critical during Moody's hot summer months.

Use horizontal sliding windows at all operable window locations, unless approved by the base Architect.

Provide window screens where windows are operable and designed for ventilation; screens are not required on windows which operate only to allow cleaning. Use durable window screens.

Orient windows to take advantage of cross ventilation.



4-10a Split-face concrete masonry with special water table shape and split-rib CMU base.



4-10b cmu detailing

4-10b Masonry detailing in C-130 complex: Horizontal band of darker, split-rib CMU is 16 inches high on building, 8 inches high on mechanical enclosure.



4-10c Future buildings in the Admin/Community Area will match the brown brick and dark bronze metal roof of the Thrift Store.



4-10d Brick and mortar colors of the existing Community Center buildings set the standard for exterior wall materials in the Admin/Community visual area.

Incorporate overhangs, porches, colonnades, high performance glazing and other strategies to block direct summer solar gain (Figure 4-10e).



Use north facing clerestory windows and other natural lighting methods to reduce lighting demand and associated cooling loads.

In accordance with Force Protection Anti-Terrorism standards, blast-resistant windows shall be used where required.

All openings shall be adequately sealed (windows, doors, ports, etc.) as an important energy conservation feature. Check closures between areas with controlled and uncontrolled environments to prevent loss of conditioned air.

Tinted, energy-efficient glazing for windows is required.

#### 4.10.2 Materials

Thermal-pane windows in vinyl casings with baked on finishes shall be specified for low maintenance and energy efficiency when justified by life cycle cost.

Windows shall have aluminum, thermal-break frames. Finish shall be dark bronze anodized or matching fluoropolymer coating (e.g. Kynar 500).

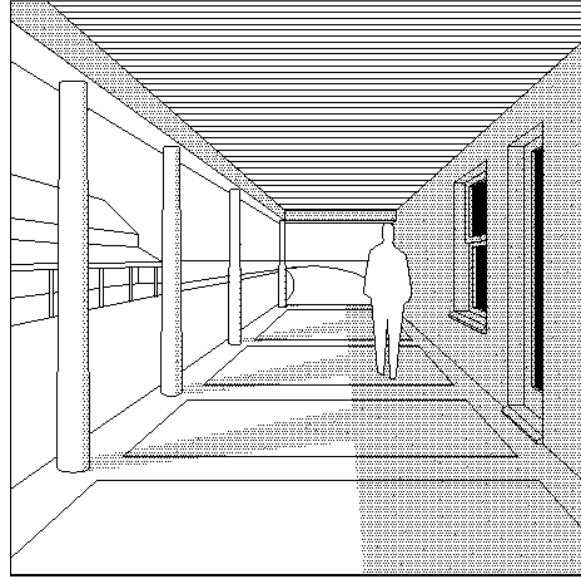
Exception: Window colors on residential structures in Grassy Pond area shall be approved by Base Architect.

Use of recycled materials for doors, windows, and door/window framing is encouraged.

Glass shall be insulated, Low "E", solar bronze tint, with minimum reflectance. Due to summer cooling loads, consider high-performance, low-emissivity and glazing where feasible, but avoid the use of mirrored glazing.

Exception: Glass in residential buildings in Grassy Pond area should be clear or have minimal tint.

Secondary Exterior Doors and Frames: Specify steel doors and frames on all facilities. Hollow metal doors and frames should be galvanized, factory primed, and field painted to match adjacent wall color.



4-10e Colonnades and overhangs shade building exterior and reduce cooling loads.

Primary Entrances: Aluminum storefront will be used at primary entrances. Color should be dark bronze anodized or matching fluoropolymer finish (e.g. Kynar 500).

Exception: Grassy Pond residential buildings should use galvanized, insulated residential steel entrance doors that have been properly prepared, primed, and finished at the factory.

Use of wood doors on the exterior is prohibited.

#### 4.11 FINISH HARDWARE

Locks shall be equal to and compatible with the base standard interchangeable core system manufactured by Best Lock Co.

Provide a 3-year warranty on parts and labor for all locks.

Prior to the Final Design Submittal, project designer shall discuss keying requirements with the building user.

Door hardware shall have a satin finish.

#### 4.12. MEDICAL BUILDINGS

Exception from the above guidelines will be granted to new buildings and additions within the medical complex, with the Base Architect's approval.

Exceptions will only be granted to structures adjacent to the existing medical buildings, as defined by the burnt orange/tan brick and beige stucco fascia's. A new medical facility that will be sited away from the existing complex must conform to the guidelines of the visual area in which it will be built.

Guidelines for medical facilities within the existing complex shall be as follows:



4-12a Main Hospital Building, 3280 Mitchell Blvd.



4-12b Existing facilities in the medical campus

Dark bronze metal roofing with minimum slope of 3:12 shall be used on new facilities.

Architectural precast concrete (cast stone) may be used as an accent material. Color and texture should match precast elements on existing medical buildings (Figures 4-12a, -12b).

Exterior walls shall be brick to match the Main Hospital Building, 3280 Mitchell Blvd. ("Tan 10-852, Wire cut Architectural," by Boral Brick, Inc.) (Figure 4-12a).

#### **4.13. OUTDOOR PAVILIONS AND PICNIC SHELTERS**

Where shelters are located near other buildings, wall/column materials shall be masonry to match adjacent building. Standing seam metal roof and trim shall be dark bronze.

Where shelters are sited in playgrounds or outdoor recreation areas, heavy timber framing may be used. Exposed wood shall be treated for exterior exposure, then stained dark brown or allowed to weather to natural color. Roofing shall be dark bronze colored standing seam metal roof system. Underside of roof deck shall be considered a finished surface (i.e. exposed fasteners protruding through decking are unacceptable).

#### **4.14 METAL BUILDINGS**

Metal buildings may be used for only large structures such as hangars or temporary facilities. Temporary buildings must be removed within one year. Specialized facilities such as water towers and fuel tanks may be metal.

##### **4.14.1 Location**

Use metal buildings where they are compatible with adjacent structures.

Metal buildings should be well-screened with walls or vegetation.

When designing a new metal building, consider using a textured, integrally colored masonry base for durability

##### **4.14.2 Materials/Finishes**

Use factory applied finishes with more than 15-year warranties.

Provide protective masonry on the exterior of buildings where impact to metal panels is probable.

Use satin finish for exposed metals such as hand rails, railings, extinguishers, etc.

##### **4.14.3 Site Justification:**

At the programming stage, submit siting criteria and waiver request.

Indicate adjacent building construction and possible visibility from major, minor, or service roads.

State the reason for selection of metal over masonry in addition to cost consideration.



4-14c Outdoor pavilion matches materials of adjacent buildings in Unaccompanied Housing Area.



4-14c Picnic shelter in the 300 area dormitories area.

#### **4.15 INTERIOR DESIGN – GENERAL**

Base standards ensure materials purchased and installed in our facilities will perform well in respect to both aesthetics and durability. These standards are developed around an understanding of the elements and principles of design and how the industry operates, not around personal likes and dislikes.

Use central corridors and open office layouts when possible. Limit private offices. Provide space for break areas and storage areas for support equipment such as copiers, faxes, etc.

Recessed mats shall be provided at exterior doorways.

Utilities and fire protection items shall be painted to match the surface on which they are mounted

Comply with accessibility laws; recess all wall-mounted fixtures such as fire extinguishers, fountains, emergency lights, and restroom accessories

Frame all artwork, pictures, and posters. Taping or tacking items to anything other than bulletin boards should be prohibited.

Conceal all communication and power connections, cables, and conduit. Provide adequate connections for each use.

Waterproof sheetrock shall be required at all bathtubs and showers.

Use floor-mounted toilet partitions in lieu of ceiling mounted.

#### **4.16 PERMANENT FINISHES**

Hard surface structural interior design finishes that last up to 15 to 20 years are permanent finishes

##### **4.16.1 Other Permanent Finishes**

Vinyl compositions tile (VCT), ceramic, other hard surface tiles, plastic laminates, toilet partitions, lockers, window blinds, all modular or systems furniture panels, work surfaces, flipper doors, etc.

##### **4.16.2 Coloring**

All permanent finishes must be either brown-tone or grey-tone neutrals by command standards. These neutral shades can be from very light to a mid-range neutral of the same shape.

#### **4.17. NON-PERMANENT FINISHES**

Carpet, paint, vinyl wall covering, upholstery, artwork, etc. are considered non-permanent finishes.

Under most conditions, non-permanent finishes will last from five to seven years.

Mid-range colorations or colorations appropriate to the facility will be used for non-permanent finishes.

Neutral colors are recommended for vinyl wall coverings or painted wall surfaces in offices or

work areas. Light reflective surfaces are important to a productive work environment.

Providing a neutral shell for interior space of work areas allows the carpet, upholstery, artwork and accessories to provide the color accents.

#### **4.18 FINISHES AND TREATMENTS**

Durable, cost-effective finishes are the standard.

When selecting floor finishing, consider moisture, soiling (abrasiveness/staining), chemicals, wheel loads, dropped objects, movable furniture, foot traffic, and traffic patterns.

##### **4.18.1 Carpet**

A bold tweed or patterned nylon commercial grade loop pile carpet is appropriate. Yarns of bold tweed must be in mid-range to dark tones in color.

Bold tweed means yarns of several different colors, not various shades of the same color.

Solution-dyed carpets are recommended for medical facilities, Child Development Centers, lodging facilities, and Youth Centers.

The face weight should be a minimum of 28 oz./sy, level loop, bold tweed carpet.

Use of carpet tile is strongly recommended in office areas with systems or modular furniture.

Carpet tile or its associated six-foot wide rolled goods also should be used in corridors.

Carpet borders may be solid in color.

Use of solid-colored carpet is approved only for Distinguished Visitors quarters in lodging facilities and in large spaces such as conference rooms.

##### **4.18.2 Hard Surface Flooring**

Hard surface or resilient flooring should be used mainly in heavy abuse areas, wet rooms, or walk-off areas to provide superior wear-ability and clean-ability.

When using Ceramic Tile, Porcelain Tile, Natural Stone and Cast Stone Flooring:

A mottled, flecked, or speckled floor tile should be used. Use a medium to dark toned grout.

Tile banding accents or patterns are allowed on walls and floors, provided the accent is another neutral shade that coordinates with the dominate tile color.

When using VCT, Sheet Vinyl, Laminate Flooring, etc.:

A mottled, flecked, speckled, wood, or stone pattern should be used. Avoid very light tones.

##### **4.18.3 Laminates and Solid Surfacing**

Flecked, speckled, mottled, textured, or stone look in matte finish are more easily maintained.

Solid surfacing material (Corian®, Avonite®, etc.) has an extended life cycle and is easily repaired, but is more costly than plastic laminate and should be considered with caution.

##### **4.18.4 Vinyl or Rubber Base and Carpet Base**

Vinyl or rubber base color should coordinate with the floor or wall surface. Do not use an accent color for the base. If a carpet base is to be used, it should be the same product that meets the wall whether field or border carpet.

A no-toe profile base should be used with carpet tile installations.

##### **4.18.5 Paint**

Use Egg shell finish, latex enamel for all painted surfaces. Use a semi-gloss finish for trim paint.

##### **4.18.6 Wainscot and Chair Rail**

Chair rails shall be considered for offices and conference rooms subject to hard use to reduce scuffs, scratches, and repainting of walls.

Chair back height must be considered to properly locate the chair rail.

Wainscot and chair rail should be no more than 32"-36" high in rooms and no more than 36" high in corridors.

Heavy vinyl bumper guards, in neutral tones, may be used to protect walls in corridors where needed. In corridors, plastic or metal corner protectors shall be specified.



#### **4.18.7 Doors and Door Frames**

Depending on the type quality of the doors, they may be either stained or painted but preferably stained and sealed.

If painted, select a color of semi-gloss finish to blend or coordinate with the walls.

#### **4.18.8 Window Blinds**

Metal horizontal blinds should be in off-white, light neutrals, or dark bronze.

Dark blinds that match the anodized finish of the window frames are acceptable, provided the windows are of reflective glass to prevent heat build-up.

#### **4.18.9 Ceilings**

Ceilings are to be white or off-white. Textured ceiling tiles in two-foot squares with a tegular edge are recommended.

#### **4.18.10 Systems/Pre-wired Workstations/ Modular Furniture**

All panel fabrics, work surfaces, flipper doors, etc., are to be in either brown-tone or gray-tone neutrals.

Only one type of systems furniture should be used per building.

## **5.0 MECHANICAL**

### **5.1. GENERAL**

Each facility shall include provisions to interface with the base EMCS system.

Asbestos containing materials (ACM) shall not be used, even including ACM fully encapsulated in gasket material.

Provide for clean pleated filters to be installed at system acceptance, with a new separate standby filter to be turned over to the Government at that time.

All HVAC equipment shall be easily accessible for maintenance.

Eliminate the need for above-ceiling return air plenum by using ducted return.

