AIR COMBAT COMMAND

Installation Development and Design (ID2)

[Moody Air Force Base, Georgia]

820th Base Defense Group Facility, Moody AFB

ID2

17 November 2011

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[1.1] Document Scope, Applicability and Audience

[1.1.1] HQ ACC/A7P

Current guidance removes design process short-circuits by realigning constraints, changing mandates into a performance framework, and limiting prescriptive requirements to those critical in meeting Command and Installation functional requirements. Prior editions of design guidance, both at the Command-level and the Installation-level, relied heavily on mandates and prescriptive formula relating to the building form, aesthetics, and materials, and this often narrowed design phase investigations into plan arrangement exercises.

Installation-level development and design guidance focuses on identification of regional and local design characteristics, common building methods and preferences, architectural context, landscape standards, infill and building density opportunities, future vision, and establishing installation-centric preferences and strategies. Building aesthetics and character cannot be fully established prior to conducting the concept charrette as aesthetics develop and evolve in response to multiple drivers. Designing and then evaluating aesthetics and architectural character is highly subjective and has to be approached on a project by project basis.

Companion information to this document is provided in the form of an Installation 3D mass model, photographic log database, and the Installation Sustainability Assessment (ISA). The Installation 3D mass model is dimensionally accurate and reflects overall building massing, height, and form. The photographic log database includes all structures on the Installation with the exception of family housing units and utility sheds. The ISA serves to provide current state snapshot of the Installation's 'green posture' and will serve as a way to measure changes over time; indicators should change for the better over time as more green design strategies and processes are put into place.

[1.1.2] Applicability

Publication of this document serves to cancel and supersede previous Installation-level design guidance. All external references to Installation-level guidance documents shall now be considered referring to the Installation Development and Design Handbook (ID2). The ID2 serves to inform Future Year Development Plan (FYDP) site selections, Area Development Plan (ADP) designs, Requirements Document (RD) investigations, and Concept Charrette Document (CCD) packages. The ID2 will be summarized in the Installation Electronic General Plan (eGP).

Architect-Engineer (A-E) Scope of Work descriptions, Request for Proposal (RFP) solicitations, and Design-Bid-Build (D-B-B) and Design-Build (D-B) contracts shall explicitly identify HQ ACC/A7P sustainable development and high performance green building design requirements and objectives as functional requirements.

The ID2 shall be referenced in all Design and/or Construction solicitations to inform Contractors of its existence, and to ensure that the goals underlying the ID2 are incorporated into all new projects. This reference should inform Contractors that the ID2 document does not mandate facility aesthetics, character, or form, but rather that it contains broad design considerations relative to the Installation's built environment. The reference should include a statement that the Contractor's responsiveness to these considerations is an important evaluation factor when reviewing proposals, as well as subsequent design submittals.

[1.1.3] Audience

This document provides criteria and considerations used in planning, development, and design of projects and are in addition to technical criteria readily available to professional architects, planners, engineers and interior designers. This document and companion information sources shall be used as primary reference in all planning/siting considerations, building renovation projects, and new construction projects.

[1.2] Development and Design - A Holistic Approach

[1.2.1] HQ ACC/A7P

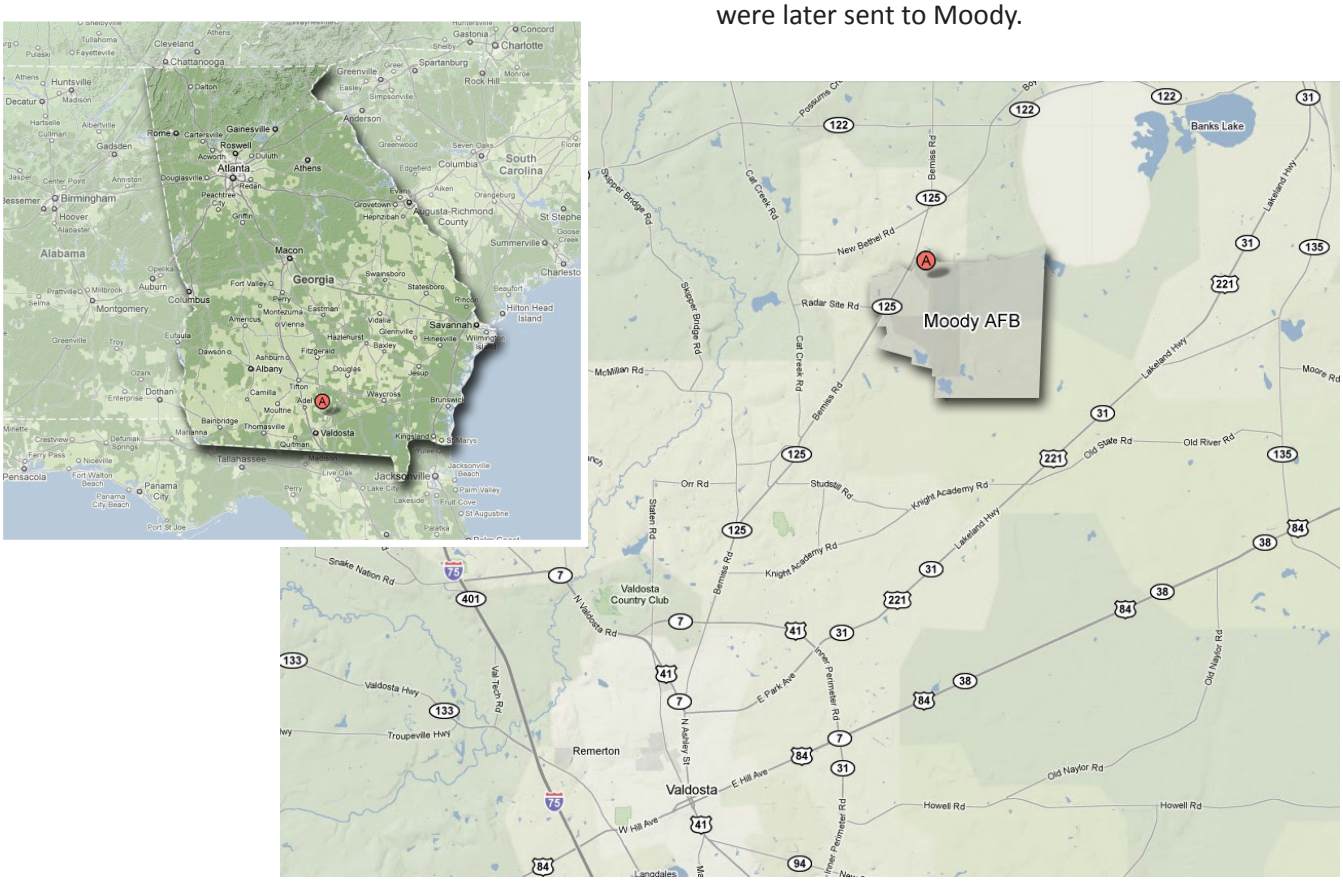
The Command's vision is to lead by example and serve as a role model for sustainable development and high performance green building design in the Air Force, DoD, and federal government. When "Green Design" is infused into every facet and decision, we'll see both immediate and long range benefits including healthier working environments, reduction of our carbon footprint, and enhancing the enduring quality of facilities while lowering the total cost of facility ownership. To this end, development and design strategies must consider myriad factors and influences, and assure solutions are appropriate to the site, sensitive to the built and natural context, reflective of functional needs, responsive to aesthetic considerations, and embody green building design.

Green design is not optional. Implementing green building design objectives (functional constraints) is required to produce a complete and usable facility or a complete and usable improvement to an existing facility. A green building design approach forms the functional and technical foundation for all performance requirements, development considerations, and design constraints made, referenced, or otherwise used in this document.

"Green Design" is synonymous with "Quality Design". Quality design strategies produce results that conserve energy; make efficient use of resources; produce visually appealing structures; reduce environmental degradation; create built environments that are livable, comfortable, safe, enduring, and productive; and shrink the environmental impact of our operations.

[1.2.2] Installation History

The Base was named in memory of Major George Putnam Moody, an early Army-Air Force pioneer killed in May 1941 while serving with the Beech Aircraft Company in Wichita, Kansas. At the time of his death, the major was working on the inspection board for AT-10 transitional trainer aircraft which were later sent to Moody.



The Base had its beginning in 1940 when a group of concerned Valdosta and Lowndes County citizens began searching for a way to assist the expanding defense program. The citizens rallied interest in the War Department for a 9,300-acre tract formerly known as the Lakeland Flatwoods Project, northeast of Valdosta. On 14 May 1941, the War Department was granted exclusive use of the land by the Agriculture Department.

On 19 February 1942, the Moody Field Advanced Pilot Training School began training 50 Army Air Corps cadets in the Beech AT-10. Following World War II in November 1947, Moody was placed on inactive status, but was reactivated in May 1951 when the Korean conflict created a need for more Air Force pilots.

The Base's primary mission in its early years was to meet the requirements of the Air Force Pilot Instrument School and Instrument Flying School.

In September 1975, the 347th Tactical Fighter Wing, belonging to the Tactical Air Command, relocated from Thailand to Moody.

In December 1975, the 347th TFW formally replaced the 38th Flying Training Wing at Moody, flying the F-4E Phantom II, as the primary mission. On 1 October 1991, the 347th TFW was redesignated as the 347th Fighter Wing. The 347th Fighter Wing was assigned to Air Combat Command in June 1992.

On 1 July 1994, the Air Force converted the 347th Fighter Wing to the 347th Wing, a force projection, airland composite wing.

On 8 May 2001, the 347th Wing converted to the 347th Rescue Wing, becoming the Air Force's only active-duty combat search and rescue wing.

On 1 October 2003, the 347th RQW was realigned from Air Combat Command to Air Force Special Operations Command in an effort to bring all Combat Search and Rescue (CSAR) assets under one Major Command.

On 3 April 2006, the 347th RQW was realigned from AFSOC to Air Combat Command to link CSAR assets directly to the combat air forces and the personnel they support.

On 1 October 2006, the Air Force re-designated the 347th RQW as the 347th Rescue Group and assigned it to the 23rd Wing, which officially became the host unit at Moody on the same day. Along with the 23rd Wing designation, the base accepted the responsibility of carrying on the historic Flying Tiger's heritage.

Among many other achievements, host wings stationed at Moody AFB won the Commander-in-Chief's Installation Excellence Award for 1991 and the 1994 Verne Orr Award, which is presented by the Air Force Association to the unit that most effectively uses human resources to accomplish its mission. In September 2008, Air Combat Command awarded the 23rd Wing with the Air Force Outstanding Unit Award for the ninth time in its illustrious history.

[1.2.3] Installation Development and Design

This Installation Development and Design (ID2) guide is intended to provide overall direction regarding future development and definition of the base areas and buildings at Moody AFB. Included are principles of design that will give order and functionality to the built environment. Sustainable design principles are foremost in the list of criteria that are being emphasized in this guide, and these principles will strongly influence building design and aesthetics.

Moody Air Force Base is a place of both natural beauty and military order *(see Figure 1.1)*. The two constructs exist together peacefully in a setting that is at once wild and contained. The Grand Bay Swamp adjacent to the main base is partially included in the boundary of the base and is used as a target range area. The natural look of this low-lying area is heavy cypress forest with constant dampness and intermittent wetting. The portions of the base which are part of this un-buildable area are identifiable with the existence of the cypress trees, as no other trees will grow in this environment. There is an abundance

Figure 1.1
CDC Preschool Annex (Former Cadet Orderly Room)

Figure 1.2
Spanish Moss

of stately Live Oak trees and Spanish Moss on base, which imparts of a relaxed southern lifestyle. Moody AFB is characterized by the lush landscape of its locale, and maintaining this wonderful natural setting is important to its identity *(see Figure 1.2)*.

Moody AFB consists of fairly homogenous zones of development, with a dense and compact main base area. Administration, community, unaccompanied housing, and recreational facilities are housed in the historic center of the Base, with the flight line support facilities ringing this area on the north, east, and south sides. To the west of the Base, across a state highway, is the main residential area, and a new residential area is planned and partially constructed to the south of the Base. Each of these areas has adequate space for the further development of additional facilities, including accommodations for new missions and possibly an entire wing. Future development should occur first on the infill sites within the built-up area since infrastructure needed is already in place, providing an economical and ecological solution to future facility siting needs.

The runways and aprons at Moody AFB are uniquely designed to support this dense and compact development. The aprons ring the main Base on three sides, allowing the flight line support facilities to surround the administrative areas, instead of being stretched-out in a line on one side of the Base. There is also the possibility to extend these aprons to the north and south, providing additional sites for flight line support facilities.

There is a heritage of masonry structures here, primarily face brick and concrete masonry. Many innovative project designs have been accomplished using these materials *(see Figure 1.3)*. There has been a substantial amount of construction completed at Moody AFB in the last fifteen years, which gives the base a fairly modern feel. Architectural style throughout the base is dominated by the use of a consistent palate of materials and consistent shapes of buildings. Future decisions about material selections and building forms should give high value to sustainable design principles in overall design concepts. The preference is for designs that are highly responsive to functional and contextual conditions, which allows building solutions to be uniquely well-suited to their purpose.

Figure 1.3
Airmen's Dormitory

Figure 1.4
Mission Lake

Given the density of the developed area of the Base and its potential as a location for future missions, consideration of more multi-story buildings would be appropriate. Designers will find guidance on site development and facility design in this ID2 that will allow flexibility to create one-of-a-kind solutions that are both practical and inspirational, while enhancing a positive relationship with the built environment.

Moody AFB is located in a warm and humid climate, with an annual precipitation of approximately 54-inches. The winter months are cool, and the summer can be blisteringly hot, with the rainfall fairly evenly distributed throughout the year. The Base is surrounded by wetlands to the south and east, and agricultural land to the north and west. The climate is not conducive to heavy outdoor activity in the hottest summer months, but there are a number of months where recreation and simple outdoor enjoyment is possible. There are running trails, walking plazas, numerous outdoor seating areas and covered pavilions on Base, in addition to sports activity fields and recreational areas at Mission lake *(see Figure 1.4)*.