Chiller change out. Add 3" supply and return fittings on the chilled water line close to the chiller in case of emergency. Install shut off valves and cam lock fittings if possible.

Life cycle cost shall be considered in fuel choice and in building R-value.

Maintain manufacturer's clear distances for airflow around equipment, including exterior screening walls.

All mechanical equipment shall be mounted on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Provide positive ventilation in attics and crawl spaces.

### **5.2 CONTROLS**

All Direct Digital Control (DDC) Systems shall be 100% integrated with the base's existing Siemens Building control system.

Do not use pneumatic control components.

All Systems over 10 Tons (cumulative) will be controlled by EMCS.

### **5.3 MECHANICAL ROOM DOCUMENTATION**

The contractor is to provide the following information with each sheet permanently mounted

under clear Plexiglas, in each mechanical equipment room:

\*Duct work schematic

\*Piping Schematics and valve schedules

\*Control schematics and description of operation

## **5.4 WATER, GAS & FUEL SYSTEMS**

All aspects and procedures for gas piping, repairing and/or installation shall comply with IAW D.O.T. Gas Pipeline Safety Provision 49 CFR Part 192.

Natural gas distribution lines shall be polyethylene pipe, yellow or orange in color, conforming to AGA standard PE 2406 or PE 2306.

Connections shall be made by heat fusion.

Metallic tape shall be installed above.

Use PVC/CPVC for condensate drain lines.

Water & Gas meters shall be installed for new construction or in renovation projects and tied into the base EMCS system. Water meters shall provide direct read per gallons.

Electric water coolers shall be lead-free and CFC-free. Provide handicapped-accessible models where appropriate; comply with ADA and ABA requirements.

Use of natural gas is preferred. Gas meters shall be installed and tied into the base EMCS system

Liquid fuel tanks shall be installed in concrete vaults above ground.

Install Anti-freeze hydrants (AFH) on the exterior of the facility.

## **5.5 EQUIPMENT ROOMS**

Design equipment rooms to be located along exterior walls with exterior access doors.

Sufficiently large doors or easily removable panels shall be designed to allow passage of large piece of equipment and/or removal or replacement of any installed equipment.

Floors are to be sloped to interior drain.

Room shall be provided with domestic water with hose bib and 115-volt power outlets.

Adequate wall space or full-standing partitions shall be provided for mounting of controls. Ensure adequate space is provided in utility and mechanical rooms for the proper operation and maintenance of installed equipment. Check equipment sizes with manufacturers catalogs. When deemed necessary, ensure mechanical specifications include maximum allowable equipment sizes.

Adequate space shall be allowed for wire brushing of water-cooled condensers, chillers and coils; filter removal; access to control actuators; etc.

## 5.6 HVAC

### 5.6.1 Design Criteria

Install pad-mounted HVAC equipment when possible. Use ridgeline vents or gable vents, instead of roof-mounted rotating fan vents. Install soffit vents.

Unless otherwise informed, winter design temperature is 31 degrees Fahrenheit, and summer design temperature is 94 degrees Fahrenheit with a wet bulb temperature of 79 degrees Fahrenheit.

Exception: If an air-cooled condenser cannot be located in shade, the design temperature may be adjusted up 5 degrees Fahrenheit higher, at the discretion of the design engineer.

Meet or exceed the following efficiencies for HVAC systems in new or renovated facilities, and when replacing equipment.

Heating Systems	Hydronic Boilers < 2,500,000 BTU/hr	Thermal Efficiency > 85%
	Hydronic Boilers > 2,500,000 BTU/hr.	Thermal Efficiency > 82%
	Warm Air Furnaces < 150,000 BTU/hr.	Annual Fuel Utilization Efficiency (AFUE) > 90%

	Infrared Heaters (open)	Combustion Efficiency > 92%
	Infrared Heaters (tube)	Combustion Efficiency > 87%
Cooling Systems* (includes air to air heat pumps)	Air Cooled <10 tons	Seasonal Energy Efficiency Ratio (SEER) > 14.0
	Air Cooled 10 – 150 tons**	Integrated Part Load Value (IPLV) <.85
	Water Cooled < 150 tons	Integrated Part Load Value (IPLV) <.55
	Water Cooled 150 – 300 tons	Integrated Part Load Value (IPLV) <.50
	Water Cooled > 300 tons	Integrated Part Load Value (IPLV) <.40
Ground Source Heat Pumps	All types	Energy Efficiency Ratio (EER) > 20

For air-to-air unitary heat pumps up to 19,000 btuh, the minimum SEER is 15.0. For units over 19,000 btuh, the minimum SEER is 15.0.

Heat high-bays and hangars with IR systems, unless prohibited by AFOSH safety regulations.

Ground source heat pumps may be used for the design and should be considered while in the planning process with the Base Architect.

### 5.6.2 Air Cooled Condensers

Selected condensers shall provide a maximum condensing temperature of 20-degrees above design ambient.

Solar effects and other site specific operating conditions shall be considered when specifying capacity.

Multiple fans and necessary controls shall be included for head pressure control.

Roof top installation is prohibited.

### **5.6.3 Ductwork:**

Standard duct material is galvanized steel constructed in accordance with SMACNA guidelines, wrapped with R-6 fiberglass insulation with foil vapor barrier.

Ductwork and insulation shall be sealed with vapor proof mastic.

No more than 4 feet of flexible ducting will be used at any air outlet.

Any take-off from rigid duct to a flexible duct connection shall begin with a minimum of 6 inches of rigid duct or prefabricated galvanized fitting with an adjustable damper.

The use of duct board in HVAC systems is not allowed.

Sheet metal ductwork shall be specified to be constructed to IAW SMACNA, "Low Pressure Duct Construction Standards or High Pressure Duct Construction Standards," as applicable.

Specify maximum ductwork leakage rates of 2% for round and 5% for rectangular (to be tested and verified during air balance).

Specify a vapor barrier material for all insulation intended for air conditioning ductwork.

Provide access doors/panels at all locations which require periodic cleaning; i.e., reheat coils and VAV terminals.

Branch ducts are to be offset from the main trunk duct (not opposite each other) for improved "balance ability."

Design of supply and return ductwork shall prevent stratification. Use baffles if necessary. All return air shall have ducted returns.

Specify manually operated, opposed blades or single blade, quadrant-type volume dampers for each branch duct take off after leaving the main duct. Splitter dampers and volume extractors are not suitable for volume control.

Specify double thickness or single thickness extended edge turning vanes in rectangular elbows.

All volume dampers are to be located at least two diameters from a fitting and as far as possible from outlets.

Install CO2 sensors in air return ducts for HVAC units over 20 tons.

### **5.6.4 Air Handlers, Water Heaters, Pumps, and Expansion Tanks**

Air handlers, water heaters, pumps, and expansion tanks that are installed above ceilings and where flooding may be a problem shall be installed with drain pans. Additionally, they shall have a work platform that extends on two sides.

Air handlers shall have supply and/or return side smoke detectors connected to the fire panel. Detection of smoke or panel activation stops the fan.

All hydronic devices shall have manual isolation valves in addition to modulating or two-position valves.

Consult the most current ASHRAE Standards for indoor air quality, heating and cooling requirements, and other design criteria.

Access openings are specified in fan guards for checking fan speed.

Provide, motor speed control, and variable discharge dampers for control of VAV systems. Do not rely on "fan tracking" as a method of control.

Specify extended greases fittings for bearings where required for access.

Provide access doors to clean BOTH sides of heating and cooling coils, drain pans, and fan blades.

Specified equipment should be in the mid-range of cataloged performance to allow for adjustment during commissioning.

Inside lights should be provided in air handlers having 25 square feet of coil area or larger. Use exterior mounted switch with indicator light.



Ensure fan-coils are installed so as to allow full opening of all access doors.

Install air handling units in equipment rooms where possible.

Air handlers above suspended ceilings are to be provided with servicing platforms, extended a minimum of thirty inches from the edge of the equipment, with a 36-inch high clear working space on the control side and other side where access is necessary.

Adequate clearance for servicing to include space for coil removal and filter changing should be available.

### **5.6.5 Louvers, Dampers, and Mixing Boxes**

Ensure that fresh air louvers are not located adjacent to heat rejection equipment (cooling towers, etc.). Also, louvers shall be at heights which will satisfy Force Protection criteria.

Ensure that fresh air louvers are motorized and connected to the control system.

Specify pressure independent balancing dampers downstream of VAV terminals.

Specify full quadrant balancing dampers for all fresh air and return air ductwork to all handling units.

Specify duct access doors on both sides of all dampers.

Specifications shall require the use of high efficiency dampers for all fresh air dampers and mixing boxes.

### **5.6.6 Coils**

Specify sufficient space between cooling and heating coils to facilitate cleaning.

Specify drainable and cleanable coils.

### **5.6.7 Filter sections**

Use 2" MERV 7 filters on equipment over 7.5 tons. Specify magnahelic pressure gauges across all medium and high efficiency filter sections.

## **5.7 REFRIGERANT EQUIPMENT**

### **5.7.1 General Refrigerant Compression**

Compressors are to be located in equipment rooms. Do not locate on roofs.

Suction discharge, and oil pressure gauges with isolation valves shall be permanently mounted on equipment room walls or free standing partitions. (Do not mount on equipment.)

### **5.7.2 Insulation**

For refrigerant lines, standard insulation material is closed cell foam insulation.

For ductwork, standard insulation material is fiberglass wrap with foil vapor barrier.

For domestic hot and cold water lines, the standard is fiberglass wrap with Kraft paper and glass fiber yarn backing, bonded to aluminized film, secured with self-sealing longitudinal laps.

Indoor piping shall have a vinyl jacket, and outdoor piping shall have an aluminum jacket with prefabricated elbows of the same material.

For high temperature water heating lines and steam lines, the standard is calcium silicate with cover.

### **5.7.3 HVAC Refrigerant Systems**

HVAC refrigerant systems shall use the refrigerant. HFC 134A or 410 equipment and others may be submitted by the design engineer for approval.

Provide training classes for government maintenance employees on system operation, four hours instruction for basic systems, and up to two full days for more complex systems. The design engineer will specify the number of government attendees.

Refrigerant and chilled water coils shall be copper tubing with copper or aluminum fins. Aluminum tubing shall not be used.

## **5.8 PIPING**

### **5.8.1 Chilled and Hot Water**

Specify thermometers and gauges at inlets and outlets of all heat exchange devices; i.e.,

converters, chillers, water cooled condensers, boilers, etc.

Specify air vents with isolation valves at all high points and at heat exchanges.

See if vapor barrier material is called for all chilled water piping insulation.

Specify chemical feeders for water treatment.

Specify dielectric unions at all connections of dissimilar metals.

Specify flow measurement equipment (i.e., orifice plates) for all major heat exchange devices and each pump.

### 5.8.2 Refrigeration Piping

Piping should be designed to provide adequate oil return.

Size suction and discharge gas risers for minimum gas velocities of 1000 fpm.

Horizontal suction and discharge gas lines shall be sized for minimum gas velocities at 500 fpm.

Specify p-traps at the bottom of all gas risers with more than 8 feet of vertical run.

Specify double gas risers for systems with unloading compressors.

See that all horizontal refrigerant lines are sloped 0.5 inches per 10 feet in the direction of flow.

Design shall provide isolation valves at inlets and outlets of all system components, every major piece of equipment and on each end of long refrigeration lines. Each separable element of the refrigeration system must have provisions for localized evacuation. Critical systems must be provided with valved bypass lines at all filter drier locations.

### 5.8.3 Piping Identification

Standard color-coded labels (ANSI A 13.1) are to be specified for all piping at ten-foot intervals. Colored pipe labels shall be printed to indicate the type of fluid carried; e.g. chilled water supply, hot water return, etc., and direction of fluid flow (arrows).

Color-coding shall be as follows:

FLUID TYPE:	BACKGROUND COLOR:	OR LETTERING:
Boiler feed water	Yellow	Black
Chilled water	Green	White
Condensate return	Yellow	Black
Condenser water	Green	White
Hot water	Yellow	Black
Make up water	Green	White
Steam supply	Yellow	White
Fuel	Yellow	Black

### 5.8.4 Installations and Repairs

All installations/repairs shall meet or exceed provisions outlined in AFI 91-203 on all piping to include but not limited to potable and non-potable water, fire suppression systems with regards to system type, compressed air and gas piping systems.

## 5.9 PLUMBING

Code Compliance

Plumbing shall comply with the following codes.

International Plumbing Code (IPC)

International Building Code (IBC)

Provide schematic & isometric of water & sewer layouts.

### 5.9.1 PVC/CPVC Piping Systems

Waste, vent, and potable water piping systems shall be PVC/CPVC schedule 80 pipe.

### 5.9.2 Copper Piping

Copper pipes may be used only on chilled water and hot water heating systems.

A. All water piping shall be schedule 80 CPVC and be installed IAW with all applicable codes and manufacturer's recommendations.

B. Exterior piping shall be schedule 40 or greater.

### 5.9.3 Sterilization

All new potable water piping systems shall be sterilized. Provide backflow prevention on all new potable water & treated industrial water.

#### **5.9.4 Pressure Testing**

All piping shall be properly pressure tested.

#### **5.9.5 Valve Installation**

Install valves with stems upright or horizontal, not inverted.

#### **5.9.6 Installing for Servicing and Cleaning**

Install each fixture with trap, easily removable for servicing and cleaning. Provide all lavatory faucets with washer less dual controls in restrooms.

#### **5.9.7 Prefabricating and Sterilizing for Efficient Work**

To facilitate installation and to minimize water service "down-time," all new equipment and piping shall be prefabricated and sterilized before start of any work on existing piping system excluding insulation.

#### **5.9.8 Sewage Lift Stations shall have the following:**

- a. Dual submersible pumps with automatic alternating lead pump controls with a manual override.
- b. Adequate wastewater storage for short power outages or maintenance down time.
- c. Adequate heat and lightning and explosion-proof switches.
- d. Easy access for maintenance personnel and pump replacement provisions.
- e. Connection of mobile emergency generator.
- f. Permanently affix data plate with the following information, but not limited to:
  - a. Size of basin.
  - b. Size of each pump.
  - c. Manufacturer & part number for component of system

#### **5.9.9 Water Distribution System**

Water distribution located in new structures may have a PEX system. If a manifold is used, then all manifolds shall be copper or brass construction.

Design of system shall be reviewed and approved by the base Architect prior 35% design submittal.

#### **5.9.10 General – Check:**

An air gap or indirect waste is to be provided on all food service equipment as required by the Uniform Plumbing Code.

Equipment schedules shall indicate the necessary units, capacities, types, sizes, special notes, etc.

Backflow prevention program devices are to be accessible to craftsmen for inspection.

Hose bibs shall be provided on exterior walls at appropriate, strategic locations.

Sufficient valving shall be provided to isolate minimum system sections for repair or maintenance by floor, wing, bay, etc.

Provide exterior sewer cleanouts within five feet of the exterior wall. Cleanouts shall be of solid brass construction set in a preformed concrete or poured concrete pad.

#### **5.9.11 Tracer Wire/Warning Tape**

Provide trace wire installed above all new utility lines 10"-15" below grade.

Tracer wire must be labeled and have connections points at each end and at intervals with a maximum spacing of 500' to allow locators to connect to tracer.

Tape shall be direct bury with warning label indicating appropriate utility and caution.

Wire shall be minimum 12 AWG six, solid copper with minimum 30 Mil polyethylene jacket. Color coated to match specific utility.

Use solid copper wire Type THHN or THWN VW-1 600V, Gasoline and Oil resistant, insulated as a minimum requirement for the tracer wire.

Provide cathodic protection for all buried metal components.

## **6.0 FIRE PROTECTION**

### **6.1 DESIGN:**

All facilities shall be designed to comply with UFC 3-600-01 and additional criteria included in this document. The fire protection engineer/designer of record (FPDOR) shall be a registered professional engineer who has passed the fire protection engineering exam administered by the National Council of Examiners for Engineering and Surveys (NCEES). The FPDOR shall review shop drawings for approval. The FPDOR shall approve or place his professional seal on construction documents upon acceptance. The FPDOR shall be identified at the beginning of the project.

When specific editions are not specified within this document, use and identify the current editions of applicable standards.

Projects shall include building code analysis, life safety code analysis and a water supply analysis in accordance with UFC 3-600-01. These items shall be included in the 35% submittal.

Building code analysis shall use the 2014 edition of International Building Code as outlined in UFC 1-200-01. Analysis shall compare the allowable area and height and the actual area and height.

Life Safety Code analysis shall be based on the current edition of NFPA 101. Analysis shall show allowable and actual data such as travel distances, occupant loading, exits, etc.

Mass Notification Systems need to be in compliance with specifications identified by UFC 4-021-01 and NFPA 72. EXCEPTION: The microphones at the ACU and the LOCs shall work as a public address system and not activate the visual warning devices of the system.

#### **6.1.1 Civil Plans:**

The civil drawings shall show all fire water mains to include positive identification of the test hydrants (both pressure and flow hydrants).

Plans must show water main from the test point to the building riser.

Show all fire hydrants and control valves. See UFC 3-600-01 for criteria.

Roads shall comply with UFC 3-600-01 and NFPA 1 for accessibility to building by emergency vehicles. Coordinate with the fire department.

Make sure all fire protection devices such as fire hydrants, control valves, etc. over 5 feet from the building are included in the civil specifications.

#### **6.1.2 Architectural:**

The architectural plans and the Life Safety Code plans shall both show the fire walls and partitions and architectural plans shall identify the UL number or other standard such as FM for fire rated assemblies.

Door plan shall identify the fire rating of any fire doors. Make sure fire doors match fire walls shown on drawings.

#### **6.1.3 Mechanical Plans:**

Mechanical plans shall positively identify all fire and/or smoke dampers and provide a detail for installation. Any smoke damper shall include a smoke detector for activation of the damper. Fire dampers shall be shown to comply with NFPA 90A and smoke dampers shall comply with NFPA 101.

Mechanical plans shall include duct smoke detectors on the control diagram. Duct detectors shall be configured to meet requirements of NFPA 90A (detectors shall automatically stop their respective fan(s) on detecting the presence of smoke and shall send a supervisory signal through the fire alarm panel to the fire department.)

Mechanical plans shall indicate air handling requirements of UFC 3-600-01, section 2-11. Specific attention is required for section 2-11.2, that states, egress corridors must not be used as a portion of a supply, return, or exhaust air system serving adjoining areas.

Exception: Toilet rooms, bathrooms, shower rooms, sink closets, and similar auxiliary spaces



may have air transfer openings, unless prohibited by NFPA 101, such as in residential occupancies.

#### **6.1.4 Electrical Plans:**

Plans must show the exit and emergency lights.

Switchgear shall show the power for the fire alarm system as a separate breaker.

#### **6.1.5 Fire Suppression Plans:**

Plans must show the hazard classification for each area.

Provide a chart showing the density, area of application and hose stream demand for each hazard classification. This data must comply with UFC 3-600-01.

Provide a riser diagram for the sprinkler system. Make sure to include a test connection for the backflow preventer. Moody AFB permits the use of "shotgun" risers.

#### **6.1.6 Fire Alarm Plans**

Plans shall show all fire alarm and Mass Notification devices. Visual devices shall show the candela rating of each device.

Manual pull stations shall be provided in accordance with NFPA 101 as required by the occupancy classification.

Riser diagram shall show all power connections, initiating devices, typical alarm devices and any interconnections of such as AHU shutdown or door releases.

Provide a matrix showing what action each device will initiate.

Locate the fire alarm panel as dictated by the fire department. Panel shall be in a conditioned space accessible to the fire department when the building is not occupied.

Provide transmitter zone schedule.

### **6.2 SPECIFICATIONS:**

#### **6.2.1 Fire Suppression:**

The specifications or the plans must indicate the hazard classification including density, area of application and hose stream demand. If shown on plans, indicate that information is shown on the plans.

Provide the water supply data or show it on the plans. If shown on plans, indicate that in the specifications. If not shown on plans, be specific as to the location of the water test such as at Hydrant 100 or the base of the riser. Designer must include the loss from the test connection to the base of the riser.

All sprinkler piping will be schedule 40 for dry pipe and pre-action systems.

Where a fire pump is required and the base power is determined to be reliable (see UFC 3-600-01 paragraph 3-6.4), use electric motor drivers which are variable speed. If power is not reliable, use variable speed diesel engine drivers. DO NOT use electric motor drivers with emergency power backup unless a generator is required for the facility.

Training of shop personnel will consist of one 4 hour training sessions that will include the testing and maintenance of the systems. Training shall be separate from the testing of the systems.

#### **6.2.2 Foam Systems:**

Contact 23 CES/CENP for Air Force specifications for hangar fire suppression foam systems.

All hangar foam based fire suppression plans must be reviewed by the Air Force Fire Protection Engineer Staff, AFCEC/COSM. Plans cannot be approved by Moody AFB Civil Engineer staff.

#### **6.2.3 Fire Alarm:**

The building fire alarm system shall be an addressable system and shall be a combination fire alarm/Mass Notification system, unless it is a low occupancy structure and prior approval is given by AHJ.

Fire alarm system shall be class B system unless prior approval is given by AHJ. Minimum wire size shall be 16 AWG.

The fire alarm control panel shall report the following conditions: alarm (either in zones or by device address), trouble, and supervisory. These signals will need to interface the installation reporting system via a proprietary Monaco Fire Reporting System. The design shall provide a Monaco BT-XM transceiver with Mass Notification kit, appropriate number of zone expansion cards, antenna, surge arrestor, grounding, cable, connections, and appropriate conduit. Provide a 3/8" diameter weep hole on the LB fitting of the antenna mount. (See figure below).

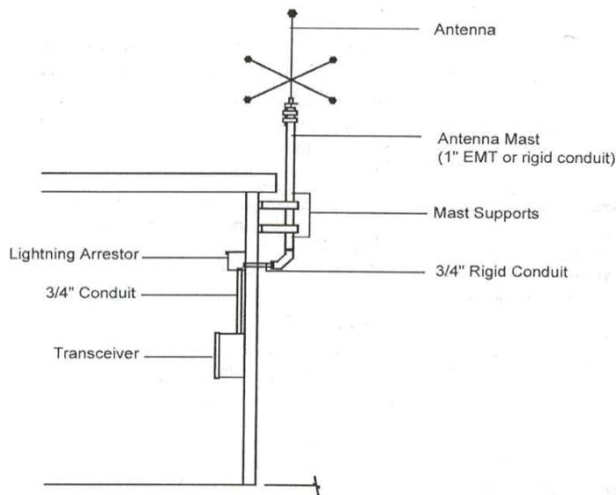


Diagram for antenna mount

Manual stations shall be key reset only no other type reset will be allowed; key shall be the same that opens/controls the fire alarm and annunciator panels. Manual stations shall NOT have glass rods.

Duct detectors shall be configured to meet requirements of NFPA 90A (Smoke detectors provided as required shall automatically stop their respective fan(s) on detecting the presence of smoke. Smoke detectors used solely for closing dampers or for heating, ventilating, and air-conditioning system shutdown shall not be required to activate the building evacuation alarm, Para 6.4.3, for duct detection devices.)

Base personnel (shop and fire department) shall be trained on the operation and maintenance of the control panel and devices with minimum 4 hours training. Two sessions will be required to make sure all personnel can attend training. This training will be separate from the testing of the systems.

#### 6.2.4 Knox Box:

All new construction and renovation projects require the installation of Knox box. See fire department for model number, ordering code and installation location.

#### 6.3 TESTING:

Specifications must clearly indicate the testing of the fire protection systems and the A/E shall develop a commissioning plan that indicates how each system will be tested and who will witness the testing for acceptance.

## 7. ELECTRICAL

### 7.1. STANDARDS

Follow these requirements and applicable publications. This list of requirements shall be used in the design for new or altered facilities. These standards should be used in addition to other codes such as the National Electrical Code, ANSI C2, and NFPA.

#### 7.1.1 Drawings

##### a. General:

- (1) These subparagraphs are placed in the normal order of the "E" plates for a new facility.
- (2) Use different site and floor plans to separate demolition from new work.

##### b. First Sheet:

- (1) Show electrical legend.
- (2) List general comments for all electrical sheets.

##### c. Site Plan:

- (1) General: Show all other exterior utilities that will affect the installation of the new underground power.
- (2) Site Work:
  - (a) Protecting the Environment: Route underground lines to avoid cutting tree roots as much as possible. Run lines outside perimeter of tree drip.

- (b) Call for leveling and seeding over disturbed earth and along trench lines and areas less than 100 sq. ft.; and call for leveling and sodding over disturbed earth areas greater than 100 sq. ft. that are affected by construction.

- (c) All lines shall be bored and jacked under road and driveway pavements. Primary voltage duct-bank/line across parking lots shall be cut and patch. Secondary lines (600 volts or less) across parking lots shall be directional bore. (NOTE: Wherever possible and economically advantageous, use directional boring instead of boring and jacking. Typical depth of directional boring is 4', or greater when obstructions are encountered. Directional

boring is especially helpful where there is heavy underground congestion with existing utilities.)

##### d. Power Plan:

- (1) Provide separate communications, mechanical and electrical rooms in new or altered facilities when practical.
  - (a) Provide electrical rooms with exterior doublewide doors of adequate height for future removal of large electrical equipment when practical.
  - (b) Ensure adequate clear space around electrical equipment in accordance with the National Electrical Code.
- (2) Provide an electrical single line diagram on the drawings.
  - (a) Show the available symmetrical short circuit current at each bus.
  - (b) Show grounding of dry-type transformers.

##### e. Interior Lighting:

- (1) Show a light fixture schedule with mounting height in the table.
- (2) Lighting plans: Show a junction box and 6 feet of flexible metal conduit to all light fixture connections above suspended ceilings, acoustical or gypsum.