The built environment of Moody AFB needs to address the region's weather conditions, providing shelter from sun and rain for both buildings and personnel. In some instances there are covered areas adjacent to buildings which allow building occupants to include the out of doors in their daily activities more often. These take the form of overhangs, canopies, covers, and large overstory trees *(see Figure 1.5)*. And by maintaining and enhancing the development density on Base, a pedestrian-friendly environment can be created regardless of the weather. Creating a system of continuous sidewalks as well as bike/pedestrian trails along all major Base roads would enhance non-motorized transportation options and promote an active lifestyle *(see Figure 1.6)*. Finally, buildings at Moody AFB need to be responsive to their setting, bringing sunlight into interior environments as natural lighting, while mitigating the undesirable effects of glare and heat gain.

Figure 1.5
Overstory Tree Canopy Adjacent to Dormitories

Figure 1.6
Landscaping Area

Moody AFB has a policy of not including irrigation systems on new facilities and provides supplemental watering only during the initial establishment of plantings. This policy supports several sustainable design and high performance green building principles. It can be taken a step further by fully instituting a landscape plantings policy to use only native and well-adapted species on Base. These hardy trees, shrubs, and other plantings would not require supplemental irrigation after establishment, yet would improve the microclimate of the Base and the exterior environment around facilities. Landscaping can play an important role in creating pleasant exterior "rooms", which allow outdoor activities to take place on many more days of the year *(see Figure 1.7)*.

[1.2.4] Installation Goals

Incorporate sustainable development and green design principles into every facility and site design project at Moody AFB.
Use the Sustainable Design Scorecard and Air Combat Command design guidance to create solutions that meet federal requirements for conserving water and energy, and for sustaining the environment. Innovations that go beyond these requirements are encouraged.

Make the places where people work and play at Moody AFB functional and pleasant places to be.
Embrace the principles of good architectural and site design to create highly functional and inspirational solutions. Interiors should be full of natural light, and have thoughtful material and color selections. Building layouts should meet the functional requirements as efficiently as possible, and that functionality should be inherent in the building's shape and form. Building layouts should allow for maximum natural light to penetrate all spaces within. Site development should tie buildings to their surroundings, allowing the buildings to fully function as part of the Base community.

Retain options for attracting new missions when siting facilities today.
Leverage Moody AFB's ability to attract new missions by preserving key infill sites for future new development. When evaluating how to meet current needs, consider if this decision will eliminate future mission bed-down options.

Figure 1.7
Exterior Plaza

Make re-use of infill sites a priority in locating new buildings.
Leverage existing roadways, parking areas, and Base utilities by locating new facilities on currently vacant infill sites. Where appropriate, consider removing infrequently used roadways to create larger infill areas where functionally feasible. Cluster parking for adjacent facilities to minimize area lost to standoff distances.

Create a sense of pride in the community at Moody AFB.
Every project should be considered relative to its visual affect on the community-at-large. Include individuals who will be affected and seek the opinions of users in all design projects. Strive to have every project be thoughtfully designed to blend with and complement the neighboring facilities.

Figure 1.8
Maintain and Care for Base Site Improvements

Foster a quality of life that encourages healthful outdoor activities.

Make outdoor activities a priority. Accommodate bike use with proper trails and bike lanes. Link all buildings and work areas to a base-wide system of walkways to encourage more pedestrian use. Extend outdoor use by having courtyards and plazas that invite indoor activities outside. Create shaded areas for summer comfort by using roof canopies and overstory trees at outdoor activity areas next to buildings and along trails.

Retain the high level of site development at Moody AFB and embrace the natural beauty of the landscape.

Continue to take advantage of the natural beauty of the lush indigenous landscape. Incorporate shade-producing overstory trees in plans for site development, and put in place a plan to care for and maintain the best existing specimens. Maintain the high level of care of Moody AFB's site improvements, from the pavements, sidewalks, and plazas to the natural landscape materials *(see Figure 1.8)*.

[1.3] Development and Design - Requirements and Evaluation Metrics

[1.3.1] HQ ACC/A7P Requirements

Command-level requirements are described in ACC Instruction, Installation Development and Design Handbook (publication forthcoming). It establishes sustainable development and high performance green building design objectives as primary functional constraints; prescribes HQ ACC/A7P review and oversight processes; identifies architectural and engineering design considerations; and promulgates performance and prescriptive constraints.

[1.3.2] Installation Requirements

The Installation Development and Design Handbook (ID2) aligns with Command-level guidance and is intended to be a vital component in developing strategies appropriate to smart growth development and the building site; sensitive to the built context; reflective of building program and scale; responsive to object/background importance; and fully implementing sustainable development and high performance green design objectives. The ID2 describes constraints and identifies objectives necessary to accomplish "Quality Design". Topics and focus areas include: Installation context, architectural context, an Illustrative Plan, overarching development and design guidelines, site selection and development considerations, landscape design issues, architectural design objectives, and technical constraints.

Technical Constraints can be generally categorized either as "Non-Negotiable", such as compatibility with existing fire-alarm communication system or existing keying system, or as "Negotiable", such as a brick blend generally used. "Non-Negotiable" constraints will not directly or indirectly predetermine building aesthetics, character or form, or limit/restrict investigation of high performance green building design strategies.

[1.3.3] HQ ACC Development and Design Review Board (D2 Board) Evaluation Metrics

Projects meeting threshold levels established in the ACC Instruction (publication forthcoming) will be evaluated by the HQ ACC Development and Design Review Board (D2 Board). D2 Board evaluations seek to validate conformance with requirements established in Command-level guidance; conformance with requirements established in this document; and adherence to principles of "Quality Design", such as optimizing benefits from site selection, optimizing energy use, protecting and conserving water resources, utilizing environmentally preferable products, enhancing indoor environmental quality, and optimizing operational and maintenance practices. All development and design solutions must embody an "appropriate response" and reflect a responsible use of public funds.

Evaluations of aesthetics and architectural design are inherently subjective and the D2 Board reserves latitude in evaluating design strategies on a project by project basis. Design aesthetics, architectural character and appropriate building form cannot be prescriptively determined in advance of conducting a concept development charrette, as these characteristics arise only after consideration and synthesis of all design drivers. Setting aesthetic preconditions short-circuits design development and will be avoided.

[1.3.4] HQ ACC D2 Board Evaluations

D2 Board evaluations may produce recommendations (non-mandatory), directives (mandatory), or a combination of both. In extreme cases, D2 Board directives may include project stoppage in order to address continued or critical failure in meeting functional constraints.

Directives must be implemented unless in very rare and extenuating circumstances a waiver is first endorsed by the D2 Board and then approved by HQ ACC/A7. Waiver requests must be submitted by the BCE Squadron Commander and clearly document the basis for non-compliance and describe actions that will be taken to offset the deviation. Issuance of a waiver does not establish precedent or basis for justifying other projects' non-compliance.

[1.3.5] Installation Metrics and Evaluations

Installation metrics are those used by the D2 Board with additional interest in evaluating implementation of Installation-centric technical requirements. Installation evaluations may result in recommendations (non-mandatory), directives (mandatory), or a combination of both.

[1.4] Organization of the Document

The Installation Development and Design Handbook (ID2) is organized into five main chapters:

Chapter 1, Introduction
Familiarizes the reader to the need, scope, applicability, requirements, and organization of the document.

Chapter 2, Installation Image
Provides insight into the existing conditions found on base, specifically in areas where new development can be accommodated.

Chapter 3, Development Considerations
Provides information regarding opportunities and constraints found within the development areas.

Chapter 4, Illustrative Plan
Provides a view of potential development opportunities in the next 10- to 20-years.

Chapter 5, Development and Design Guidelines
Highlights approaches to Sustainable Development and High Performance Green Buildings (SD&HPGB), Site Development, and Architectural Design.

Appendices
Identify specific technical considerations, constraints, and other supporting materials.

[2.1] Installation Image

The mental image that people form of a town or military installation provides the information they use to navigate its streets and comprehend its physical layout. This information also serves as the basis upon which they develop either a positive or negative impression of its visual appearance. Study of an installation's image refers to an assessment of how "legible" a place is to residents and visitors. Can a person easily go from place to place based upon their understanding of its street patterns, notable landmarks, and other visual cues? Do an adequate number of landmarks exist to help a person organize their mental map? Does the visual character of this place cause a person to like or dislike it?

Answering these questions provides insight into how to make installations better places in which to work, live and recreate. It benefits visitors as well, by making wayfinding easier. It provides insight into how an installation's appearance can be improved by changes to its public spaces (shopping, community services, parks), by adding landmarks, and by improving the visual character of its primary and secondary streets. Every community improvement project - for example a street reconstruction, new building, or park rehabilitation - can contribute to creating a more mentally coherent and attractive community. In most cases, projects undertaken to provide safer roads or construct a new, more efficient facility can also contribute to an improved community image. This image analysis, along with the other guidance included in this ID2, when aggregated are intended to assist installation leadership and project designers in improving the visual image of Moody AFB. Examining the design of all new facilities in the larger context of the Base's image will assist designers in creating new buildings which complement existing forms and urban patterns.

The theory underlying the concept of image analysis was first documented in 1960, in a book titled "Image of the City", by Kevin Lynch. The book explained Lynch's theory of how individuals comprehend space and attempt to make sense of the layout of urban areas ranging from neighborhoods to metropolitan regions.

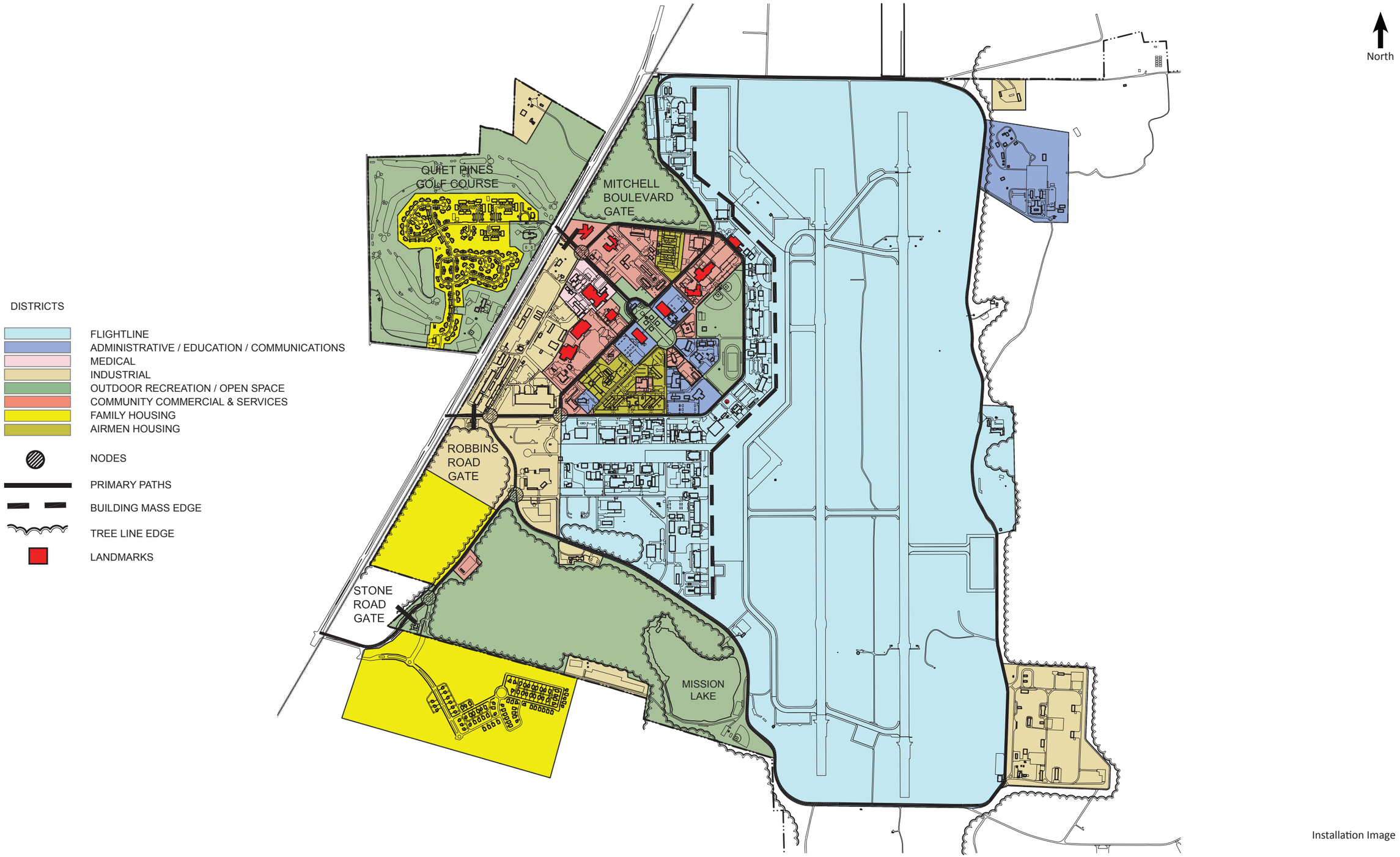
[2.1.1] Installation Image Analysis

Moody AFB presents a very consistent and well-manicured appearance. First time visitors traveling throughout the Base will find a consistent use of architectural materials, colors and building forms throughout the different land use districts on Base *(see Figure 2.1)*. The Civil Engineering staff has consistently required that the architectural standards from the Base's previous design guides be incorporated into new construction and renovation projects. The installation's location in the humid Southeastern United States facilitates the creation of a lush, green landscape on Base. Base leadership has ensured that consistent grounds maintenance provides a green and clean landscape within the main base area.

Street patterns at Moody AFB were laid out to respond to the Base's two original north-south and east-west runways. The centerline of the Base's primary entry road, Mitchell/Dargue Boulevard, was oriented to run from the entry gate on Bemiss Road to an imaginary point where the two runways intersected. This placed the entry road on an axis with a 45-degree diagonal to both runways. A series of roadways were established that run parallel to the runways, creating a series of concentric streets that form an octagonal pattern in the southeast half of the main base. The Base Headquarters and several other buildings were sited on the axis. This forced the entry road to wrap around both sides of these buildings on its route to the Base water tower, located next to the flight line.

The location of the original Base Headquarters building at the boulevard's intersection with Berger/ Burrell Streets signified a change in the Base's street

Figure 2.1
23rd Wing Headquarters



Installation Image

Figure 2.2
New Stone Road Gate

layout. From this point west to Bemiss Road (Georgia State Highway 125), the street pattern becomes a more or less rectilinear layout. Along the Base's western edge, the streets parallel the railroad line which runs adjacent to Bemiss Road. When viewed in plan, the collective street pattern nearly forms an octagonal layout.

The street pattern has been modified over time with segments of some minor streets eliminated as smaller, temporary buildings were replaced with larger, permanent structures and land uses changed. Additional streets were later added south of the back shops apron. Most of these roads run parallel to this apron or to the South Ramp to the east.


Figure 2.3
Parachute Tower

The largest issue related to the Installation image at Moody AFB is wayfinding. A third entry gate will soon be added at Moody AFB *(see Figure 2.2)*. This may necessitate certain changes to the Base's vehicular circulation system in order to assist visitors, new residents and the directionally challenged to successfully navigate Moody's road system. Two "tools" can be used to make wayfinding more intuitive for motorists. The first "tool" is to create a system of consistent travel paths that allow motorists to reach their desired destinations. The second "tool" is to create easily identifiable landmarks at key decision points where the paths diverge. These landmarks could be architectural elements, traffic features like a roundabout, or signage that directs motorists to their desired destination.

The Base's flat terrain and mature trees make it difficult to use vertical elements, such as the historic water tower and C-130 parachute drying tower, to act as landmarks to aide in wayfinding *(see Figure 2.3)*. While these features can play an important role for areas on the Base where they are readily visible, these two features are not visible from large portions of the main base. Landmarks at Moody AFB need to be readily apparent to motorists at eye level. Roundabouts and signage will work best at this Base *(see Figure 2.4)*.

Architectural landmarks, such as the former Cadet Orderly Room at the eastern terminus of Mitchell Boulevard, provide unique visual cues to persons navigating a new environment. Locating buildings that make a prominent architectural statement at


Figure 2.4
Roundabout Landmark

Figure 2.5
Base Signage

key decision points along main travel routes can aid in navigation. Alternately, using streetscape improvements including plantings or banners on street lights can provide cues regarding the routes that motorists should follow. Architectural elements like masonry columns can be used to demarcate points of entry or the boundaries of community districts.

Use of directional signage is the most obvious wayfinding tool *(see Figure 2.5)*. To be successful, signage needs to be obvious to first-time or infrequent visitors and placed at key decision points along travel routes. Information shown on the signs must be clear and concise. Minimizing the amount of text for each location shown is critical. Using the words, "Medical Facilities" on a single line with an arrow will be more successful than showing three lines of text with three arrows that reads "Medical Clinic", "Dental Clinic" and "Pharmacy". Color-coding the field color behind text on wayfinding signage is often done to assist in the wayfinding process. Signs with a red background might indicate community commercial and services, blue might indicate flight line facilities, and yellow might indicate administrative facilities. This use of color makes it easier for visitors to follow the route to the facility they are trying to locate.

- *Consider providing a landmark at the intersection of Robbins Road and George Street to better demarcate this important intersection as a gateway to the Base's community commercial area*
- *Consider implementing the recommendations in Section 3.3 CIRCULATION at the Burma Road roundabout to improve wayfinding from the Stone Road Gate to the Exchange/Commissary and 23rd Wing Headquarters*
- *Review existing wayfinding signage to determine its effectiveness*
- *Reserve prime redevelopment sites for new facilities that will bolster Base image and accommodate bed-down of new missions to improve Base sustainability*

[3.1] Reuse Opportunities

Reusing structurally-sound existing buildings that are adaptable to current needs conserves natural resources, reduces the volume of demolition debris sent to landfills, and decreases the extent of land needed for development on an installation. Using existing buildings for new purposes also reuses the existing infrastructure serving these sites. In-place roadways and utility services can continue to be used to support the new uses.

Reuse of existing parking lots and service drives associated with these buildings provides the additional benefit of avoiding the need to increase the amount of impervious cover on base. Avoiding additional pavement will decrease the heat island effect, decrease the volume of stormwater created and preserve existing greenspace.

Facility reuse is the "greenest" approach to construction of facilities and one that fully accounts for the "real" cost that construction places on the natural environment. Often facility reuse is the most cost effective method of providing new space on base, if the proposed use can be accommodated in the existing structure. Matching a new use to available building stock may require re-thinking how the space needs are accommodated. Likely it would be different than how space would be laid-out in a new building. Good design can build on these differences to create new space that incorporates the heritage of the building's past use with the space uses of today.

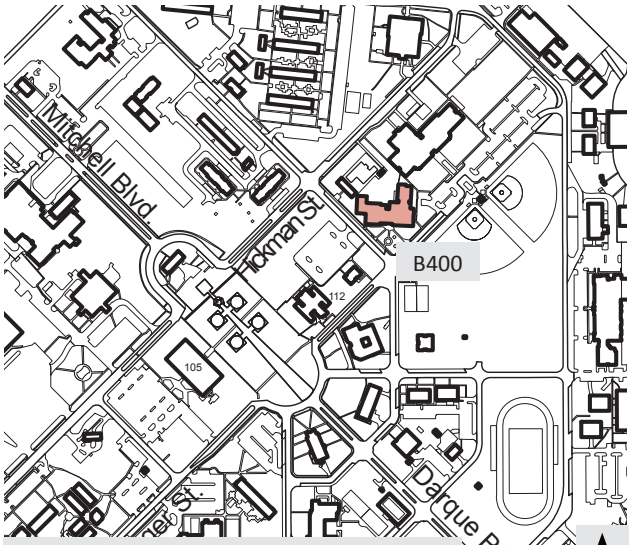


Figure 3.1
Building 400 - Services Headquarters

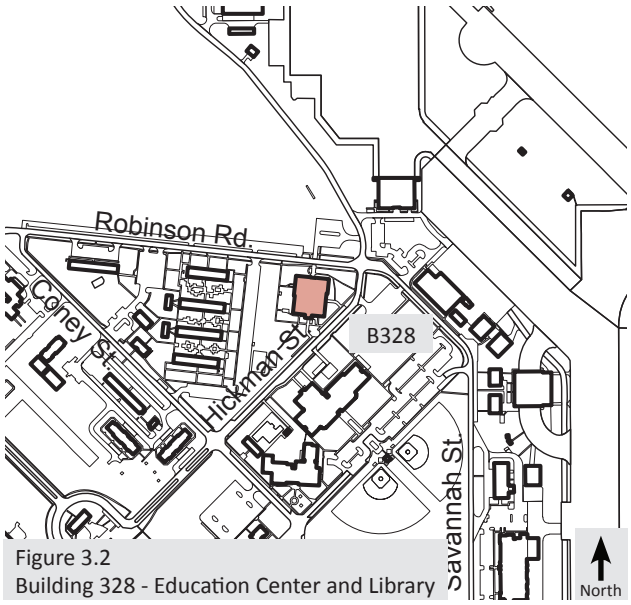


Figure 3.2
Building 328 - Education Center and Library

Moody AFB has a history of reusing existing buildings by re-purposing structures often built for other uses. Reuse of each of these structures has extended its service life beyond the original purpose. After the new Fitness Center was constructed Building 400, the former Fitness Center, was repurposed to provide office space for Headquarters Support Services and the Airmen and Family Readiness Center *(see Figure 3.1)*. Building 328, which once served as an air traffic control facility, was renovated to serve as the Base's Education Center and Library *(see Figure 3.2)*. In the Base's community center, a former Class VI Store, Building 843, was repurposed to serve as the Community Thrift Shop *(see Figure 3.3)*. This conversion located a needed community commercial use adjacent to the Exchange and Commissary. In all

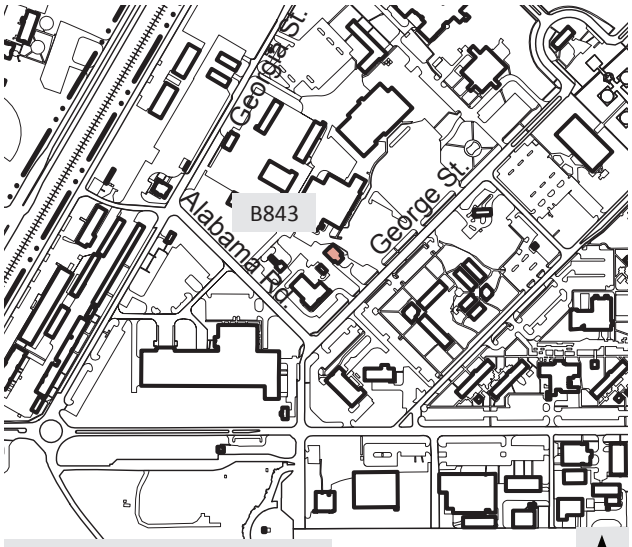


Figure 3.3
Building 843 - Thrift Shop

of these cases, an existing building was reused for a new use, extending its service life, decreasing the cost of providing the needed spaces, and recycling rather demolishing an existing structure.

Other recent examples of building reuse at Moody AFB include:

- **B104** – Former Cadet Orderly Room to CDC Annex
- **B150** – Former bank to drug testing facility
- **B609** – Mobilization Storage to Wing SERE and Life Support
- **B780** – Former Exchange to CE warehouse
- **B907** – Former warehouse to Airmen's Attic
- **B908** – Former warehouse to Outdoor Recreation

[3.1.1] Planned Reuse Projects

Building 108 – The former base movie theater is currently being repurposed to become a conference center. The new use takes advantage of the building's central location on Base and adjacency to the two Wing Headquarters buildings *(see Figure 3.4)*.

Buildings 322, 323, 324 and 326 – North Airmen's Dormitory Campus – In the future, Building 324 will be re-purposed or demolished. The other three dormitory will be converted to billeting *(see Figure 3.5)*.

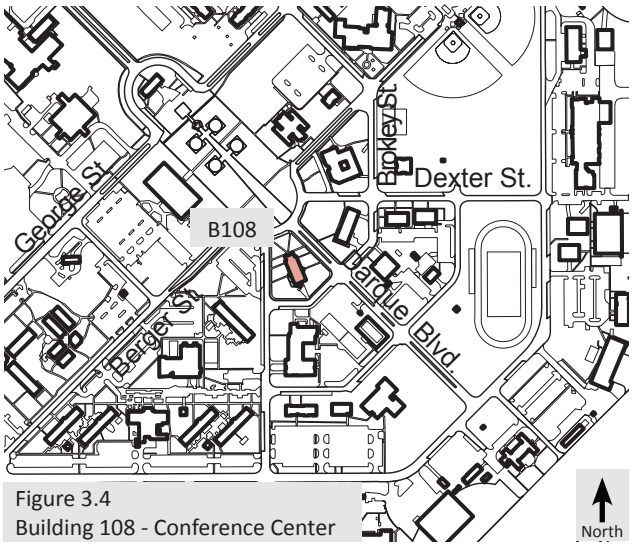


Figure 3.4
Building 108 - Conference Center

Building 320 – Moody Billeting Office – This building will be re-purposed to another use, due to its location adjacent to a street *(see Figure 3.6)*.

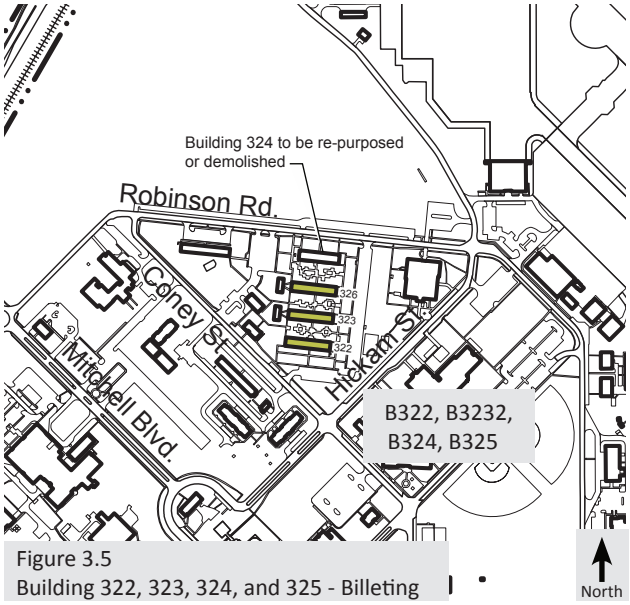


Figure 3.5
Building 322, 323, 324, and 325 - Billeting

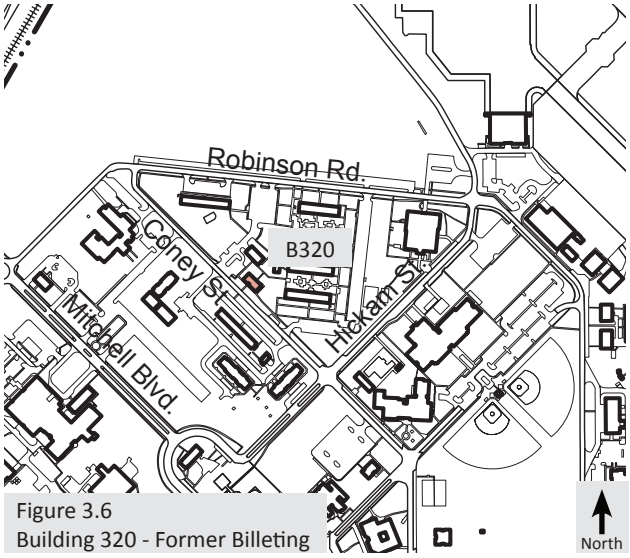


Figure 3.6
Building 320 - Former Billeting

[3.1.2] Buildings Not Considered for Reuse

Not every building is a candidate for reuse. Building condition, size, configuration and location may make reuse impractical or at odds with installation-wide planning goals. Examples of this situation exist at Moody AFB. Buildings 617, 622, 704, 706, 707, 709 and 798 will be demolished to allow construction of new facilities.