##### f. Lightning Protection:

- (1) Show roof and counterpoise design.
- (2) Provide details of air terminals, conductor attachments, roof penetrations.
- (3) Show all details based upon the type of roof on the project. For example, if the project contains a standing seam roof, then all details shall be shown based on attachments to a standing seam roof.

##### g. Fire Alarm - Riser Diagram:

- (1) Provide riser diagram with signal line circuits, notification circuits, LOC location, remote annunciator location, transceiver, and antenna location.

(2) Draw riser as a 2-conduit loop system, which means supply and return are separated per NFPA 72 guidelines.

h. Telephone/Communications/CATV: Show both plan views and riser diagrams.

### 7.1.2 LOAD LEVELS

Calculate load levels for at least the following items.  
NOTE: Consider derating for 50 degree C ambient in uncooled spaces.

- a. Branch and feeder circuits.
- b. Panelboards and switchboards.
- c. Generators and automatic transfer switches.
- d. Transformers.

## 7.2. POWER SYSTEM PROTECTION STUDIES

- a. Design: Perform a short-circuit study during design to determine proper AIC ratings of all electrical equipment. Include calculations in the design analysis.
- b. Time Current Coordination Study: For projects that contain adjustable trip settings, a short circuit and time current coordination study will be needed to properly adjust the settings on the breaker trip units. The study needs to be based on the actual equipment that will be supplied on the project. Include in the study all cut sheets on the electrical equipment, breakers, and trip units being furnished on the project.
- c. KVA: At a minimum, use 400 KVA or infinite bus available at the primary side of the main transformer.
- d. Scope: Include the protective system from the nearest upstream devices beyond the transformer primary fuses down to and including all adjustable or selectable low-voltage protective devices.
- e. Limiters: Do not use low voltage cable limiters to achieve short-circuit limitation for equipment.
- f. Transient Voltage Surge Suppression (TVSS) is required at the main service entrance as a minimum. Double-ended switchboards will require a TVSS on each side.

## 7.2.1 Motors

- a. Size: Motors of 1 HP and more shall be 3-phase.
- b. Reduced Voltage Starting: Use reduced voltage motor starting on 75 HP and up. For smaller motors, evaluate motor-starting voltage drop and provide reduced voltage starting if over 10% drop.
- c. Efficiency of poly-phase squirrel-cage induction motors shall be industry standard.

Use premium efficiency units for new and retrofit motors (Ref: ASHRAE 90.1), with an operating power factor of 90% or greater. Provide reduced voltage starters or variable speed drives for all 15 HP, or larger. Variable speed drives shall be connected to the base wide EMCS.

## 7.3. EXTERIOR POWER

- a. Underground: Feed all new facilities underground.
  - (1) All primary underground feeders shall be installed in concrete-encased duct as described below and secondary feeders from the transformer to the service entrance shall be in minimum of Schedule 40 conduit.
  - (2) Designer shall use double-ended main switchboard on a transformer capacity of 2,000 KVA and larger. In other words, if the load requires 2,000 KVA or larger transformer capacity, the designer shall use two transformers (e.g., two 1,000 KVA) with a double-ended switchboard construction. Double-ended design shall have a main breaker on each side and a tie breaker.
  - (3) 3 phase, 4-way Dead-front sectionalizing equipment shall be provided and installed in order to comply with the Electrical Standards. Each exterior transformer shall be connected to a separate dead-break junction. Transformers shall not be looped to feed downstream exterior transformers unless approved by 23 CES Electrical Manager.
  - (4) New Construction – Discovery of electrical wire/cables during worksite excavation. Project Manager & Base Electrical Foreman will be notified if wire/cable exposed during excavation is found. Determination will be made upon investigation to encase said wire/cable in conduit or relocate below grade as not to interfere with foundations, slabs,



footers, or other foundations, slabs, footers or other foundation materials which will render wire cable inaccessible.

b. Equipment Pads:

(1) Size pads to extend beyond transformer/switch 6" on all sides. 8 inch thick minimum with 4 inches above grade.

(2) Pads may have openings in center of pad.

(3) Grounding for Pad Mount Transformers Air Switches and Sectionalizer. Add one 3/4" X 10' copper clad ground rod in center of pad with min of 6" above pad for connections and tested to 25ohm or less. Extend a #4/0 bare copper conductor to ground stud. Resistance readings will be provided to the Government.

c. Duct Bank:

(1) For main lines (from manhole or switch to manhole), run concrete-encased 4 inch PVC (Sch. 40 or Type DB) with a spare conduit for each main run.

(2) For last turn up into a pad, use Sch. 80 PVC if concrete is not encasing the last piece.

(3) Provide pull wires (nylon, Greenlee #430, 210 tensile strength) in each empty conduit.

(4) Use sweeping bends if only one turn of less than 90 degrees.

(5) Turns of 90 degree or more with 15 KV cables shall have a manhole at the turn. Handholds are allowed for two runs (single-phase or three-phase) of #2, 15 KV only.

(6) Run neutral with phase conductors in each conduit.

(7) Use metallic backed warning tapes 12inches above all duct banks. Show detail section for duct on drawings.

(8) Install underground secondary conductors in duct sized per the NEC.

d. Cable: Main line is defined as cable running from pad mounted air switch to pad mounted air switch, riser pole to pad mounted air switch, 600 amp

sectionalizer to 600 amp sectionalizer, or pad mounted air switch to 600 amp sectionalizer.

(1) Primary cable shall be 1/C, 15 KV, copper. Two types are acceptable:

(a) XLP (MV-90), wire shielded with 100 percent insulation (Base Preference).

(b) EPR (MV-105), tape shielded with 133% insulation.

(2) Neutral conductor shall be 600 volt with THWN insulation.

(3) Main line – 3 - 1/C #2/0 AWG, 15 KV & 1 #2 AWG, 600 volt grounded neutral.

(4) Transformer feeders:

(a) From Pad mounted air switch: Use 3 - 1/C #2/0, 15 KV with #2 THWN neutral. This avoids having fused compartments in the pad mounted air switches.

(b) From 600 amp sectionalizer: Use 3 - 1/C #2/0, 15 KV with #2 THWN neutral

(c) From existing 200 amp sectionalizer: Use 3 - 1/C #2/0, 15 KV with #2 THWN neutral.

e. Manholes and Handholds:

(1) Primary manholes:

Do not use manholes for pulling points or splices in a main line. Instead use sectionalizer as needed to keep cable connections/splices above grade with run lengths not more than 450 feet.

Cable will wrap around inside manhole/handhold allowing max amount of cable for slack purposes.

(2) Primary (for #2, 15 KV cable only) and secondary handholds' shall be 4' X 4' X 4'. All sides and bottom shall be concrete.

(a) Do not use handholds' for main lines. Handholds may only be used in single feeder runs from a sectionalizer or air switch to transformers as needed.

(b) Turns of 90 degrees or more shall use secondary handholds or runs greater than 300'.

(3) Core-drill all raceway openings in existing manholes/handholds unless cast in-place terminators are available.

f. Connections:

Due to high water tables of South Georgia, no below grade splices/connections will be allowed.

(1) Use no primary cable T-splices or in-line splices.

g. Pad mount Air Switch Features - Design basis is Federal Pacific PSE-10

(1) 4-way, Air type.

(2) Dead front, rated 600 amp with dead break elbows and viewing window.

(3) Each compartment is individually switched.

(4) No mechanical interlocks.

(5) Furnish 6 locks and one key for each switch installed. Use locks manufactured by Best Lock Corporation, lock number, 11B722-L with Moody core number E-21, short shank. Keys provided shall be blank and uncut, also manufactured by Best Lock Corporation.

h. Sectionalizer Equipment – Design Basis is Cooper Power Systems SecTER

(1) 3 phase, 4-way dead break junctions

(2) Dead front with 600 amp rated junctions.

(3) Place 600 amp insulated protective caps on ends of all connectors and dead break junctions.

(4) Provide the following optional equipment:

(a) 18 inch base spacer, if needed

(b) Hold Down Cleats

(c) Parking stands

(d) Ground nuts welded in place

(e) 12ga steel construction

(5) Sectionalizing enclosure and dead break junctions shall be furnished and fabricated by the same

manufacturer. Sectionalizing equipment shall be delivered to the jobsite as a complete unit from the manufacturer.

i. Riser Pole Connections When Specified.

(1) Use 5" "U" guard on all secondary/primary risers

(2) Make transition from overhead riser to underground with rigid steel elbow.

(3) Use fiberglass arms only on pole that are not vertical construction.

j. Service Entrance Transformers (General Requirements):

(1) Primary transformers shall not be installed indoors.

(2) Individual transformer sizes shall not exceed 2500 KVA.

(3) Designer shall use double-ended main switchboard on a transformer capacity of 2000 KVA (two 1000 KVA) and larger. Each transformer, service lateral, and side of the double ended main switchboard shall be sized for 25% spare capacity over the calculated demand, or at 20% spare capacity of the equipment rating.

(4) All new facilities shall be fed with 480/277 volts, unless special permission is granted by Civil Engineering at Moody AFB. On facilities with 480/277 volts and 208/120 volts, service into the facility shall be 480/277 volts with interior dry type step down transformers to supply the 208/120-volt system. Using separate exterior transformers to supply the 480/277-volt system and 208/120-volt system is not acceptable.

(5) Voltages: Primary - 12,470V Delta, Secondary - 480/277 volts.

(6) Unless stated elsewhere, the standard average winding temperature rise of 65 degrees, OA Class should be provided. Do not use forced air cooling to provide KVA capacity for demand load or spare capacity.

(7) Dry type primary transformers are not allowed.

(8) Transformers shall have an insulating fluid of the less flammable type, either a high fire point fluid or a silicone fluid.

(9) Provide minimum of 10 feet clearance on the front side for safe working clearance. Space shall be at flat ground level in front of the equipment NO shrubbery is to be planted in front of a door on any type of high voltage equipment.

k. Service Entrance Transformers (Construction Types):

(1) Use low profile utility type in residential areas.

(2) Pad Mount Transformer Standards:

(a) Pad mount construction may be used for applications rated at 1500 KVA and less. Due to the fusing arrangement specified herein, dead-front transformers rated 2000 – 2500 KVA are not readily available in pad mount construction. For larger transformers above 1500 KVA, use fused load interrupter switch with liquid filled substation transformer.

(b) Dead-front construction.

(c) Loop-feed construction with universal bushing wells. Install primary cable feed on one side with surge arrestors on the loop feed bushings.

(d) Load-break connectors

(e) 4 position 3 pole load-break selector switch (off, A, AB, B)

(f) Fuses (Side-wall mounted “Bay-O-Net” oil-immersed expulsion fuses in series with coordinated oil-immersed current limiting fuses). Bay-O-Net fuses are to be externally replaceable with a hot stick without opening the transformer tank.

(g) External tap changer.

(h) 9 KV Lightning/surge arresters.

(i) Parking stands

(j) Four 2-1/2% high voltage taps, two above and two below rated voltage.

(k) Sufficient clearance for access to drain plugs.

(l) Full height isolating barriers between high voltage and secondary section.

l. Electrical Facility Metering

(1) Provide metering cabinet mounted on a pedestal next to the transformer. Cabinet shall include built in switches to disconnect the meter. Provide digital read-out meter.

(2) Provide and install CT’s/PT’s in transformer, and interconnect wiring between CT’s/PT’s and meter cabinet.

(3) This metering shall be in addition to the multifunction metering requirements listed elsewhere for service entrance switchboards.

m. Exterior Service Entrance Feeders

(1) Secondary Cables

(a) Run underground.

(b) Use single conductor copper with THWN insulation.

(c) Use no conductors larger than 500 MCM.

(2) Feeder busway may be used for liquid filled substation type transformers rated 2000 – 2500 KVA. However, their use is discouraged and considered only upon request.

**7.4. EXTERIOR LIGHTING - GENERAL**

a. Parking Lot Lighting

(1) General requirements:

(a) Use aluminum poles (anodized bronze in color).

(b) Calculate lighting levels based upon IES (Illumination Engineering Society) for maintained levels for parking lots - design for 2.0 FC average with no point less than 1.0 FC.

(c) Fixtures shall be controlled by individual photocells on each fixture. Photocells shall activate at 3 foot-candles of ambient light.

(d) Feed at 277 V when practical. If feasible, feed by panelboards mounted adjacent to pad mounted

transformers. Otherwise, feed from adjacent buildings served by the parking lots.

(e) Parking lot and area lighting shall be LED, rectangular cut-off (shoebox) fixtures. Poles shall be round, tapered aluminum shaft. Color shall be dark bronze anodized finish.

#### b. Street Lighting

General requirements: Use aluminum poles

(a) Only provide where adjacent parking lot lighting is insufficient for street level.