Building 617, the existing Security Force Operations Facility, is one of the oldest buildings on Base. It is functionally obsolete and sited close to the apron. Parking serving the facility does not meet AT/FP standoff requirements. The building will be

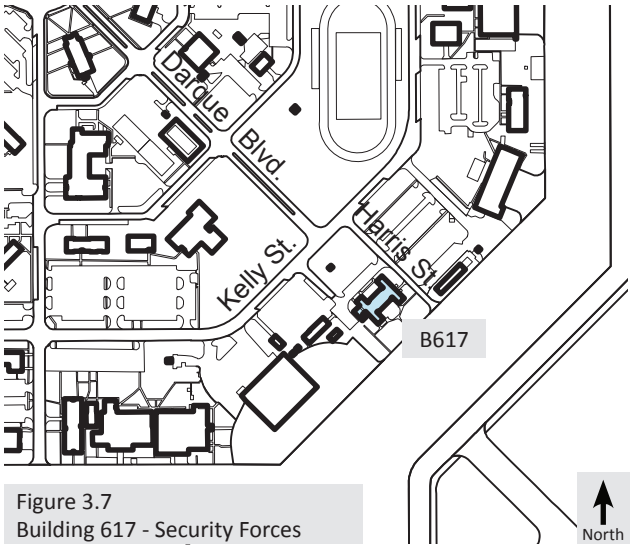


Figure 3.7
Building 617 - Security Forces

demolished when the unit occupying it is moved to different space. The demolition will create an infill site adjacent to the flight line *(see Figure 3.7)*.

Building 622, the existing Base Operations Facility, is functionally obsolete and sited too close to the apron. Parking serving the facility does not meet AT/FP standoff requirements. The existing building will be replaced with a new structure that meets current AT/FP requirements and has proper setback from the apron *(see Figure 3.8)*.

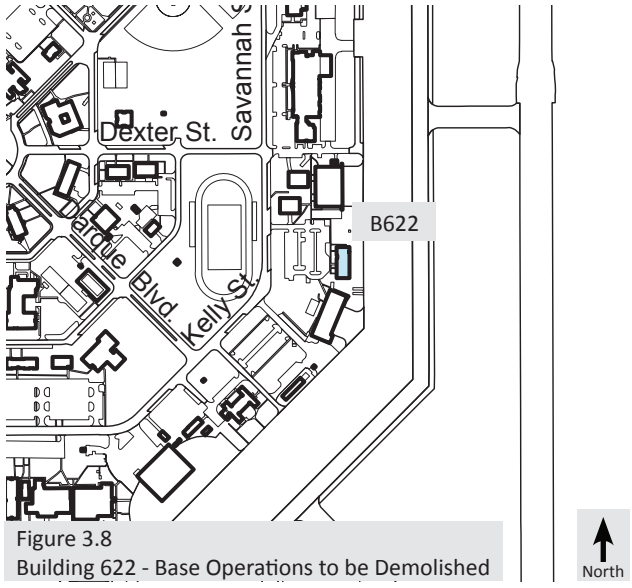


Figure 3.8
Building 622 - Base Operations to be Demolished

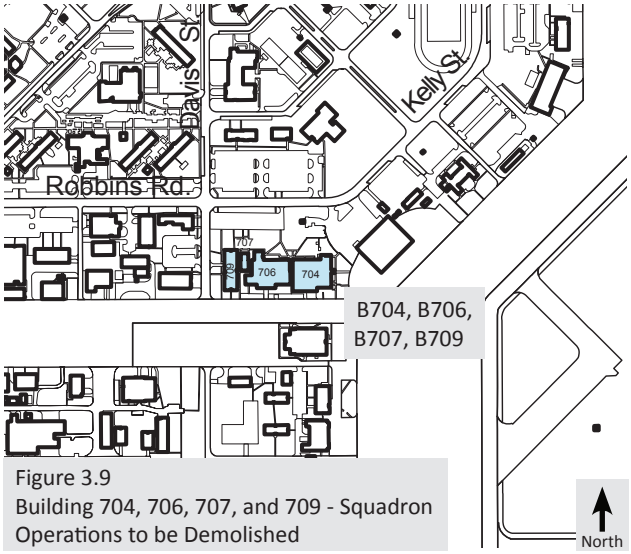


Figure 3.9
Building 704, 706, 707, and 709 - Squadron Operations to be Demolished

Buildings 704, 706, 707 and 709 serve as fighter group headquarters and squadron operations facilities to be demolished. These buildings are functionally obsolete. Parking serving the buildings does not meet AT/FP standoff requirements. The existing buildings will be demolished when the unit occupying them is moved to new space. The demolition will create an infill site adjacent to the back shops area, as well as the flight line *(see Figure 3.9)*.

Building 798 is functionally obsolete. It will be removed to provide an infill site for a new fighter headquarters and squadron operations facility *(see Figure 3.10)*.

Figure 3.10
Building 798 - To be Demolished for New Fight Headquarters and Squadron Operations Facility

[3.2] Infill Opportunities

Moody AFB has been able to maintain its compact area by recycling building sites for new uses. The 23rd Wing Headquarters, AGOW Headquarters and Heritage Park are located on infill sites which once contained administrative buildings. Sections of road were removed to create a campus-like setting for this area *(see Figure 3.11)*. Other successful projects on infill sites include the new Child Development Center *(see Figure 3.12)* located on a former family housing area just north of the Mitchell Boulevard Gate, and the new Temporary Lodging Facility (Buildings 200, 201, and 203) located on the site of the former SVS HR Office (Building 205) on the north side of Mitchell Boulevard *(see Figure 3.13)*. This deliberate reuse of sites already served by roads and utility systems lowers construction costs, reuses existing assets, and has resulted in only a moderate expansion of the main base area since the Base's initial development. Moody AFB has a successful history of using infill sites for new construction projects.

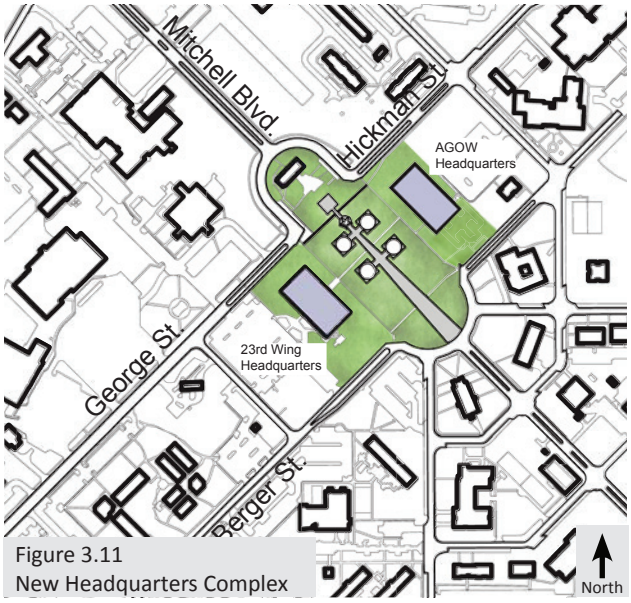


Figure 3.11
New Headquarters Complex

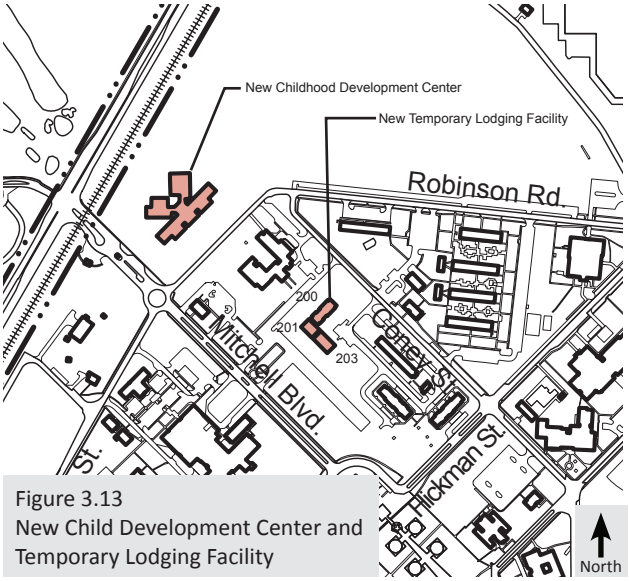


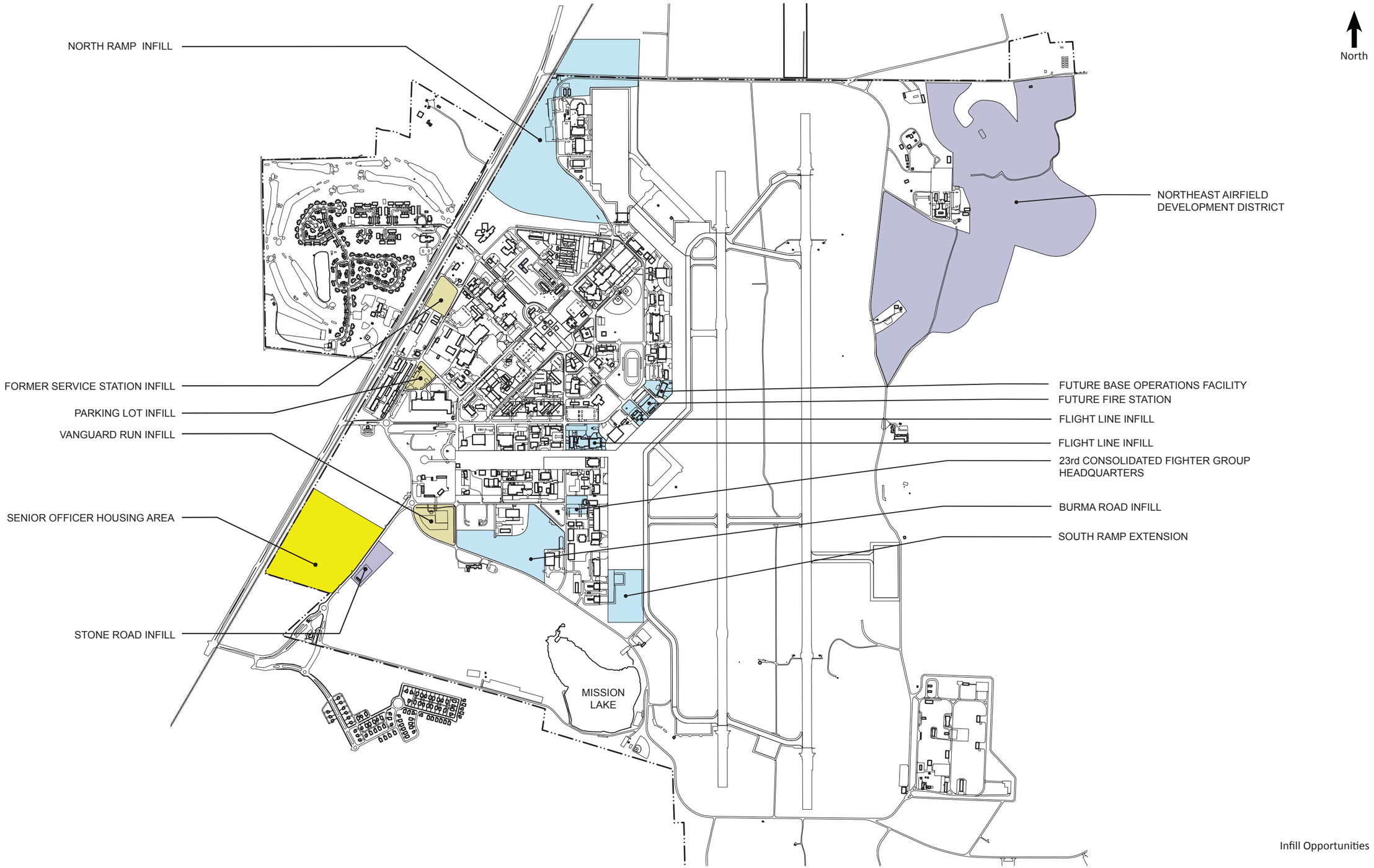
Figure 3.13
New Child Development Center and Temporary Lodging Facility

Additional opportunities exist at Moody AFB to locate new, small and large facilities on infill sites. Base leadership should be strategic in approving how these infill sites will be re-used, since this has large implications on the Base's sustainability and long-term viability for mission expansion.

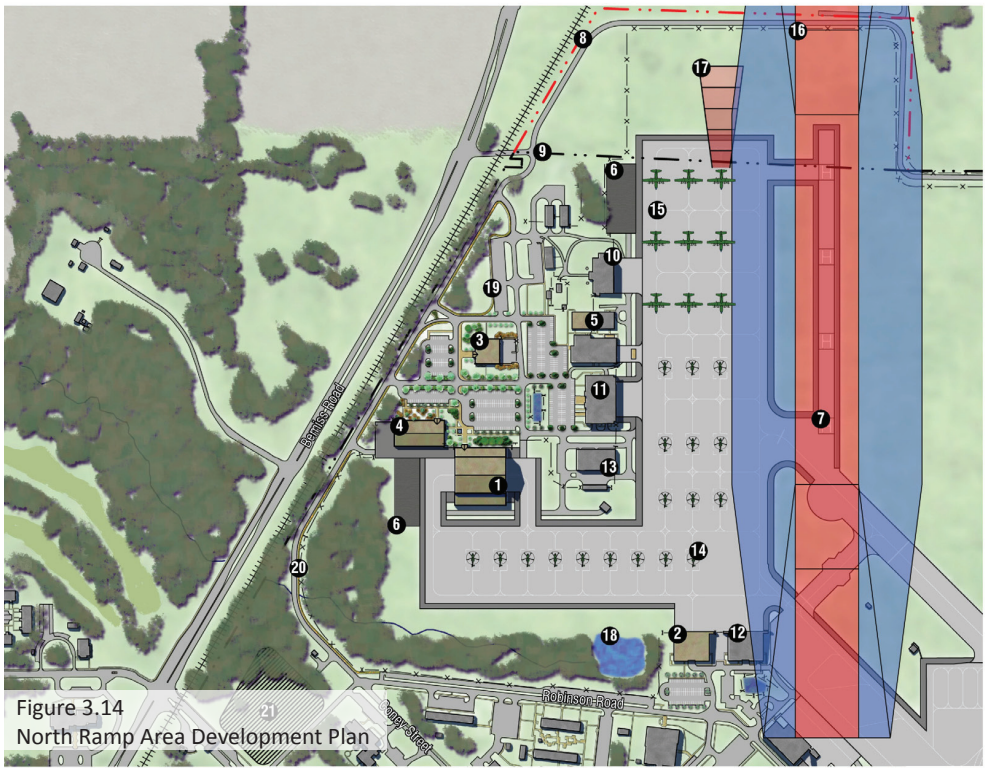
[3.2.1] Proposed Mission-Related Infill Projects

The following mission-related infill projects were identified as part of the Infill Design Charrette,


Figure 3.12
New Child Development Center



Infill Opportunities



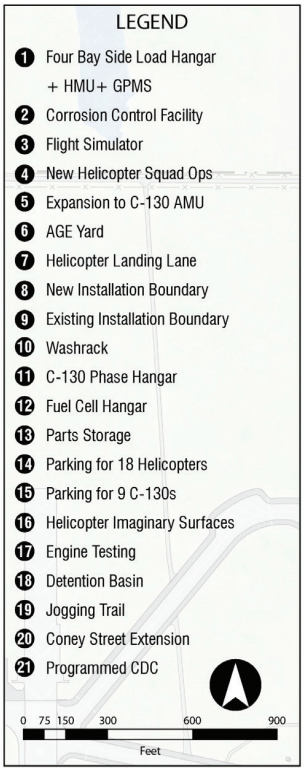


Figure 3.14
North Ramp Area Development Plan

conducted with Base Civil Engineering staff. As infill sites are selected for new uses, consideration should be given to ensuring all siting decisions are in line with Moody AFB's unique mission of housing Combat Search and Rescue (CSAR) and Security Forces for Air Combat Command.

The following discussion of infill sites refers to general geographic areas at Moody AFB where infill opportunities exist. In some cases, the land is vacant or under-utilized; in others existing buildings are nearing obsolescence or have reached functional obsolescence, warranting demolition.

[3.2.2] North Ramp District

This district includes the North Ramp Area. Once implemented, all CSAR aircraft will be located here. A new section of ramp will extend west from the existing ramp, to provide parking for helicopters and aircraft access to a new four-bay side load hangar. Additional buildings will be constructed in this area to support aircraft maintenance and operations. A portion of Burma Road and the existing running path will be relocated to the west *(see Figure 3.14)*.

This infill project expands Base development into a currently vacant area of forested land that includes the headwaters of Beatty Creek. This triangular area is bounded on two sides by the Base, and by Bemiss Road on the third side. Wetland mitigation may be required elsewhere on Base to replace any wetlands impacted by this project.

[3.2.3] Main Base District

Most of Moody AFB's infill projects have involved demolition of functionally obsolete buildings to create available sites. This will remain true for most future infill sites. A few, currently vacant small sites were identified within this area development plan is the main base district which might serve as infill locations.

Former Exchange Service Station Site – An Exchange service station was located south of the water treatment plant on the southwest corner of the intersection of Georgia and Florida Streets. Florida Street extends along the site's northern edge and then turns south to run along the site's western edge. The Base perimeter runs along the west side of Florida Street. Base Civil Engineering facilities exist to its south and transportation facilities to its east. This approximately 3-acre site has a benzene plume that is approximately 30 to 50 feet below the surface. Environmental remediation is currently taking place

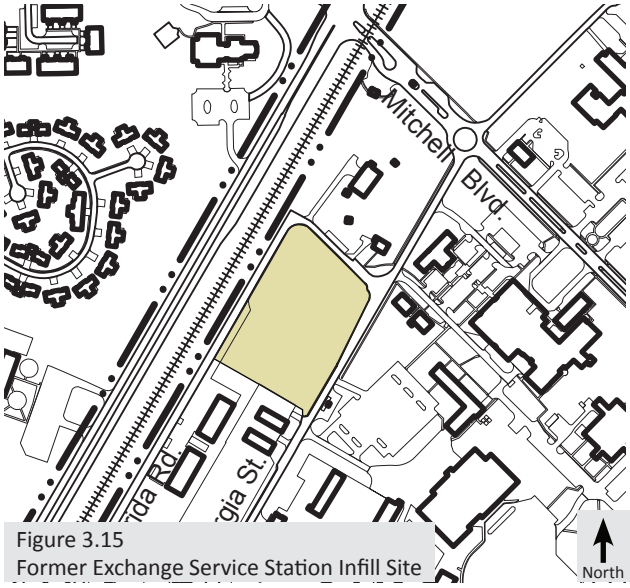


Figure 3.15
Former Exchange Service Station Infill Site

and the presence of the plume should not impact future use of the site. The best use for this site would be industrial, due to its adjacent land uses *(see Figure 3.15)*.

Parking Lot on Southeast Corner of Georgia and Alabama Streets - This area is used for temporary storage by Base Civil Engineering and parking. Other nearby paved areas could be used for temporary storage. This approximately 2-acre parcel contains a parking lot and a small building which houses communications switch gear and Base Civil Engineering functions. This building could be accommodated in the new site design or relocated. The best use for this site would be industrial *(see Figure 3.16)*.

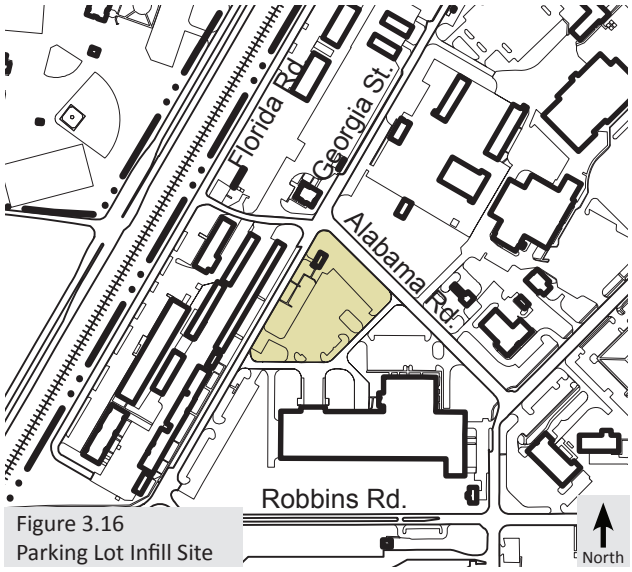


Figure 3.16
Parking Lot Infill Site

[3.2.4] Central Ramp District

New Fire Station Infill Site – A new fire station is planned to be built immediately south of the existing station. The new station will be set back further from the apron. It will occur on the site of the existing Base Operations Facility *(see Figure 3.17)*.

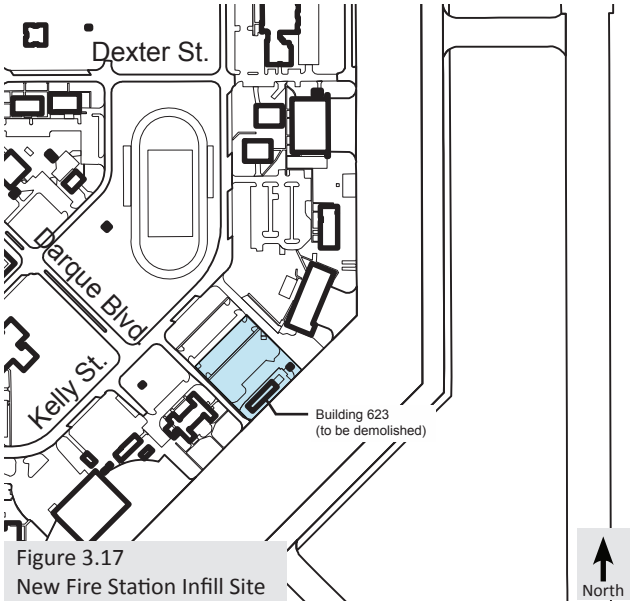


Figure 3.17
New Fire Station Infill Site

New Base Operations Facility – The new Base Operations Facility will be built south of the existing structure *(see Figure 3.18)*.

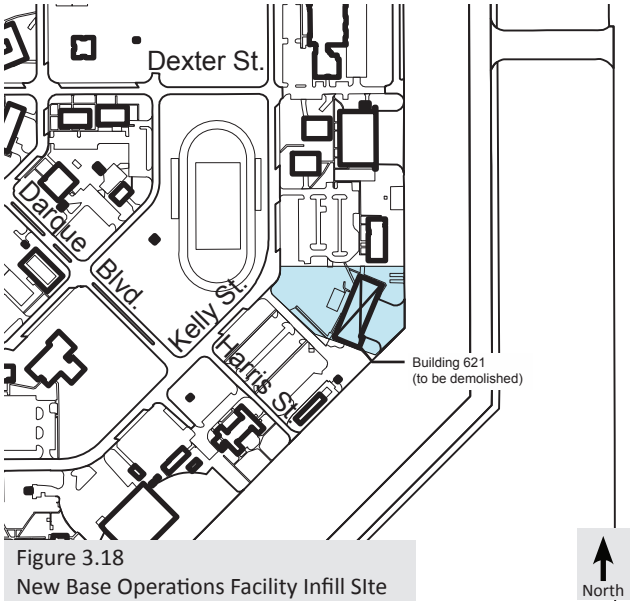


Figure 3.18
New Base Operations Facility Infill SIte

Building 617 Site – The demolition of this building in the future will create an infill site adjacent to the Central Ramp. The new facility on this 2-acre site should serve the flight line *(see Figure 3.19)*.

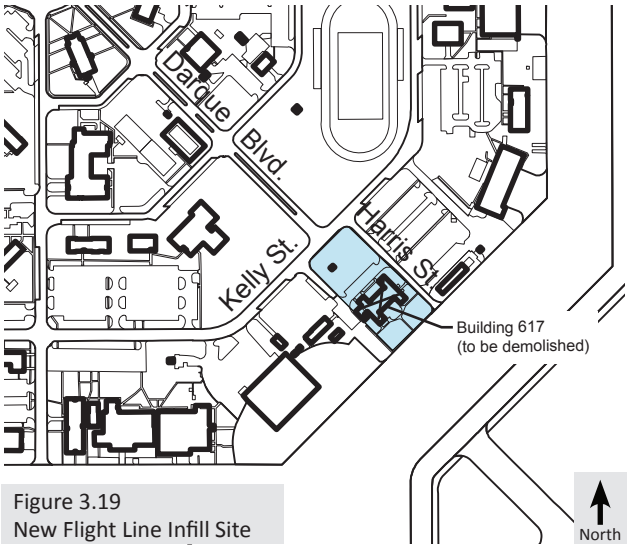


Figure 3.19
New Flight Line Infill Site

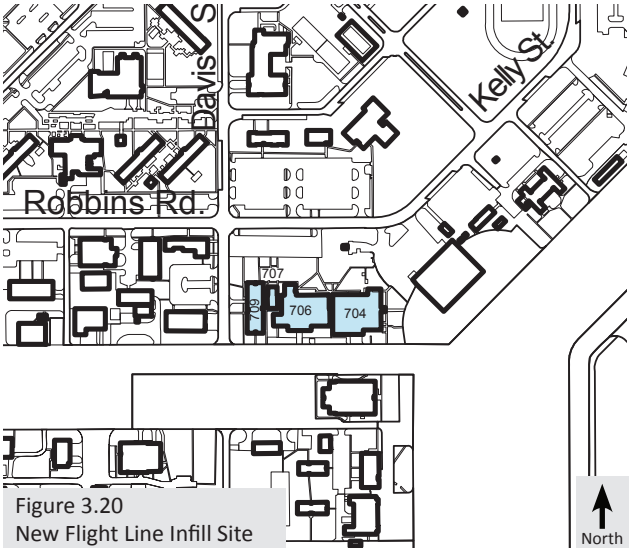


Figure 3.20
New Flight Line Infill Site

Buildings 704, 706, 707 and 709 Site – The buildings on this site are functionally obsolete and their demolition will create a prime development site of 5-acres that is located along the back shop apron yet close to the Central Ramp. The site's new use should serve the flight line *(see Figure 3.20)*.

[3.2.5] South Ramp District

This district includes the back shops apron and South Ramp. The airfield is its eastern boundary and Burma Road forms its southern and western boundary.

23rd Consolidated Fighter Group – An Area Development Plan has been prepared for a portion of this district, which focuses on selecting a location for the 23rd Consolidated Fighter Group Headquarters and Squadron Operations Facility. The preferred location for this complex is near the intersection of Vanguard Run and Flying Tiger Road. This new facility would be located in the "backyard" of the flight line maintenance facilities. Building 798 will be demolished, since it occupies part of the infill site *(see Figure 3.21)*.

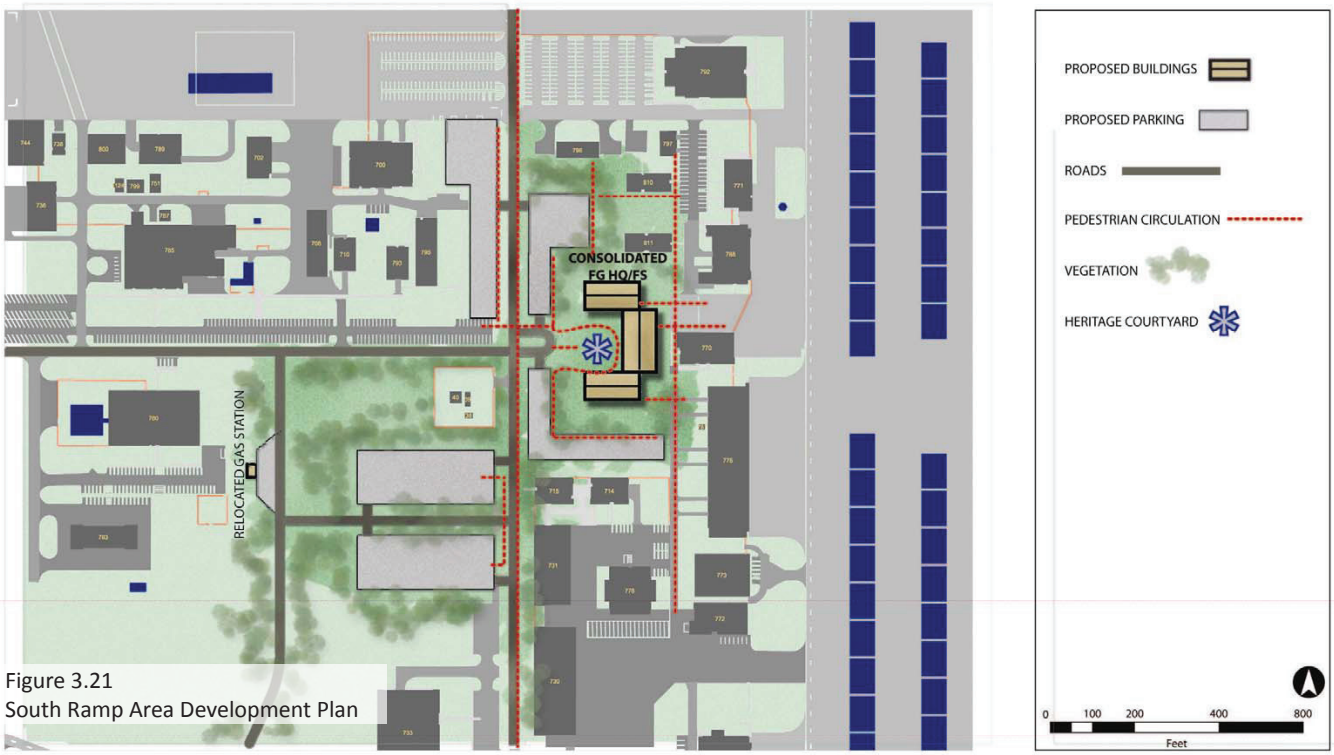


Figure 3.21
South Ramp Area Development Plan

Figure 3.23
Aircraft Shade Shelters

South Ramp Extension – Vacant land exists at the South Ramp's southern end. The ramp could be extended to provide additional space to park and service aircraft *(see Figures 3.22 and 3.23)*.