(b) Calculate lighting levels based upon IES (Illumination Engineering Society) for maintained levels - design for 1.0 FC with no point less than 0.5 FC. Street Lighting shall be 250w LED, Cobra Head fixtures. Poles shall be round, tapered aluminum shaft

(c) Fixtures shall be controlled by individual photocells on each fixture. Photocells shall activate at 3 foot-candles of ambient light.

(d) Feed at 277 V. If feasible, feed by panelboards mounted adjacent to pad mounted transformers.

c. Sidewalk Lighting: Any sidewalk that is not adequately lighted by the parking lot lighting and branches into the entryway of the facility shall be lighted with sidewalk lighting. Design Basis – LED lamps.

d. Exterior Doors: Provide fixtures above or next to all exterior doors. Select light fixtures at the main entrance that will accent the architecture.

e. Facility Site Lighting: If security is a concern or parking lot is adjacent to a wall, provide wall pack LED fixtures spaced to provide 2.0 FC average to the area.

f. Exterior Storage Area Lighting: Provide lights around the perimeter of the entire storage area.

(1) Install pole on a concrete base with 3/4inch x10ft ground rod in center.

(2) Poles shall withstand steady wind velocity of 80 MPH and have a 1.3 gust factor based on the effective projected area of the fixtures and brackets provided.

(3) Poles shall be spaced to provide 3 foot-candles.

Efficacy > 100 lumens/ watt with upward efficiency < 10%.

Install photo sensors to turn lights on/ off at sunrise and sunset.

#### 7.4.1 Exterior Lighting Sports

All lighting shall be LED. Calculate lighting levels based upon IES (Illumination Engineering Society) for maintained levels. Type sports facility shall dictate the type control (photocell/timer) needed

a. Type: All lighting shall be metal halide.

b. Poles - All pole construction shall be aluminum set in a concrete base.

#### 7.5. LIGHTNING PROTECTION SYSTEM (LPS)

a. Mandated Need: Provide on all facilities with explosives or hazardous materials. Ground in accordance with Chapter 7, Lightning Protection, DOD 6055.9 STD and AFI 32-1065, Grounding Systems.

b. Determined Need: Use "NFPA 780 Risk Determination" for go/no-go decision on whether to install LPS. Use value of Lightning Flash Density = 5.

c. Documentation: Present all calculations in the design analysis.

d. Design

(1) Design per UL and NFPA 780.

(2) Conductors:

(a) Use only copper, except aluminum is allowed on galvalume or other aluminum roof materials.

(b) All conductors on roofs shall be treated as main conductors.

(3) Install Transient Voltage Surge Suppression (TVSS) on the service entrance of each protected facility. Assume one service entrance per facility unless field checking or MAFB record drawings indicate otherwise.



(4) Installation:

(a) Methods shall conform to UL 96A.

(b) Components shall conform to UL 96.

(c) Contractor shall obtain a UL letter of findings for the facility. The UL letter of findings shall be provided to the Government directly by UL after inspection by UL personnel. The Contractor shall make all corrections listed in the UL letter of findings.

(d) Only allowed penetrations on standing seam metal roofs is the roof cap. Conductors should be concealed under the roof if at all possible. Otherwise, conductors are to be attached to the metal standing seam roofs by adhesive and bolted connections. Under no circumstances are penetrations to be made in the insulated panels of standing seam metal roofs.

(e) All down conductors shall be concealed in the wall with PVC sleeve.

(f) A counterpoise with ground rods shall be installed around the entire facility. Counterpoise shall be minimum #1/0 bare copper and installed 2 feet below grade per NFPA 780. All below grade connections shall be exothermic type.

## 7.6. SYSTEM GROUNDING

a. Ground Electrode For Electrical Service: For new construction., provide a tripod set of ground rods 20 feet apart with thermal-welded bare copper 4/0 wire between them. The closest ground rod to the facility shall be at least 10 feet from the facility.

### 7.6.1 Switchboards, Panelboards, and Motor Control Centers

a. Choice of type:

(1) Use switchboard construction when 1000 Amps or larger.

(2) Use power distribution panelboard construction when equal to 800 Amps. Boxes shall be minimum 9 1/2 inches deep.

(3) Use panelboards when 600 Amps or less.

b. General:

(1) Use NEMA 3R outdoors. NEMA 4X may be specified in cases where the corrosion potential is high. Fiberglass is preferred over stainless steel for NEMA 4X.

(2) Use copper bus only.

(3) Size to allow for a 25% increase in power demand.

(4) Spare pole/space capacity shall be minimum 25% of total pole/space capacity.

(5) Panelboards, switchboards, or motor control centers shall not be tapped to feed new loads

(6) Existing Equipment: When installing breakers in existing panels, insure the manufacturer can still supply them and at reasonable price and delivery schedule.

(7) When doing any work involving the main service entrance, install or re-install a laminated riser diagram of the electrical system on the wall near the panel.

(8) Provide typed directories in each cabinet.

(a) Clearly label each circuit as to type load and specific location. Ex.: Réceptacles N. Wall

(b) Note on the directory from where the cabinet is fed. Ex.: Fed from Panel PA in Mech Room, Ckt. 4.

(9) All service entrance equipment shall contain a main breaker. If the facility requires double ended design, as stated elsewhere in this standard, then two main breakers with a normally open tie breaker shall be provided, with Kirk key interlock.

(10) Feeders to service entrance and any panelboard within the facility shall not contain any derated neutrals. As a minimum, neutrals shall have an ampacity of the phase conductors. Feeders to panels with 200 percent rated neutral busses shall have the neutral conductors rated 200 percent of the feeder phase conductors.

(11) New construction shall be designed with one service entrance, except as noted for transformer requirements over 5,000 KVA.

(12) Labeling of Panel Schedules and Drawings for Branch Circuits: Each homerun symbol on the drawings shall be labeled in accordance with the pole numbers instead of a circuit number.

(a) Three-phase loads shall be designated by the three-pole numbers, such as HB - 1,3,5 or HB - 8,10,12. The single pole number, such as LA-12, shall designate single-phase loads.

(b) Panel schedules shall be numbered with odd numbers on the left side, top to bottom, and even numbers on the right side top to bottom.

c. Distribution Panelboards and Switchboards:

(1) Protect by breakers. Fuses are not permitted.

(2) All switchboards and panelboards shall be 3-phase, 4-wire, with ground bus. Install a neutral conductor to all switchboards and panelboards regardless of load.

(3) If the main breaker has ground fault protection, provide it as well on the feeder breakers.

(4) Show future frame space in all service entrance rated or distribution panelboards or switchboards, with full mounting hardware provided for plugging the breakers into them.

(a) Switchboards. 1000 - 1200 Amps, provide:

1. 1-400 amp frame space.
2. 2-225 amp frame spaces.
3. 1-100 amp frame space.

(b) Switchboards. 1600 Amps and above, provide:

1. 1-800-amp frame space.
2. 2-400 amp frame spaces.
3. 2-225 amp frame spaces.
4. 1-100 amp frame space.

(c) 800 amp panelboards. Provide:

1. 2-225 amp frame spaces.
2. 2-100 amp frame spaces.

(d) 600 amp panelboards and below. Provide:

1. 1-225 amp frame space.
2. 3-100 amp frame spaces.

(e) All frame space sizes shall be based on three pole breakers.

(5) Use an electronic multi-meter in the main panelboard or switchboard instead of ammeters,

(6) On double-ended switchboards, control switches and meters shall be connected to the side of the energized source. As soon as power is de-energized from one of the incoming sides of the double-ended switchboard, all control power shall automatically transfer to the other side of the available energized source.

(7) Switchboards

(a) Main through bus shall be fully rated and non-tapered copper bus.

(b) Distribution sections shall have the same depth as the main service section.

(c) TVSS units may be located integrally with service entrance equipment.

(d) For new construction, the main breaker and meter shall be located in a separate section from the distribution feeder breakers.

(e) Provide electronic multi-function meter in the main section.

d. Panelboards - Other:

(1) All panelboards shall be "main breaker interior" type unless the upstream circuit protective device is within sight of the downstream bus being fed.

(2) Gutter taps, sub-feed lugs, feed-thru panels, and taps of conductors inside junction boxes are unacceptable circuit feeds to panelboards.

(3) All panelboards shall be fed from a separate circuit breaker in an upstream bus. The only exception to this shall be when no more than two panelboards shall share the same feeder circuit from a dry type transformer. The second panelboard shall be connected from a feeder breaker in the first

panelboard. The second panelboard shall be installed adjacent to the first panelboard or inside the same room.

(4) If multiple (three or more) 208Y/120 volt panelboards are fed from the same dry type transformer, then a 208Y/120 volt distribution panelboard shall be installed downstream from the dry type transformer. Each panelboard shall be connected to a dedicated circuit breaker in the distribution panelboard.

(5) Minimum panelboard size:

(a) Use minimum 225 Amp bus rating and main breaker, 42 poles.

(b) If the demand load is 40 Amps or less, then a 100 Amp panel, minimum 30 poles, is permitted.

(6) Mount main breakers at the top or bottom in a vertical position specifically designed for that purpose. Exceptions only apply for approved applications of 100 Amps or less and 30 poles or less.

(7) Do not use load center type panelboards except for military family housing construction and temporary lodging facility construction.

(8) Panelboards with 200 percent rated neutrals shall be used when supplying power to the following areas:

(a) Office administrative areas

(b) Cubicles or System Furniture

(c) Individual office Rooms

(d) Large open office areas

(e) Computers

(f) Electronic Equipment

(g) Electronic Test Labs

(9) When supplying panelboard feeders to panels with 200 percent rated neutrals, the neutral conductors to the panel shall have an ampacity of twice the phase conductors in the feeder.

(10) When supplying panelboard feeders to panels with 100 percent rated neutrals, the neutral

conductors to the panel shall not be derated less than the phase conductors in the feeder.

(11) Column width panelboards are unacceptable.

(12) Panelboards shall not contain integral TVSS units. Any TVSS units installed at panelboards shall be separate units and installed adjacent to the panelboards.

e. Circuit Breakers:

(1) Use snap in, bolt-on type or I-Line type.

(2) Do not use ground fault breakers. Use only individual ground fault receptacles.

(3) Magnetic only switches shall not be installed in any switchboard or panelboard. All breakers shall have thermal-magnetic characteristics.

f. Main Breakers and Feeder Breakers shall be as follows:

(1) Main (and Tie – If Required) Breakers in Main Switchboards – Service Entrance Rated.

(a) Insulated-case.

(b) 100% rated.

(c) Individually mounted in a separate section from the distribution breakers.

(d) Solid state trips with the following trip functions:

Main Breakers: Adjustable LT, Adjustable ST, Adjustable GF (where required by Code), with separate adjustable time delay settings for LT, ST, GF (if pickup used).

(2) Feeder Circuit Breakers in Main Switchboards – Service Entrance Rated.

(a) Molded-case.

(b) 80% rated.

(c) Group mounted - stationary.

(d) Use solid state or standard thermal magnetic breakers. Breakers shall contain adjustable magnetic trip on all 225 amp breakers and larger where available.

(3) Main Circuit Breakers in Main Distribution Panels (MDP) - Service Entrance Rated (800 Amp Bus).

(a) Molded-case.

(b) 80% rated

(c) Stationary mounted.

(d) Solid state trips with integral digital ammeter display with the following trip functions:

Adjustable short time pickup with adjustable delay bands and adjustable instantaneous pickup.

(4) Feeder Circuit Breakers in Main Distribution Panels (MDP) - Service Entrance Rated (800 Amp Bus).

(a) Molded-case.

(b) 80 % rated.

c) Use standard thermal magnetic breakers. Breakers shall contain adjustable magnetic trip on all 225 amp breakers and larger where available.

(5) Breakers Used in Service Entrance Rated Panelboards 600 Amps and below shall be standard molded-case thermal magnetic.

g. Startup: Provide special startup along with training on setting and maintaining the breakers to CE shops. Use an independent testing firm registered with NETA or manufacturer's service engineer to set the adjustable devices. Include:

(1) Startup in the field.

(2) CE Shop training.

(3) O&M manuals.

(4) Schematics of electronic devices.

(5) Solid state trips tested in field with a portable test kit.

(6) Specified equipment used in the startup provided to CE shops for future maintenance.

## 7.7 GENERATORS, TRANSFER SWITCHES, AND FUEL TANKS

a. Generators: Base actual size on load analysis for 60-80% loading, based upon field readings when possible.

b. Fuel Tanks:

(1) Provide tank large enough for generator to run 72 hours at 100% rated load. Exception: Tank may be allowed to be smaller (approx. 12 hour runtime) when the generator set is used as backup source for emergency lighting only.

(2) Fuel tank shall be above ground, similar to Convault construction. The fuel tank shall be encased with secondary 3000-PSI concrete spill containment. Concrete sub-base tanks are not acceptable. Tank may be allowed to be skid-mounted when the generator set is used as a backup source for emergency lighting only. In this case, a weatherproof enclosure shall cover the generator set and the fuel tank

(3) A day tank is not required. The fuel shall be fed directly to the diesel fuel pump intake line.