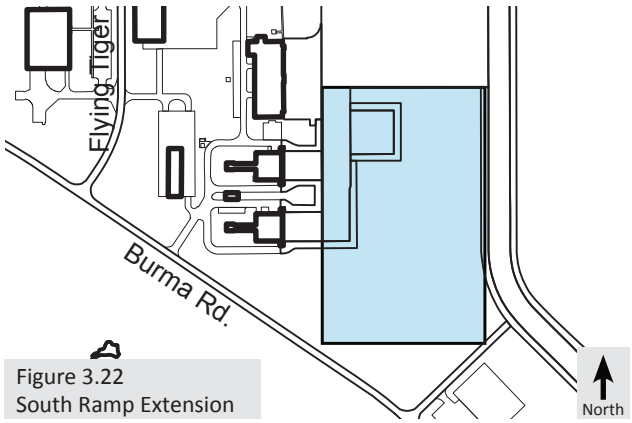


Figure 3.22
South Ramp Extension

Vacant Land between Vanguard Run and Burma Road – An irregular-shaped, 27- acre site exists on the southern edge of the industrial area that could be used for back shop or flight line-related infill.

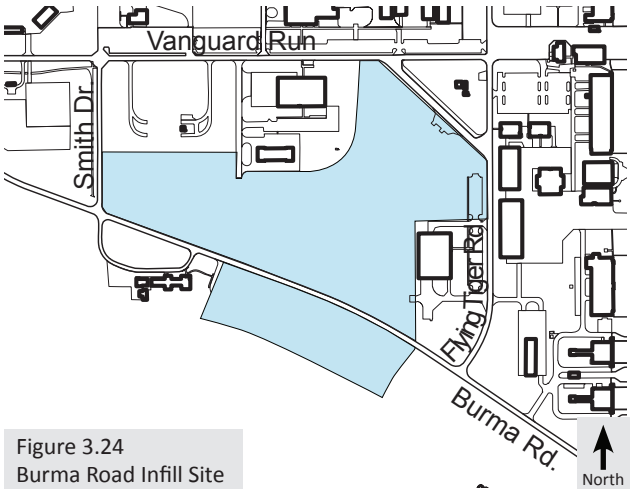


Figure 3.24
Burma Road Infill Site

Building 724 was recently constructed on the east end of this parcel. Additional infill projects could be sited in this area since it has direct access to either Burma Road or Vanguard Run *(see Figure 3.24)*.

Vanguard Run RV Storage Lot – This 6-acre site could be used as an infill site for industrial or back shop facilities. A band of the mature pine forest should be preserved where the site abuts roads. The RVs stored at this location, along with those stored at the Stone Road RV lot, could be consolidated into a single RV storage facility. Locations suggested for the consolidated RV lot include the areas on either the east or west sides of the working dogs facility on the south side of Burma Road, or along the north side of the Hidden Lake Road west of Mission Lake *(see Figure 3.25)*.

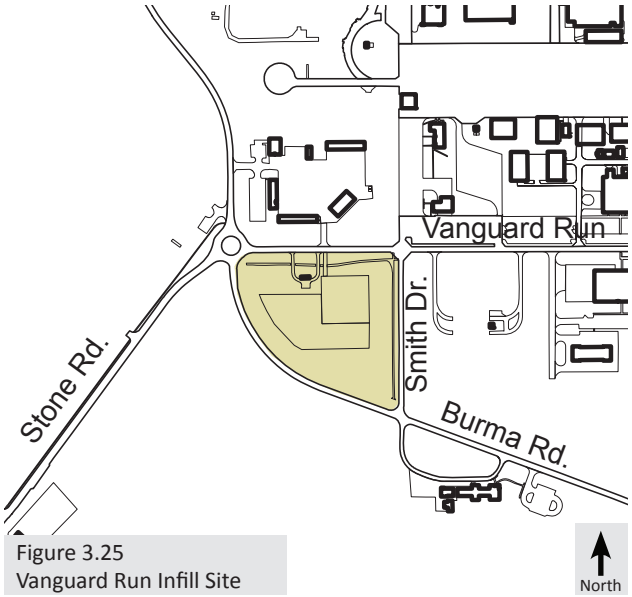


Figure 3.25
Vanguard Run Infill Site

[3.2.6] Stone Road District

This district includes the area along both sides of Stone Road from the new gate north to Burma Road. Two infill opportunities exist along the road. The forested area east of the road contains a former landfill, potentially limiting development in that area.

Senior Officer Housing Area – A forested area bounded by Bemiss Road on the west and Stone Road on the east that is immediately north of the new Stone Road Gate is planned to become an on-Base housing area for senior officers. These units will replace the senior officer housing units that were demolished to provide the site for the new Child Development Center. This area is contiguous with the main base and has the potential to use Low Impact Development (LID) techniques for stormwater management. The existing forest can be preserved around the housing area, to shield it from view. The design of this housing area should incorporate and respond to the wetlands within the 36-acre site *(see Figure 3.26)*.

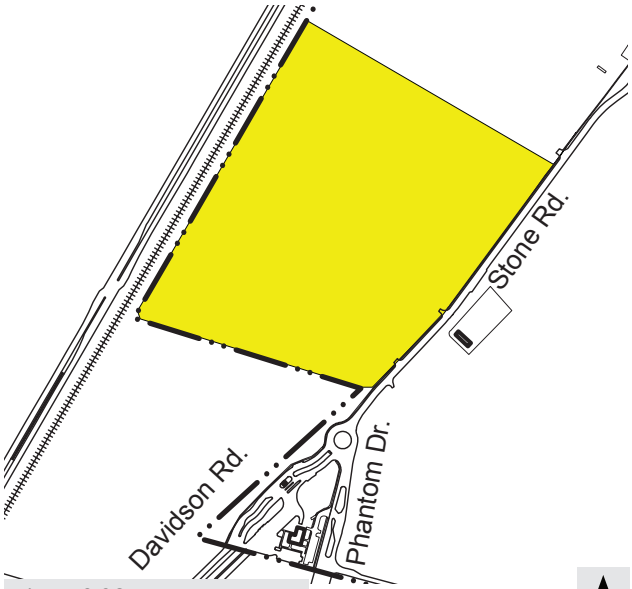


Figure 3.26
Senior Officer Housing Area

Stone Road RV Storage Lot – This site could be used as an infill site for a community service or administrative use. Due to the site's high visibility and location near the Stone Road Gate, the visual character of a facility sited here should be carefully considered. The RVs stored at this location, along with those stored at the Vanguard Run RV lot, could be consolidated into a single RV storage facility *(see Figure 3.27)*.

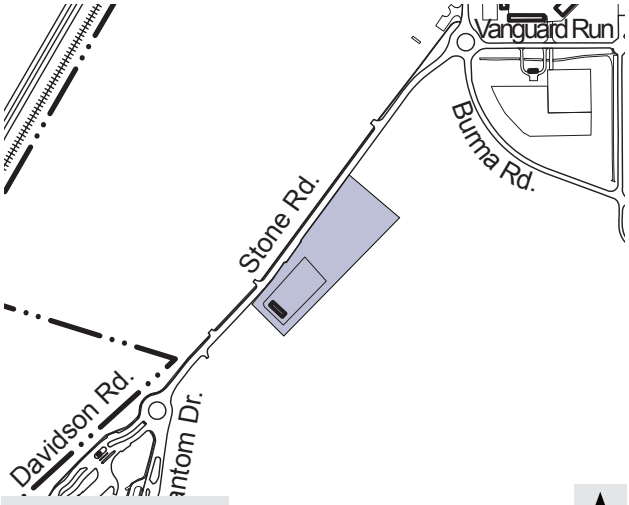


Figure 3.27
Stone Road Infill Site

[3.2.7] Northeast Airfield Development District

A large area of land exists on the northeast corner of the airfield adjacent to the 820th Security Forces complex, which could be developed to bed-down a new or expanded existing mission at Moody AFB. The approximately 185-acre site is bounded on the west edge by the 820th Security Forces facilities, on the north edge by the Base property line, and the east and south edges by wetlands. The southern portion of this site is believed to serve as habitat for the gopher tortoise, which is a Species of Concern for the State of Georgia. Locating new facilities on this side of the airfield would need to take into account the operations of the 820th Security Forces administrative and training activities that occur in this area *(see Figure 3.28)*.

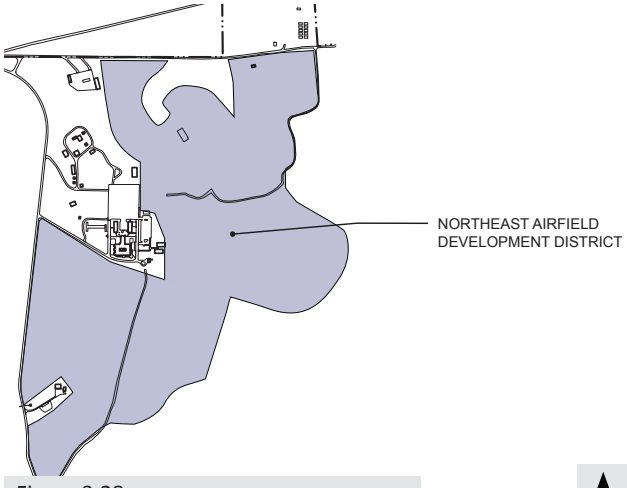


Figure 3.28
Northeast Airfield Development District

[3.3] Circulation

[3.3.1] Vehicular Circulation

Moody AFB's dense main base area and adjacent airfield aprons create an efficient on-Base circulation system. Truck traffic serving flight line and industrial operations can easily reach these destinations without having to pass through areas with administrative and community facilities. Commercial vehicles currently enter the Base at the Robbins Road Gate and can proceed directly to the flight line, supply/mobility warehouse or Exchange/Commissary complex. When the new Stone Road Gate is opened, this pattern will remain, with improved access to the southern flight line facilities along Vanguard Run and Lancers Lane.

Several traffic calming projects have been implemented to improve traffic flow and safety. Roundabouts have been located at four key intersections. One roundabout is immediately inside the Mitchell Boulevard Gate where the Boulevard intersects with Georgia Street and Robinson Road. A similar roundabout occurs just inside of the Robbins Road Gate where Robbins Road, Burma Road and Georgia Street intersect. Both roundabouts appear to improve traffic flow in and out of the gates during peak traffic flow *(see Figure 3.29)*.

The other two roundabouts occur on the section of Burma Road and Stone Road that connect to the new Stone Road Gate. The roundabout nearest to the new gate allows vehicles to either double-back to the south and enter one of the Base's family housing areas, or proceed north to reach the main base. The design of this roundabout implies that the path to the main base is the road leading to the north. A second roundabout occurs where Stone Road intersects with Burma Road and Vanguard Run. Mature forest surrounds this area, blocking views of the main base. The roundabout's configuration requires the motorist to travel about 270 degrees around the roundabout to continue north to the main base. The fact that two legs of Burma Road intersect with this roundabout may cause confusion for visitors and others not familiar with the Base road system.

Figure 3.29
Roundabout

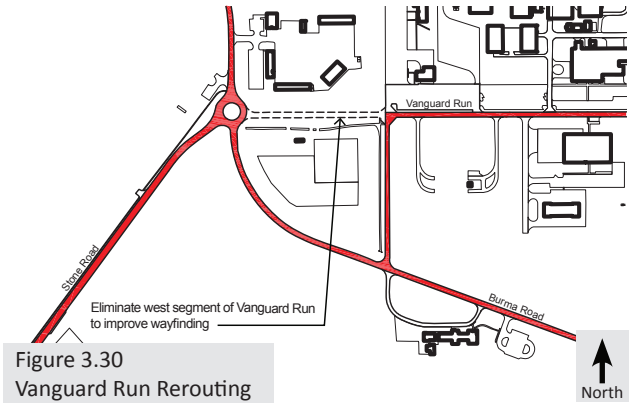


Figure 3.30
Vanguard Run Rerouting

To reduce the chance of confusion and to improve intuitive wayfinding, consideration should be given to re-routing the leg of Vanguard Run which currently intersects with the roundabout, to instead intersect with Burma Road east of the roundabout *(see Figure 3.30)*. This would make the layout of this roundabout very similar to one near the Stone Road Gate, assisting motorists in finding their way. As a motorist continues northbound from the second roundabout, the airfield comes into view to the right, providing a point of orientation prior to reaching the Robbins Road roundabout. When motorists arrive at the Robbins Road roundabout, the landscape median on Robbins Road indicates that it is the primary route extending into the Base's central area from this roundabout *(see Figure 3.31)*.