(4) Include a high level alarm in the fuel tank to prevent overflow.

(5) Include an interstitial leak monitoring system to monitor and prevent tank leakage from the tank into the tank enclosure.

(6) Copper tubing is not allowed. Use only threaded black steel.

(7) Install a ¾" X 10' ground rod in a ground well. Extend a #1/0 copper conductor from the ground rod to the tank.

(8) Include on all four sides of the fuel tank the following markings:

(a) Flammable

(b) No Smoking within 50 Feet

(c) Diesel Fuel

(d) Capacity of Tank



(9) If the top of the tank is greater than 42" above finished grade, include steps.

(10) A 3.0-PSI anti-siphon check valve shall control fuel feeding into the diesel fuel pump.

(11) For Above Ground Storage Tanks: Provide a ball cut-off valve on each side of the supply and return fuel line.

c. Transfer switches:

(1) Switches shall be three-pole with solid neutral. Four-pole switches may be considered upon request with reasoning's provided.

(2) Use bypass feature for critical facilities per design guidance.

(3) Automatic transfer switches and controls shall be installed in electrical rooms and not in areas where steam piping or other high humidity "generators" are present. Transfer switches shall not be installed outdoors.

(4) All transfer switches shall be of the automatic type unless noted or requested.

## 7.8 INTERIOR POWER

a. General.

(1) In existing facilities fed at 208V, convert to 480V. In new facilities the service voltage shall be 480Y/277 unless the Government gives approval for 208Y/120 volts.

(2) Provide small distributed dry-type transformers (delta-wye) as needed for 208Y/120V to step the voltage down from 480Y/277. In administrative areas, locate dry type transformers and branch panelboards in electrical closets distributed throughout the facility to keep the branch circuits below 200 feet.

(3) Use reduced voltage motor starting on 75 HP and up. For smaller motors, evaluate motor-starting voltage drop and provide reduced voltage starting if over 10% drop.

(4) Use generic "off the shelf" equipment. Field fabrication of panels, switches, etc., is not allowed.

(5) The following wiring methods shall not be used: Armored Cable (Type AC), Flat Cable Assemblies (Type FC), Flat conductor Cable (Type FCC), Integrated Gas Spacer Cable (Type IGS), Metal-Clad Cable (Type MC), Mineral-Insulated, Metal-Sheathed Cable (Type MI), Nonmetallic-Sheathed Cable (Types NM, NMC, and NMS) {except for residential use}, Power and Control Tray Cable (Type TC) {unless specifically called for in project scope documents}, Underground Feeder and Branch-Circuit Cable (Type UF), Nonmetallic Underground conduit with Conductors (Type NUCC), Flexible Metallic Tubing (Type FMT), Electrical Nonmetallic tubing (Type ENT), and similar wiring methods with various manufacturer's name brands.

(6) All wiring shall be rated 600 volts, single copper conductor, with Type THHN/THWN insulation.

(7) All wiring shall be installed in metallic conduit raceways above grade or PVC (schedule 40) below grade. Raceways in walls shall be metallic type EMT. Conversion from PVC to metallic shall be done with a metallic elbow below grade.

(8) Cable tray as a raceway for power wiring is highly discouraged and is approved only by exception upon request.

(9) Raceways shall be concealed wherever practical in finished spaces.

(10) Motor Control Centers shall have disconnects, branch circuit overload protection, and controllers mounted in a single assembly. Whenever the starter is located in the MCC, use thermal magnetic or instantaneous trip circuit breaker with separate adjustable overloads. If the unit contains no starter, and the starter is located at the machine, then a thermal-magnetic circuit breaker shall be used to supply the motor feeder.

(11) Electric - Operated Projector Screens in Conference Rooms, Classrooms, and Training Rooms: Coordinate locations with user. Provide power and wall switches for control.

(12) Main electrical rooms shall be a separate room with no other trades sharing the electrical room. Main electrical room shall be located on an exterior wall with exterior double doors, and without a center support, in the opening for removal of equipment. Doors shall contain an exterior lock.

(13) Electrical closets within the facility shall be separate rooms with no other trades sharing the closets. Electrical closet doors shall contain a lock.

(14) Unless special permission is granted by Civil Engineering, all dry-type transformers shall be installed within the main electrical room and electrical closets within the facility.

(15) Provide insulated conductors installed in rigid steel conduit, IMC, rigid nonmetallic conduit below grade only, or EMT, except where specifically required by NFPA 70 to be installed otherwise. Flexible metallic conduits in lengths less than 6 feet may be used for connections to light fixtures and equipment, such as motors that vibrate.

b. Branch Circuits.

(1) On all new circuits, allow for future expansion by loading to no more than 80% of the NEC maximum. 15 amp circuits are not allowed.

(2) No more than three to six outlets shall be placed per circuit, even if sizing in accordance with the NEC indicates more outlets can be installed on the circuit. Ref: UFC-3-520-01, 6-2.10

(3) Do not use multi-wired circuits (shared neutrals) for single-phase loads. Run a separate neutral.

(4) Do not use underfloor duct systems.

(5) Provide a separate green grounding equipment conductor in all conduits. Raceway shall not be used as a sole equipment ground. Ground shall be sized in accordance with Table 250 of the NEC.

(6) Do not use ground fault breakers for 120 volts, 20-ampere circuits.

(a) Use only individual ground fault receptacles.

(b) Provide GFCI receptacles in all bathrooms, locker rooms, within all wet areas of a facility, and at all outside locations. Exception, GFCI breakers are allowed for chilled water freeze protection cabling.

(7) Branch circuits shall be rated a minimum of 20 amperes, except where lesser ratings are required for specific applications. Branch circuit conductors will in no case be less than No. 12 AWG.

(8) Maximum of three phases or poles shall be installed in any conduit system, which includes single-phase circuits, regardless of derating tables in the NEC. All shall be of separate phases. Exception: For system furniture, maximum of 4 phases may be contained in the same branch circuit raceway for 8 wire systems furniture.

(9) The combined voltage drop on feeders and branch circuits will not exceed 5 percent. Individual voltage drop on feeder and branch circuits shall not exceed the recommendations of the NEC.

c. Dry-type Transformers:

(1) Use dry-type general purpose (delta-wye) in the facilities except in cases listed below which require K = 13 non-linear dry type transformers.

(2) Use K-rated (K=13) non-linear dry types when providing power to the following areas:

(a) Office administrative areas

(b) Cubicles or System Furniture

(c) Individual office Rooms

(d) Large open office areas

(e) Computers

(f) Electronic Equipment

(g) Electronic Test Labs

(3) Dry type transformers shall not be ceiling-mounted or wall-mounted. Mount the transformer on a concrete pad on the floor with rubber pad isolators.

(4) Maximum size dry type shall not exceed 300 KVA.

d. Low voltage cable and conduit:

(1) Use only copper conductors.

(2) Use THHN indoor and THWN outdoors.

(3) Base conductor size on the above.

(4) Do not use setscrew or die cast conduit connectors on EMT conduit. Use steel compression fittings only.

(5) Screw-in flex connectors are not allowed. Connectors for flexible metal conduit shall be malleable iron/zinc plated and of the 2-screw clamp type with insulated throats conforming to UL 514B & NEMA FB-1.

(6) For areas without conditioned air, apply the ambient correction factors in NEC, article 310.

e. Computer areas:

(1) Locate separate emergency shutdown switches (inside hinged covers to prevent accidental activation) for all computerized operations, including their air handling and computer room units. Locate switches at each exit door of the computer room.

(2) Activation of the fire alarm system shall also shut down the computer equipment, computer room units, and air-handling units.

f. Air Handling Equipment and Devices:

(1) Device Plates: All device plates shall be type 302, 0.035 inch thick, brushed finish, and UL Listed stainless steel.

(2) Disconnect Switches:

(a) Heavy duty type.

(b) NEMA 3R outdoors, NEMA 4X in corrosive areas.

(c) When fused, use rejection type R fuses.

g. Grounding:

(1) Ground rods - ¾" X 10' copper clad. Use exothermic weld to connect to grounding system.

(2) Service Entrance Ground Electrode: Connect a tripod of three ground rods spaced 20 feet apart to the service entrance electrode connection. Tripod shall be at least 10 feet from the facility.

(3) For new construction: In addition to the service entrance ground electrode listed above, install a ground ring with ground rods around the entire new facility with connections to the steel beams evenly spaced around the perimeter of the structure. Connect the electrical service entrance ground bus to the ground ring at a single point copper ground bus bar located in the main electrical room.

(4) Grounding shall be provided for all new communications rooms. For new construction, connect the grounding in each communication room to the single point ground bus located in the main electrical room.

(5) Grounding shall be provided for all new raised floor systems. Due to the various methods of grounding computer raised floors, details are left to be provided by others.

(6) Static ground receptacles shall be provided for all new hangars and painting facilities. Receptacles shall be interconnected together with the grounding system and steel structure in the facility.

(7) All raceways shall have an insulated equipment ground conductor sized in accordance with the NEC.

h. Wall switches: Only type EMT conduit is permitted for any receptacles, switches, or other devices inside walls.

(1) 20 Amp minimum.

(2) Hard Use Specification Grade or Heavy Duty Specification Grade.

i. Convenience Receptacles - General: Only type EMT conduit will be allowed to be used for any receptacles, switches or other devices inside walls.

(1) An outlet is defined as 20 Amp minimum, NEMA 5-20R, and duplex. Minimum locations for convenience receptacles shall be as described in this standard.

(2) Hard Use Specification Grade or Heavy Duty Specification Grade.

(3) When weatherproof, use spring-hinged flap covers.

(4) Convenience receptacles shall be located 18 inches AFF, to the center of the outlet.

(5) Explosion proof convenience receptacles shall be provided at all explosion proof areas within a facility. Explosion proof convenience receptacles shall be rated in accordance with Article 500 of the National Electrical Code.

(6) Explosion proof convenience receptacles shall be rated 20 amperes.

(7) Provide a plug for each explosion proof convenience receptacle.

(8) Provide dedicated outlets for large copiers (typically 1500 VA) and color laser printers to serve office administrative spaces. Provide outlets for smaller laser printers located throughout office areas. Some copy rooms may have high-capacity printers requiring additional load. Coordinate on type of copy equipment and locations during design.

j. Areas - Convenience Receptacles shall be provided in all the following areas listed below:

(1) At Communication Outlets - adjacent to each communication outlet

(2) Small Individual Office Rooms (less than 250 SF): one outlet on each wall but with spacing not to exceed 8 feet.

(3) Conference Rooms:

(a) One outlet ceiling mounted within 18" of where a projection screen would be installed.

(b) A minimum of one outlet on each wall additional outlets mounted at 16 ft. maximum separations around the perimeter of the room.

(c) Install one outlet in the corner of the room opposite where a projection screen would be used.

(d) Install a floor mounted receptacle in the front of the room for a podium.

(4) Communication Rooms: Provide two outlets in the center of each wall.

(5) Receptacles for Pre-wired System Furniture:

(a) Prewired system furniture is defined as follows: furniture that contains pre-wired powered panels with plug-in receptacles and communication outlets mounted in the furniture base. Prewired system furniture would have the power and communication wiring extended into the furniture channel through a power pole or flexible whip.

(b) If furniture is included in the Design Build RFP or Statement of Work, then all raceway, wiring, and

power capacity should be provided. Wiring should be extended to the furniture and terminated on the outlets.

(c) Coordinate on the type of systems furniture, and provide a wiring arrangement that best suits the layout and type of furniture. Projects will use either an 8-wire or 10-wire system.

(6) Administrative areas larger than 250 square feet with or without prewired systems furniture (now or later):

(a) In these spaces, install outlets at 8 feet intervals around all walls and one outlet on each furred out interior column.

(b) These outlets shall be installed flush in the walls and interior columns. This is in addition to the outlets specified for prewired system furniture cubicles.

(7) Non-Prewired Systems Furniture - If furniture is installed in areas of the facility, which is not prewired system furniture, but uses the outlets in the walls, then provide the following:

(a) Two 4 plug outlets shall be installed in the center of each cubicle or desk area, flush mounted in the wall. A Maximum separation shall not exceed 8 feet on the walls. A Maximum of two cubicles or desk areas shall share a circuit.

(8) Mechanical, Electrical rooms and Mechanical Mezzanines: One outlet at 20 ft. intervals around all walls. Provide additional outlets as needed to coordinate with equipment locations.

(9) Mechanical and Electrical Equipment: One outlet shall be installed within 16 feet to 20 feet of each piece of equipment. This shall be provided wherever equipment is located, whether inside or outside, roof, mezzanines, etc.

k. Special Receptacles for Hangars: Obtain special requirements from user or project scope of work.

## 7.9 INTERIOR LIGHTING

a. Calculate lighting levels based upon IES (Illumination Engineering Society) for maintained levels. Maintained level is defined as a calculated foot-candle level taking into consideration all depreciation light loss factors (LLF).

b. General Lighting

(1) The standard lighting system shall utilize fluorescent T8 or T5 lamps with electronic ballasts having a total harmonic distortion (THD) of less than 10%. Interior systems that are not shall employ the most energy efficient, cost effective, low maintenance lamps. Wherever possible, four-foot lamps are to be used. T5 lamps may be used when required by project design.

(2) Modular wiring systems are not allowed.

Light fixtures in stairways shall be above the landings and not above the steps.

(3) Install a junction box and 6 feet of flexible metal conduit to all light fixture connections above suspended ceilings, acoustical or gypsum. Maximum length of flexible conduit shall not exceed 6 feet.

IESNA lighting levels shall be used as a general guide.

(4) Facilities with a Built-in Service Desk:

(a) Provide down task lighting directly over the entire service desk counter.

(b) Provide switch next to entrance into the service desk area.

(5) Foyer/Halls/Corridors: Fixtures shall be 2X4 with refractive acrylic lens troffer. Maximum of three lamps shall be used in a fixture.

(a) High-bay metal halide fixtures shall be used in applications with high light levels and the bottom of the fixture is at least 25 feet above the floor. An example of high light levels is defined as applications with minimum requirements of 75 FC. T5HO fluorescent fixtures are an acceptable option (substitution) based on energy savings.

(b) Low-bay metal halide fixtures may be used in applications where the bottom of the fixture is less than 25 feet above the floor.

(c) Metal reflectors should only be used in industrial areas where architectural aesthetics is not a concern.

All dimming systems shall employ switching scenes that will return emergency lights to full brightness upon loss of normal electric power.

**7.10 EMERGENCY AND EXIT LIGHTING**

a. General

(1) Facilities over 25,000 square feet shall use a small permanent generator to feed the circuits in the emergency system. Interruptible Power Supplies (IPS) units have been found to have long-term maintenance problems.

(2) Wall packs with integral battery units are not acceptable within the facility. For facilities less than 25,000 SF, emergency lighting shall be provided with integral battery packs in the fixtures.

(3) Clearly mark the emergency fixtures with a label designated "emergency" and a printed label with the circuit number, so Shop personnel can find them easily. Install a laminated plastic nameplate on the fixture. Nameplate shall have an orange background with white letters (minimum ¼ inch letters), which describe the emergency lighting circuit number. All raceways shall be marked with a 3 inch orange tape band every ten feet. All junction boxes used in the wiring shall have orange covers.

(4) This is not a code driven requirement. Replace with: Install emergency lighting in required areas in accordance with the Life Safety Code (NFPA 101).

(5) Place a laminated drawing of the system near the emergency unit, or near the main electrical panel for a system of individual fixtures, but always on the building interior.

b. Exit Signs

(1) Install exit signs only at exits in accordance with the Life Safety Code (NFPA 101).

(2) For facilities greater than 25,000 SF, exit signs shall be connected to a central emergency unit.

(3) For facilities less than 25,000 SF, exit signs shall contain an integral battery for 90 minutes of illumination.

(4) All exit signs shall be LED type. Exit signs in lobby or vestibule shall be clear with red lettering.



(5) Self-illuminating or reflective types are not allowed.

All dimming systems shall employ switching scenes that will return emergency lights to full brightness upon loss of normal electric power.

### **7.11 FIRE DETECTION AND ALARM SYSTEMS, INDIVIDUAL BUILDING MASS NOTIFICATION SYSTEMS (FOR NEW SYSTEMS)**

#### **a. General**

##### **(1) Fire Alarm System:**

(a) Fire alarm system shall be class B system unless prior approval is given by AHJ. Minimum wire size shall be 16 AWG.

(b) Fire Alarm system shall be addressable Style 6 signal line circuits and Style Z indicating appliance circuits.

(c) The Notifier NFS-320 is the preferred choice for fire alarm control panels. For applications that exceed 145 devices, the preferred choice is the Notifier NFS2-640.

(d) When required by code, install remote digital display annunciator for lobby area; must be operated by the same key as the fire alarm panel.

##### **(2) Radio Transmitters:**

(a) For Projects with Fire Alarm and Mass Notification: Monaco BT-XM with associated antenna, mounting brackets, cabling, and surge arrestor.

(b) For Projects with Fire Alarm Only: Monaco BT-X with associated antenna, mounting brackets, cabling, and surge arrestor.

##### **3. Mass Notification Systems**

(a) The Wheelock SP40 is the preferred Mass Notification System (MNS) panel.

(b) The Wheelock SP4-LOC with microphone and emergency HVAC button is the preferred MNS remote local operator console (LOC).

##### **b. Design/Installation Considerations**

(1). Fire alarm and mass notification shall use the same speakers. Design the system in accordance with Fig. 4-2, UFC 4-021-01, Change 1, dated January 2010.

(2) Design of speaker layout and wattages used shall be based on "intelligibility". System shall provide clear "intelligibility" from anywhere within the center of all spaces. Design drawings and shop drawings shall show all wattages and candela ratings.

(3) In large open administrative spaces, speakers shall be evenly spaced throughout in the ceiling.

(4) In large industrial areas, design and layout shall consider the space of the area, structure, and ambient +.noise expected under normal operations. In these spaces, use supervised speaker horns or cluster types mounted overhead that provide high intelligibility with voice reproduction. Speakers shall be UL approved for fire protective signaling systems and meet all applicable UL standards for speaker/ visual devices.

(5) Local operator console with microphone shall be located in an accessible location for local control of emergency messages. Post operating instructions for users to follow when using the microphone.

(6) The system shall be connected to the existing BASEWIDE Monaco D-21 radio system. Base personnel shall program the Base head-end equipment to accept the new facility for mass notification. Base personnel shall program the radio transmitter for fire alarm.

(7) Standard messages for Moody AFB will be provided to the Contractor in a digital format and loaded into the FACP/ MNS panel by the Contractor

##### **(8) Qualifications:**

(a) Provide all qualifications and certificates in the submittal.

(9) Separate raceways shall be provided for the SLC loop.

(10) SLC wiring shall use shielded wire. Wire sizes shall be determined based on voltage drop calculations in the shop drawings.

(11) Amplifier size shall be based on not more than 75 percent capacity. Strobe circuits shall be designed not to exceed 75 percent capacity. Follow loading guidelines established for maximum load on remote extension power supplies.

(12) Control panels and remote expansion power supplies shall be installed in an air-conditioned space. Due to the amount of panels involved and the exposed raceways, the system shall not be installed in finished spaces.

(a) Fire alarm riser shall be drawn as a Class B system.

(b) Install wiring with no splices between devices. Terminal strips shall not be used in between devices unless special approval is granted on a case by case basis by the Alarm Shop.

(c) Do not connect notification devices to the style 6 wiring loop using addressable modules. Notification appliance circuits shall be connected directly to the FACP NAC terminals or to NAC outputs in Government furnished remote expansion power supply panels.

(d) All wiring shall be installed above grade and in metallic raceways. Minimum size of raceways shall be ¾ inch. Use liquid tight flexible metal conduit for short connections (less than 6 ft.) to tamper switches and flow switches only. Provide 3" minimum red tape band on fire alarm conduits every 10 feet. Red tape markings shall be provided on all raceways, whether installed exposed or hidden such as above acoustical ceiling tiles. Junction box covers for fire alarm shall be painted red. Paint markings shall not be allowed in lieu of the red tape markings.

(13) Contractor shall provide:

(a) Submittals in accordance with Specifications.

(b) As-builts and schematics prior to final acceptance testing.

(c) O&M manuals prior to final acceptance testing.

(d) Testing before acceptance.

(e) CE Shop training.

(14) In out buildings or other locations where detectors are connected by underground conduits to the main building, provide MOV-type surge arresters on both ends.

(15) Place spare of the O & M Manual Contractor-furnished metal cabinet near the FACP. Place a copy of the as-built drawing in a tube next to the FACP/MNS panel.

(16) Place a laminated drawing of the system near the FACP.

(17) Keep detectors away from HVAC vents.

(18) FACP shall disable all air conditioning computer room units in the event of any alarm within the facility.

(19) Whenever a duct detector goes into an alarm state, the FACP shall shut down the associated air handling system and send a supervisory signal to the Fire Dept. via the transmitter.

## **7.12 SITE LIGHTING**

### **7.12.1 General/Design**

1.0 Create a unified appearance on base by selecting light fixtures of a consistent design and lamp type.

2.0 Fixtures shall be low maintenance and vandal resistant.

3.0 LED lamps are preferred for most areas. Avoid use of low-pressure sodium lamps. LED lighting for Street lighting, obstruction lighting or parking lot lighting is unauthorized on Moody AFB.

4.0 3.2.2 Area, Street, and Parking Lights

5.0 Parking lot and area lighting shall be LED, rectangular cut-off (shoebox) fixtures. Lamps shall be 250W LED on 30-foot poles. Poles shall be round/square, tapered aluminum shaft. Color shall be dark bronze anodized finish (Figure 2-3p).

6.0 Cobra-head fixtures on dark bronze anodized tapered poles are preferred for street lights in all visual areas except Family Housing and Grassy Pond.

7.0 Street lights in Grassy Pond Recreation Area shall be cobra-head fixtures mounted on wood poles.

8.0 Fixtures for pedestrian circulation and area lighting shall be mounted on 12' to 15' high posts (Figure 2-3q). Fixture shall be standard cobra head dark bronze anodized.

## 8.0 COMMUNICATIONS

### 8.1.0 Communications Guidance for New Buildings

#### 8.1.1 References

American National Standards Institute (ANSI) C2  
National Electrical Safety Code

Electronic Industries Association  
Telecommunications Industry Association  
(EIA/TIA)

EIA/TIA-568A Commercial Building  
Telecommunications Cabling Standard

EIA/TIA-569 Commercial Building Standard for  
Telecommunications Pathway and Spaces

EIA/TIA 607 Commercial Grounding and  
Bonding Requirements for Telecommunications

#### 8.1.2 Building Entrance Facilities

(outside cabling interfaces with intra-building  
backbone cabling):

EIA/TIA 569

Number of entrance ducts: min. 2 @ 4" diameter

Outside cabling should enter into the  
Communication Equipment Room (CER).

Underground cable should be placed in  
interconnecting ducts, hand holes, and manholes.

Utilities should be placed into conduit system  
regardless of circumstances. Direct bury only by  
exception

#### 8.1.3 Communication Equipment Room (CER) (environmentally controlled)

EIA/TIA 569

Required for a facility that has significant C-CS  
requirements. (Unoccupied facilities and small  
facilities will normally not require a CER.)

Should be entrance facility for outside cabling

Should be provided with a large single door that  
can be locked (controlled access)

##### a. Location:

Should be located on first floor with exterior wall

Should **not** be co-located with other utility  
services (due to EMI)

CER can act as Telecommunication closet (all  
horizontal cabling [cabling run from TC to  
outlets] should be less than 295 feet [90 meters])

##### b. Power:

Minimum two (2) 20 Amp dedicated branch  
circuits

Each wall should have at least 2 duplex  
receptacles (120 VAC)

Check with users for special power requirements

Grounding (EIA/TIA 607):

Must meet appropriate NEC requirements and  
practices

Single point ground for all communications-  
electronics equipment for the building with the  
CER.

Coordinate with user for communications  
equipment that needs special grounding.

Size (to be determined at pre-design)

##### c. Equipment

Telephone backboards shall be 4x8 feet, 3/4-inch  
thick with two coats of insulating fire-retarding  
varnish.

Punch down blocks for voice add cables shall be  
equivalent to AT&T Type 66MI-50 blocks  
mounted on standoff brackets. Separate block  
fields should be provided to terminate:

##### d. Voice riser cables (main feeder cables)

Patch panels for copper data and voice cables shall  
be rack mountable copper patch panels with RJ45  
connectors on the front and individual 110  
termination on the back of each connector.  
Connectors must comply with EIA/TIA 568A Cat  
6 requirements.

Equipment racks shall be cabinet mounted, 19-  
inch racks for Patch panels and network  
equipment. Each rack should also include a 20-  
Amp, 10-receptacle power strip.

**8.1.4 Telecommunications Closet (TC)**  
(houses hub equipment, Intermediate Distribution Frames)

EIA/TIA 569

Each floor greater than 10,000 sq. ft. should have TC

Location

CER can act as TC (horizontal cabling length must be less than 295 ft. [90 meters])

Should be located near center of area to be served

Should not be collocated with other utility services (due to EMI)

Power (see CER paragraph 9.9.1.3)

Grounding (EIA/TIA 607)

Must meet appropriate NEC requirements and practices

As a minimum, provide a No. 6 ground wire or larger connected with a direct home run to the ground plate in the CER.

Grounding must be 10 ohms or less measured at the grounding point.

Size (EIA/TIA – 569). To be determined at pre-design.

Equipment (see CER paragraph 9.9.1.3)

**8.1.5 Cabling** (must be installed by certified Cat 6 installer)

Provide 1” EMT conduit from wall-mounted box to above ceiling area for voice and data cables.