Traffic calming improvements near the Base's center have creatively reused former street rights-of-way and provided streetscape improvements adjacent to Heritage Park. When the new Freedom Fitness


Figure 3.31
Robbins Road Landscape Median

LEGEND

- PRIMARY ROAD
- PRIMARY ROAD - OFF BASE
- SECONDARY ROAD
- MINOR ROAD

Existing Vehicular Circulation Map

Center was constructed, a segment of Burrell Street was eliminated and a new parking lot constructed on the former street alignment. The parking lot allows for passage from Gardner Street to Savannah Street, but requires that the motorist take several 90 degree turns *(see Figure 3.32)*. Segments of Mitchell Boulevard were similarly removed to create a new green space at the Base's center. This space includes a static display of heritage aircraft. Motorists driving through this area are routed around the ends of the ellipse that was created by the street removal.

Landscape medians extend the entire length of Mitchell and Dargue Boulevards. Similar medians extend one block from Heritage Park on George, Hickman, Burrell and Berger Streets. These medians visually decrease the street width which causes most motorists to slow their speed.

Figure 3.32
Freedom Fitness Center Parking Lot

A recent traffic calming project replaced a section of Woolsley Street between Davis and Berger Streets with a pedestrian plaza. This project eliminated a former road with on-street parking that ran through the south Airmen's Dormitory campus. Removing this street allows airmen to walk from the area's dormitories to the dining hall or bowling alley without crossing a street.

A review of traffic calming opportunities should be conducted for the first block of George Street from Robbins Road north to Alabama Road. George Street makes a sharp right bend at the Alabama Road intersection. That intersection has full traffic movements, including left and right/straight lanes out of the Shoppette parking lot. This coupled with two wide drive approaches on George Street's west curb line to serve parking for the Envision Store and Building 934, potentially allow a large number of traffic movements in a small section of road. This issue is most apparent for eastbound vehicles on Alabama Road. Consideration should be given to narrowing the drive approaches to better define the west curb line. Further consideration should be given to adding speed limiting devices on George Street, which would slow both north and south bound traffic. Converting the full-movement intersection to a "T" intersection, with access only to George and Alabama Roads, could also be considered.

Robbins Road, Kelly Street and Savannah Street run along the flight line separating it from the remainder of the Base. This route provides direct truck access to flight line facilities on the central and north ramps. Vanguard Run and Lancer Lane provide similar truck access to the industrial and flight line facilities on the Base's south ramp and service way. Burma Road provides access to the facilities on the east side of the airfield. Trucks needing to travel on this road can easily access it either from the Robbins Road or the new Stone Road Gates. Changing the commercial vehicle entry point to the new Stone Road Gate will not impact any of these access routes.

Moody AFB has a history of successfully removing minor, low-use streets to create larger, contiguous parcels for infill projects. In addition to the examples cited previously, the removal of a one block long section of Woolsley Street created a location for the newest Airmen's Dormitory. Similarly, sections of Wagner Street that ran north of Dexter Street were removed to allow construction of the Freedom Fitness Center II and adjacent ballfields. The removal of these unneeded street sections reduces long-term maintenance costs, creates a net decrease in the amount of impervious cover on Base, decreases the volume of stormwater from Base paved areas, and provides opportunities for infill development to occur.

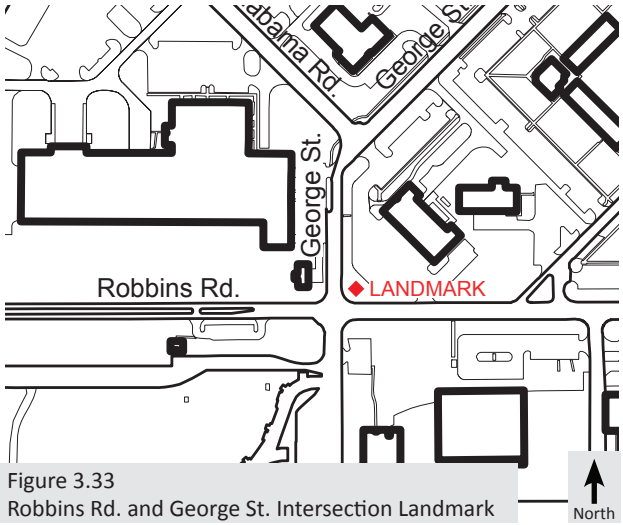


Figure 3.33
Robbins Rd. and George St. Intersection Landmark

Wayfinding, as discussed in the Installation Image section, is an issue for visitors and new residents. Creating a simple wayfinding signage system to ensure that visitors and motorists can easily find their way to key community and administrative facilities would benefit the Base. Due to the relatively large number of community and administrative facilities along George Street, a landmark is needed where it intersects with Robbins Road to direct motorists to those facilities *(see Figure 3.33)*.

Figure 3.34
Typical Off-Street Parking

Parking

Most parking on Base occurs in off-street parking lots. On-street parking occurs along some sections of streets near the south Airmen's Dormitory campus and on scattered sections of streets near some administrative and community facilities. Base Civil Engineering has removed on-street parking as streets have been reconstructed. However, in some cases adequate available space to build off-street parking does not exist. Parking for new facilities is designed to meet AT/FP standards. Base Civil Engineering has relocated existing parking which did not meet AT/FP standards for some existing facilities. Base Civil Engineering intends to relocate all non-conforming parking as funding becomes available *(see Figure 3.34)*.

The amount of parking on Base appears to be more than adequate. Ensuring that an adequate but not excessive amount of parking exists on Base is challenging, as mission and building use changes. New parking lot construction should be limited to meet requirements, and no more. Preferred parking near building entrances for car/vanpools and low-emitting vehicles should be included in all new construction projects. This strategy could also be applied to existing lots when they are restriped. It is typical to set aside five percent of total stalls for each of these user groups. This follows the intent of LEED. One additional strategy to consider is installing bicycle racks at all facilities to encourage biking to work and community facilities, and for recreation. This simple improvement would enhance the Base's sustainability, lower its carbon footprint, and help decrease both stormwater runoff and heat island effect.

- *Continue installing traffic calming features to improve traffic flow and safety where needed*
- *Consider possible traffic calming options for the first block of George Street, north of Robinson Road*
- *Consider realigning west end of Vanguard Run, to intersect with Burma Road instead of the existing roundabout*
- *Consider adding a landmark or roundabout at the intersection of Robbins Road and George Street to better direct traffic to the community and administrative core*
- *Annually review minor low-use streets for possible removal*
- *Remove any unneeded streets when infill or redevelopment occurs*
- *Continue to relocate parking which does not meet AT/FP standoffs as funds permit*
- *Remove excess and underutilized parking as funds permit*
- *Set aside 5% of parking for car/vanpools and 5% of parking for low-emitting vehicles in new and restriped lots*
- *Provide secure bicycle racks at all facilities*

[3.3.2] Pedestrian Circulation

Walkways occur inconsistently across the Base. Areas well-served by a system of sidewalks suddenly transition to areas with inconsistent coverage or a total lack of walks. Continuous walks don't extend to highly-used community facilities like the new Shoppette, Exchange or Commissary. Key sections of walks are missing that should connect the north and south Airmen's Dormitory campuses to these facilities as well as to the Base's medical facilities.

Along the flight line and in industrial areas, the only walks present connect parking lots to building entries. These areas lack a system of walks which could be used by Airmen to walk from either dormitory campus to nearby portions of the flight line. While these walkways may never be heavily used by airmen who work on the flight line, their absence implies every person on Base should drive every time they move from one facility to another.

Sidewalks paralleling one or both sides of streets provide an alternate transportation mode, as well

Figure 3.35
South Airmen's Dormitory Complex Plaza

as encourage recreational use by on-Base residents and those who work in an area. Making walking and bicycling on-Base attractive and efficient reduces the need for expensive and expansive vehicle transportation improvements. It also encourages active and healthier lifestyles. Due to seasonal weather conditions, all walkways won't be used every day of the year, but when they are used, they contribute to a more sustainable and greener installation *(see Figure 3.35)*.

The concept of creating multi-modal streets that accommodate pedestrians, cyclists and motorists is termed "Complete Streets". A national non-profit organization exists to assist communities and military installations to implement this concept. The organization is called the National Complete Streets Coalition. The Coalition website address is www.completestreets.org. The website provides information on complete street fundamentals, best management practices and training opportunities for professional staff and citizen advocates.

Adding regularly-spaced trees or clusters of shade trees periodically along streets will provide shade for pedestrians and increase use. Street trees are most appropriate in areas away from the airfield and flight line, to minimize the potential for BASH incidents. Placement of benches with shade trees at key locations along the walk system again provides an amenity and contributes to an improved walking experience, which in turn encourages greater use.

Figure 3.36
Sidewalks Set Back from Curb

In some cases at Moody AFB, walks along streets are set back from the curb. An excellent example of this is the walk on the north side of Robbins Road between Georgia and George Streets. This provides a safer and more pleasant experience for the pedestrian *(see Figure 3.36)*. Where space allows, varying the distance from the walk edge to the street curb can improve the visual character of the walk and make using it more interesting, by creating a walk with long, sweeping curves.

Walkways in the areas surrounding the Exchange/ Commissary complex provide pedestrian access to the edge of the parking areas, but the complex lacks an internal walk system to bring people to the store entries. Pedestrians are forced to weave through parking stalls to get to the buildings. This condition is especially dangerous for persons with disabilities who use a wheelchair or other mobility devices, because they are less visible among cars in the lot.

- *Adopt and apply a "Complete Streets" philosophy to all Base streets*
- *Provide five-foot wide walks on each side of street along most streets, with at least a walk on one side along the flight line, in industrial areas, and along low-use streets*
- *Perform a "gap analysis" on all Base streets to create an inventory of locations where walks are missing*
- *Add walks to existing areas where they are lacking, to connect areas well-served by walks*
- *Require all new construction projects to include walks throughout project site, as needed*
- *Provide shade along walkways with trees and provide benches for resting*
- *Move walks away from road edges where space exists, to improve the walking experience*
- *Ensure that a complete walkway system exists within the main base, allowing base residents and workers to walk to work, take a stroll during a lunch hour, or go to the store*

[3.3.3] Base Trail Circulation

Moody AFB lacks a comprehensive trail system that could provide an alternate means of transportation for Base residents and create an on-Base recreational amenity. This trail system would be comprised of

LEGEND

- EXISTING BASE TRAILS / RUNNING PATH
- PROPOSED CONNECTOR TRAILS
- BASE RUNNING TRACK

Pedestrian Circulation Map

Figure 3.37
Airfield Running Track

shared-use trails which allow use by pedestrians, runners, bicyclists, in-line skaters and persons using mobility devices. This system should follow major streets where feasible.

At Moody AFB it would be appropriate to extend a shared-use trail along Robbins Road, Kelly Street and Savannah Street, on the side opposite the flight line. This trail would connect with the ends of the running path that extends around the airfield along Burma Road. A spur from this trail could extend west along Robinson Road, to connect the north Airmen's Dormitory campus and the temporary lodging facilities to the existing path. The Robinson Road spur could continue west to the Mitchell Boulevard Gate.

Similarly, an extension could be constructed to the Robbins and Stone Road Gates, to encourage the use of bicycles as an alternate transportation mode. An opportunity would exist at the Stone Road Gate to extend the trail to serve the Magnolia Grove Family Housing area. A running path system that runs in the Whispering Pines Family Housing area could be upgraded to serve as a shared-use trail system that could be connected to the Base via the Mitchell Boulevard Gate. A crossing signal would be required on Bemiss Road to provide a safe connection between the housing area and Main Base. Creating this connection would provide a safer route for Whispering Pines residents who would like to commute to work on Base or utilize community facilities on Base.

A trail through the center of the main base might be possible, along the west side of Berger and Burrell Streets. This trail would pass the Freedom Fitness Centers I and II, providing a connection to the airfield running path *(see Figure 3.37)*.

Most similar trails of this type have an 8 or 10-foot width and require a corridor that is two to three times the trail width. In some locations, a new 10-foot-wide trail would replace a 5-foot wide walk along one side of the major streets. The new trails should be setback from the curb and separated from the existing roads by green space where possible *(see Figure 3.38)*.

Figure 3.38
Shared Use Trail

Figure 3.39
Base Trail

Tree clusters should be added along the trails, or shade structures should be provided, to create areas for trail visitors to get out of the sun. When considering adding plantings along trails, review locations in light of BASH issues, to avoid creating aircraft operation hazards. Signage should show the layout of the trail system and include information on trail routes and lengths. With this information, visitors can select an appropriate trail to enjoy during their first visit. As their familiarity with the area increases during repeat visits, they can explore more of the trail system *(see Figure 3.39)*.

Alignments for the proposed trails are shown on the Pedestrian Circulation Map.

- *Study the proposed trail concept further to determine its feasibility and confirm that these are the best routes*
- *Incorporate shared-use trails along one side of all major streets in all future design projects*
- *Consider providing trail signage to encourage greater use of trails*
- *Provide tree clusters or shade structures along trails. Consider BASH issues in all planting designs*
- *Provide trail parking areas and information signs on trail grades and lengths*
- *Install bicycle racks at Base destination points*

[3.3.4] On-Street Bike Trails

The creation of on-street bike trails should be explored at Moody AFB. Implementing a "share the road" system could increase bicycle commuting and decrease the number of intra-base vehicle trips. While the perception is that existing roads are too narrow to accommodate both bicycle and vehicle traffic, a planning process that includes interested bicyclists could identify potential bike routes and set the stage for a mind change on this topic. If installations without daily public transportation are to be sustainable, new approaches to intra-base transportation have to be explored *(see Figures 3.40 and 3.41)*.