Voice:

EIA/TIA 568A Cat 6

Voice station cables shall be 4 pairs of Unshielded Twisted Pair (UTP) 24-AWG solid copper conductor

Provide RJ-45 outlet, (shared outlet with Data)

Installed length of copper voice cables must be less than 295 ft. (90m) from communication outlet to TC

Data:

EIA/TIA 568A Cat 6

Data cables shall be 4 pairs of Unshielded Twisted Pair (UTP) 24-AWG solid copper conductor

Installed length of copper data cables must be less than 295 ft. (90m) from communication outlet to TC

Provide RJ-45 jack, shared outlet with Voice.

**8.1.6 Identify proper cabling to be installed in the building**

Consider the performance and application demands placed on the cabling system.

Determine if the system will migrate toward more demanding applications like CAD/CAM, imaging or multimedia.

Consider all unique physical requirements in the building.

Voice

EIA/TIA 568A Cat 6

Testing

Length (max. 295 ft. [90m])

Data

Copper

EIA/TIA 568A Cat 6

Length (max. 295 ft. [90m])

\* Testing

Fiber

ANSI/EIA/TIA-492AAAA

\* Testing

**8.1.7 Ensure that all communication outlets are identified**

Proper EIA/TIA 568A pinouts for Voice and Data jacks.

**8.2 FULL SPECTRUM THREAT RESPONSE/MASS NOTIFICATION SYSTEM, (FSTR/MNS)**

**8.2.1 General**

FSTR/MNS consists of the capability to transmit emergency instructions from either the Command



Post (Bldg. 105) or the Security Forces Building (Bldg. 617) to the inside the occupied area of the building.

This is accomplished by the FSTR/MNS having the following capabilities and components:

An audio fire & emergency evacuation panel capable to transmitting the following messages over the building Mass Notification System speaker:

IKHZ for 5's – "May I have your attention please. This is the command post with a test of the Moody Mass Notification system. Repeat, this is only a test."

5's Wail – "Attention, attention. Moody AFB is in Force Protection Charlie. All personnel immediately implement FPCON Charlie Actions."

5's Wail – "Attention, attention. Moody AFB is in Force Protection Delta. All personnel immediately implement FPCON Delta Actions."

No sounds – "May I have your attention please. All clear, the emergency has ended."

Code 3 Horn – "Your attention please. Moody AFB has issued a severe weather warning. Take required actions and tune into local radio or television for the latest updates."

Siren – "May I have your attention please! A fire emergency has been reported in the building. While this is being verified, please leave the building by the nearest exit."

Full Spectrum Threat Response/Mass Notification System (FSTR/MNS) shall take precedence over the fire alarm messages. The clear strobe shall continue to flash during all messages, mount min. of 80" above floor.

#### **Speakers and Strobe:**

The intent is to have the Fire alarm strobe being red in color and mounted per ADA requirements. The FSTR/MNS speaker/strobe combination shall be colored to match the room and mounted independently to the fire Strobe.

Speakers shall be field adjustable in the following wattage increments: 1/8, 1/4, 1/2, 1, & 2 and field adjustable for 25V or 70V audio systems.

The strobe shall be field adjustable in the following candela increments: 15 & 30.

Weather-proof appliance enclosures shall be provided in outdoor applications. The enclosures shall be clear, slotted, and weather resistant with drain screen.

#### **8.2.2 Existing FSTR/MNS Control Stations**

Provide complete compatibility with existing FSTR/MNS control stations located in buildings 105 & 617, including software and screen-up dates

#### **8.2.3 Existing Alarm Systems**

Provide complete compatibility with existing fire alarm reporting system.

#### **8.2.4 Points of Contact:**

To update this proprietary software and system contact:

Systems Technologies, Inc.  
9456 Phillips Highway (US1)  
Suite 10  
Jacksonville, FL32256  
1-877-784-0025 904-880-1190  
[www.systems-technologies.com](http://www.systems-technologies.com)

### **8.3 LIGHTNING PROTECTION**

#### **8.3.1 Copper Lightning Protection**

Provide copper lightning protection system per the latest NFPA 780, Standard for the Installation of Lightning Protection Systems.

#### **8.3.2 Ground Impedance**

Shall be 5 Ohms or less when measured using the three-point ground-measuring device

#### **8.3.3 Roof-mounted grounding systems**

All components shall be attached via thermosetting adhesive

## **9.0 ENVIRONMENTAL**

### **9.1 Environmental Management System (EMS)**

Executive Order 13423 states that “All appropriate facilities will use EMS as the primary management approach for addressing environmental aspects of internal agency operations and activities”

The Contractor shall perform work under this contract consistent with the relevant policy and objectives identified in the agency, organizational, or facility EMS applicable for your contract. The Contractor shall perform work in a manner that conforms to the Moody AFB EMS, including but not limited to: addressing significant aspects the Contractor may be responsible for, developing and maintaining Operational Controls identified by the Moody AFB EMS, and providing monitoring and measurement information as necessary for the installation to address environmental performance relative to the environmental energy goals

All on-site contractor personnel shall complete appropriate environmental training specified for the type of work conducted on-site. Upon contract award, the government Project Manager/Inspector will notify the facility-level EMS Coordinator to arrange EMS training for appropriate staff.

All waste materials generated by any work under the contract performed on a government installation shall be handled, transported, stored, and disposed of by the contractor and by his subcontractors at all times in accordance with all applicable Federal, state, or local laws, ordinances, regulations, court orders, or other types of rules or rulings having the effect of law. Contractors should make every effort to divert construction debris from the waste stream. All materials diverted should be reported by weight using the form provided as an attachment to this contract.

## **9.2 Hazardous Materials**

Materials determined to cause a hazard to health shall not be used in construction at Moody Air Force Base.

### **9.2.1 Asbestos and Lead Paint**

Asbestos containing material will not be used in construction.

Copies of the base asbestos survey will be provided to the A-E for determination of areas where asbestos removal will be required.

Where this information is not provided, the A-E will perform asbestos surveys on material suspected of containing asbestos material.

All existing asbestos-containing material to be disturbed by construction shall be identified on the drawings and removed as part of the project.

All paint used shall be lead-free, where lead-free is defined as 0.06% or less lead content in the dry film.

## **9.3 Permits:**

The Architect/Engineer will identify all permits necessary for the construction of projects.

This includes permits required by the Georgia Environmental Protection Division (EPD), State Highway Department, U.S. Environmental Protection Agency (USEPA), Corps of Engineers and other state and local governments.

Examples of the types of permits that the Architect/Engineer would have to provided drawings and/or identify include the following:

NPDES Permits

Erosion and Sedimentation Control permits

Air emission permits

Underground storage permits

Water system construction permits

Sewer system construction permits

Highway construction permits

## **9.4 Off-Base Waste Material Disposal**

Disposing of any waste material off base at approved landfills, require that the Contractor

provide trip tickets to ensure that the waste materials were disposed of properly.

These trip tickets should be submitted to the Civil Engineering Project Manager so that they can keep a log of the amounts of construction debris that is deposited in the landfills or recycled.

Asbestos, lead-based paint and hazardous waste debris tickets should be submitted to the Civil Engineering Project Manager.

*NOTE:* Ensure that this policy on waste disposal tickets is clearly written into the specifications, or else Moody AFB cannot enforce it.

#### 9.4.1 Environmental Standards:

All design work should comply with all current environmental standards to include, but not limited to: Construction Storm water, Storm Water, Air Emissions, Drinking Water, Waste water, Solid Waste, Recycling, Hazardous Materials, Hazardous Waste, Hazardous Waste Disposal, Natural and Cultural Resources. For more information concerning any environmental aspects please contact the local environmental office.

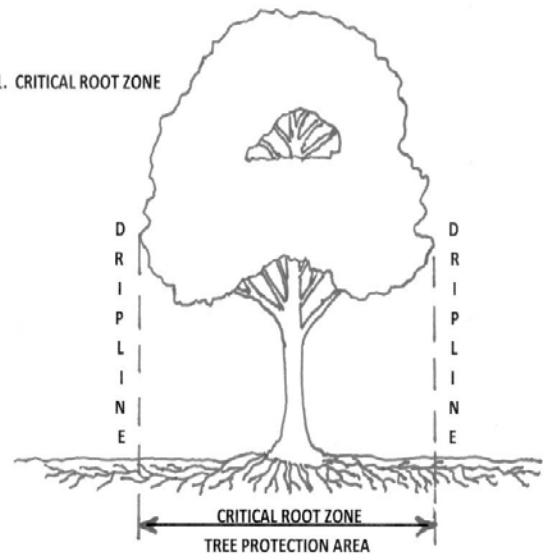
Construction of Federal facilities over 5000 square feet are required to be designed and constructed in compliance with the Energy Independence and Security Act (EISA), to include storm water planning, design, and construction. EISA storm water requirements are separate and often exceed the requirements of local storm water permitting requirements.

#### 9.5 Protection of Trees on Construction Sites or Near Planned Excavation Activities:

Prior to construction or demolition activities, the contractor or subcontractor (or government employee if applicable) shall construct and maintain, for each pre-designated protected tree or group of protected trees on a construction site, a protective fencing which encircles the outer limits of the trees critical root zone to protect it from construction activity. The **Critical Root Zone** for the purpose of this document is defined as the ground area beneath the tree canopy around the trunk of the tree extending out to the drip line of

the outermost canopy of the tree (see Figure 1.). The **Tree Protection Zone** includes the critical root zone area and also any tree limbs, trunk, or foliage directly above the critical root zone. Some rare, special, old or large trees may require a larger area based on a formula as recommended by the Base Forester. Otherwise, the Tree Protection Zone fence should be installed at the outer drip line of the canopy. The Tree Protection Zone fencing can exclude any paved streets or parking lots which already exist near the tree, although the limbs and foliage above streets and parking areas still should be protected during the construction process. Sidewalks can be straddled with Tree Protection Zone fencing if they are within the outer drip line of the canopy. Sidewalks can be excluded from within the Tree Protection Zone fencing if the sidewalk is located near the outer edge of the tree canopy drip line or if they are directly adjacent to an excluded existing street.

FIGURE 1. CRITICAL ROOT ZONE



**Tree Protection Zone fences** on construction sites should be a minimum of 48 inches high. The fence should be made of a metal chain link fence with T-posts or metal pole posts, or a wooden framed fence (such as 2" by 4" lumber). The fence should be supported at a maximum of ten foot intervals by T-posts, metal posts or wooden minimum 2" by 4" board posts. The bases of fence posts should not be concreted in, but rather tamped in with soil and gravel as needed to firm

up posts. Prior to installing fence posts, all applicable underground utilities in the area should be identified, marked, and the normal Moody Air Force Base digging permit process must be completed for proper clearance to install the posts at the designated locations. On the tree protection fencing, a plastic or metal sign should be placed every 20 feet approximately on the side facing construction activities stating, "Tree Protection Zone, Keep Out."

## **9.6 Historic Buildings**

Historic buildings or buildings eligible for historic listing will be identified prior to commencement of the project. Facilities over 50 years old that have not been evaluated for historic status are required to be treated as though they were historic. Facilities identified as eligible for listing on the National Register of Historic Places or over 50 years of age and not evaluated for eligibility, require a DOI certified architectural historian to review the project and determine that the work will not affect the historic properties of the facility. This determination must then be coordinated with and receive concurrence that the work will not affect historic characteristics from the State Historic Preservation Office (SHPO) prior to commencement of work.

## **9.7 Monitoring Wells & Plums (Restoration)**

Projects must be designed to ensure the work will not impact ERP sites (proposed construction sites must be reviewed early in the process to ensure future work is not halted or delayed because of ERP site contamination).

All ERP wells and infrastructure should be identified on the drawings. Projects must be designed to avoid ERP wells and remediation systems/infrastructure. If wells are damaged and cannot continue to serve as reliable monitoring points, the construction contractor

will be responsible for paying for the cost to replace the wells.

The following stipulations for construction on/near ERP sites of known contamination will be met by the contractor or project engineer:

a. Project will comply with GA DNR guidance for disposal of contaminated soils/materials.

b. If suspected contaminated material is identified during construction activities, the contractor and his workers are to stop work immediately and notify the Moody AFB Environmental Restoration Program Office. Please note that removal and disposal of any contaminated material will be conducted using construction project funds. All soils and/or groundwater removed from any ERP site will require sampling and analysis for disposal purposes. The Moody AFB ERP staff will assist with determining sampling requirements. Please note that any sampling and analysis conducted will be a construction cost and will not be eligible for Environmental Restoration Account funds.

c. Construction contractor and site workers will be informed of the potential for encountering contaminated material on the job site. Safety observers currently certified with OSHA 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER) training will be present during excavation activities. The contractor will ensure that the proper Personal Protective Equipment (PPE) is worn during the excavation.

d. Prior to construction activities, the contractor shall contact the ERP Program Manager.