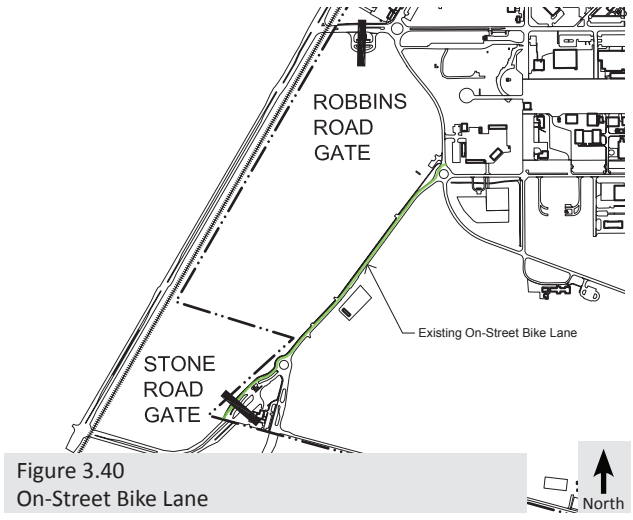


Figure 3.40
On-Street Bike Lane

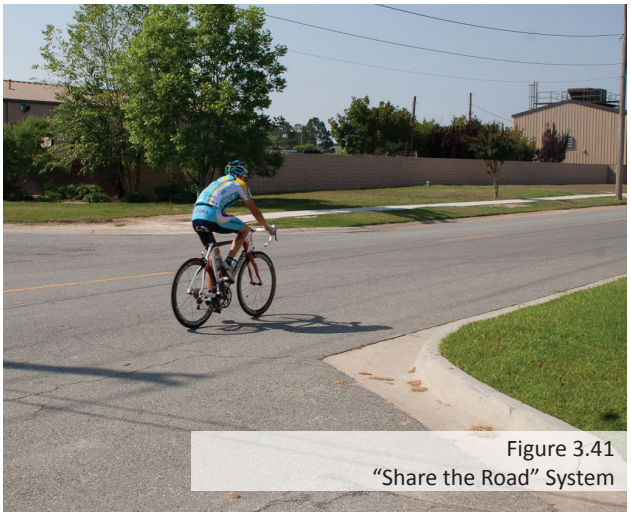


Figure 3.41
"Share the Road" System

The creation of a system of on-street bike lanes with sidewalks following the same routes may be more feasible than creating a shared-use trail system. Further study is needed to determine which option would work best at Moody AFB to provide a multi-modal transportation system *(see Figure 3.42)*.

- *Complete an in-depth study of how best to provide multi-modal transportation at Moody AFB*
- *Develop a "share the road" on-street bike trail system if determined to be feasible*
- *Create Commander's Bike-Pedestrian Committee to foster off- and on-street trail development on-Base*

Figure 3.42
Shared-Use Trail

[3.4] Utilities

Power, communications, natural gas, potable water, and sanitary sewer services are available throughout the Installation's developed areas. Utilities on Base generally parallel roadways. There are no identified constraints regarding the availability of utilities relative to current use levels or planned future expansion *(see Figure 3.43)*.

Electric power for the Base is supplied by Colquitt Electrical Membership Corporation (CEMC) from the Oglethorpe Power Corporation. The Base has a single substation that is supplied by two feeders that are on the same circuit, but come from different directions. On-Base distribution of power occurs using a collection of overhead and underground electrical distribution lines that form five circuits. The circuits are phased and can be interconnected to allow loads to be swapped if one circuit fails. Existing above ground power lines will be placed underground as funding becomes available. Standby power systems exist for many critical operation facilities. Load shedding generators are used at eight facilities to reduce utility costs, by reducing demand at peak times during the year.

Natural gas is supplied to Moody AFB through a Defense Energy Support Center managed contract. The Base has replaced approximately 90% of the original steel supply piping with polyethylene piping. The Base has a propane-air mixing plant to allow it to supplement the natural gas supply during times of high demand. Plans exist to extend the gas main loop around the airfield, to eliminate remote propane systems.

Potable water is provided by an on-Base water system supplied by wells with treatment by a nanofiltration plant. The three potable water wells have the capacity to provide 0.83-million gallons per day (MGD). A looped main system serves all areas of the Base including remote facilities on the airfield's east side. Potable water is used for some landscape irrigation systems, however the newest irrigation systems on Base use reclaimed water. The irrigation system for the Base golf course is supplied by a well that serves only that purpose.

Wastewater treatment services are provided by a Base-owned and contractor-operated wastewater treatment plant. This treatment plant was constructed in the 1940s and extensively upgraded in 1995. The treatment plant's permit allows discharge at an average rate of 0.75 MGD with a maximum of 1.125 MGD. The Base has rehabilitated existing sewer lines to reduce inflow and infiltration. This eliminated overflows and surcharges at the plant. Repairing the degraded lines decreased the volume of water being sent to the plant and lowered on-going operations costs. Additionally, there are seven septic systems around the Base that serve remote facilities. The Base meets all treated wastewater requirements.

The Installation's stormwater drainage system is discussed in Section 5.1 SUSTAINABLE DEVELOPMENT AND HIGH PERFORMANCE GREEN BUILDINGS.

Figure 3.43
Solar-Powered Street Light

[3.5] Land Use

Land uses at Moody AFB are fairly consistent within the main base. Moody's largest land use, the flight line and airfield, wrap around the main base's eastern edge. A belt of permanent green space separates the central portion of the flight line from adjacent community, administrative and residential areas. This green space was created by removing obsolete buildings in the area and reusing the sites for either outdoor recreational facilities or landscaped open spaces. The green space buffers noise and decreases glare resulting from airfield operations, and provides convenient areas on-Base for sports fields, running track and open space.

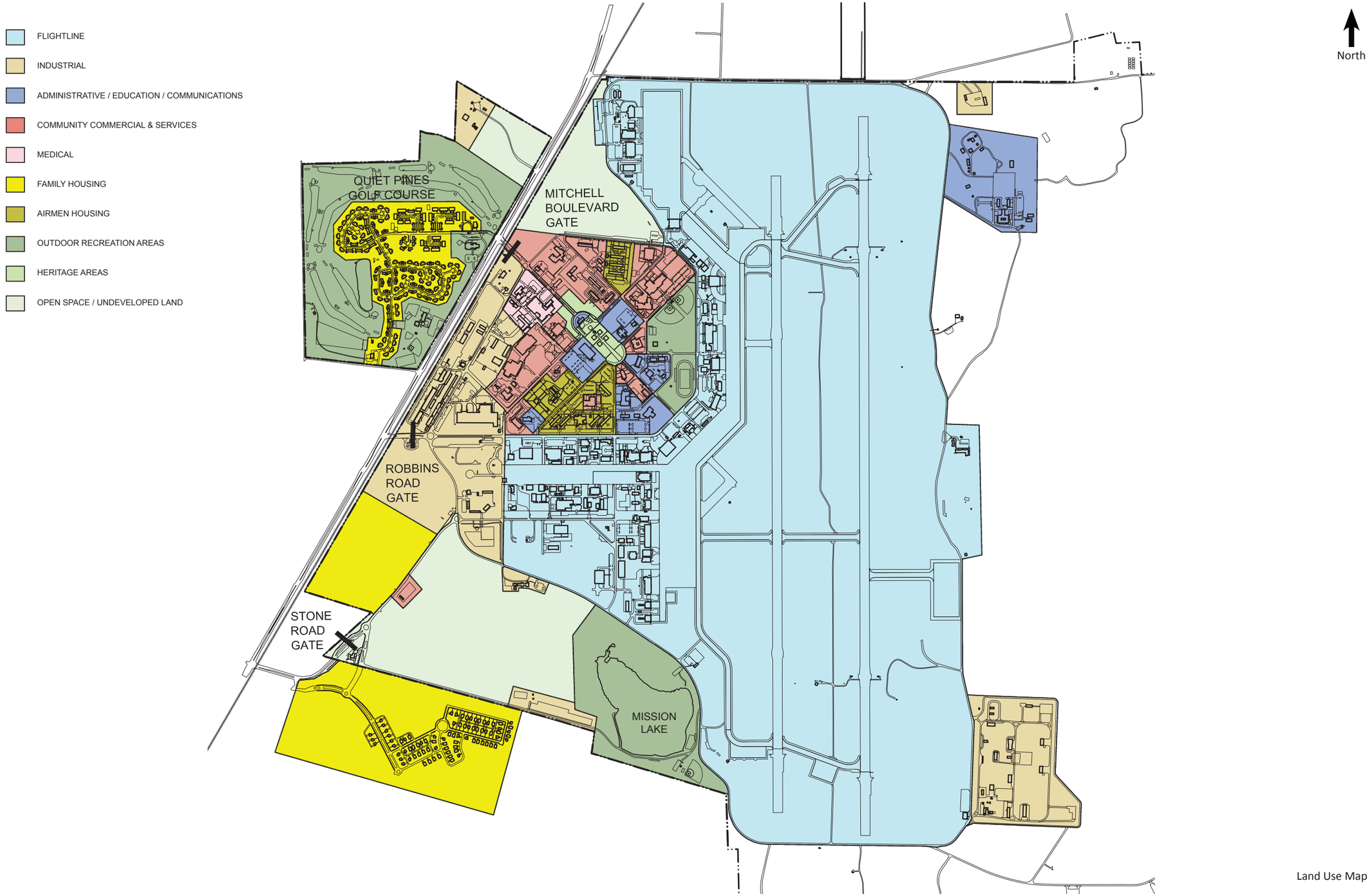
The Base's administrative, community commercial and services, and on-Base Airmen housing areas are arranged to form blocks of similar use within the main base. It appears that land use at Moody AFB has been carefully considered as old facilities have been removed and new facilities have been sited. The two Wing Headquarters flank Heritage Park at the base's center. Community and medical facilities form an arc around the west side of this important land use. The two Airmen's Dormitory campuses flank the central administrative area. Administrative uses related to flight line operations occupy the remaining southeast portion of the main base. Open space and landscaping provide buffers between adjoining land uses and screen views.

The Base has done a good job in selecting sites to relocate existing units and bed-down new missions. Vacant land exists near the north ramp, which has been reserved for an expansion of units located there. Similarly, vacant land exists on the southern edge that would allow expansion of the adjacent industrial land use. These areas should be reserved for future growth of these missions. A large vacant area exists on the northeast corner of the airfield adjacent to the 820th Security Forces complex, which could be developed to bed-down a new or expanded existing mission at Moody AFB. This large site could be used for a single large mission or several smaller units. The impact on training activities for the 820th Security Forces should be a prime consideration when evaluating new uses for this area.

Ordnance storage occurs on the airfield's southeastern corner. The Base's hot cargo pad is immediately to the north, and the Base CATMA and range control facilities are to its east. These land uses are related and compatible. Due to the presence of adjacent wetlands, there is little potential for additional facility development in this portion of the Base.

Land use patterns at Moody AFB demonstrate the benefits received from carefully siting new facilities and mission. The challenge at Moody AFB is to continue this tradition. Due to its compact main base and limited infill and expansion capabilities, leadership at Moody AFB needs to carefully review alternates and trade-offs when considering changes to the existing land use pattern.

- *Examine capability and opportunity costs for potential new land uses within the cantonment area*
- *Continue to reserve the expansion area near the North Ramp for missions located there*
- *Continue to reserve the expansion area between Vanguard Run and Burma Road for land uses compatible with existing flight line back shop and industrial uses*
- *Reserve the airfield east side expansion area for a new mission that will complement the two current Wings and improve the sustainability of Moody AFB*


FLIGHTLINE
INDUSTRIAL
ADMINISTRATIVE / EDUCATION / COMMUNICATIONS
COMMUNITY COMMERCIAL & SERVICES
MEDICAL
FAMILY HOUSING
AIRMEN HOUSING
OUTDOOR RECREATION AREAS
HERITAGE AREAS
OPEN SPACE / UNDEVELOPED LAND
QUIET PINES GOLF COURSE
MITCHELL BOULEVARD GATE
ROBBINS ROAD GATE
STONE ROAD GATE
MISSION LAKE
North

Land Use Map

[3.6] Constraints

[3.6.1] Cultural Constraints

Moody AFB is located in a rural area, with scattered single-family residential subdivisions and small acreages surrounding it. Strong local support for the Base's operations dates back to the Base's establishment in the early 1940's. However, due to cultural constraints, including established housing and other development, and natural resource constraints, it is unlikely that the Base can expand its boundary significantly. Smaller acquisitions of adjacent property are planned to protect airfield operations.

Strategies to minimize the impact of these cultural resource-related constraints include:

- *Consider opportunity costs of all main Base infill development to ensure new uses are the "highest and best use" for each site*
- *Continue to work with local private and community leaders to protect Moody AFB's right to operate and expand the missions stationed there*

[3.6.2] Natural Resource Constraints

Moody AFB's greatest constraint is its ability to expand its developable land, due to the Base's location adjacent to a blackwater swamp and its associated wetlands. This situation makes land use planning and the siting of new facilities critical to the Base's long-term sustainability. Base Civil Engineering staff has a good understanding of this issue and has considered it in past facility siting decisions. Area development plans for select areas of the Base take this issue into account *(see Figure 3.44)*.

Figure 3.44
Mission Lake

Figure 3.45
Permeable Pavement

The relatively flat terrain of the Base negatively impacts utilities dependent upon gravity such as sanitary sewer and storm drainage. This condition makes increasing development density attractive as a way to potentially limit the number of sanitary sewer lift-stations required and to decrease the length of force mains.

Increasing density may require more creative methods to effectively deal with stormwater. Stormwater issues will become increasingly important at Moody AFB as new federal regulations regarding stormwater quality and quantity are implemented. Due to these new regulations, the volume of stormwater that is generated by new development on Base must be fully mitigated on site. The challenge of meeting new stormwater requirements was tested during the design and construction of the new Airmen's Dormitory. Base Civil Engineering staff should monitor these Best Management Practices (BMP's) to determine which are successful and what modifications will be necessary for these features to perform satisfactorily at Moody AFB *(see Figures 3.45 and 3.46)*.

Figure 3.46
Bioretention Cell

Figure 3.47
Rain Garden

Meeting Section 438 of the Energy Independence and Security Act of 2007 (EISA) on new construction projects could potentially result in stormwater management becoming a major constraint to further development on infill sites. The need to detain all additional stormwater generated by new development is challenging and requires creative solutions which come at a higher cost for construction, on-going maintenance, and land area to accommodate them. Programming documents (1391's) developed for future projects on Base must include these costs in project budgets *(see Figure 3.47)*.

Availability of potable water at Moody AFB is not currently a constraint. None the less, this resource is so valuable that it must be considered in this evaluation of natural resource constraints. Recently, Base leadership wisely eliminated the use of potable water for new landscape irrigation systems. This eliminates an expensive and often wasteful practice of water use. The Base's use of non-potable reclaimed water for landscape irrigation should be expanded where supply lines exist and new irrigation systems are warranted. For all new landscape plantings, the use of native and well-adapted plant species, as defined in the Base's landscape development guidance documents, will help ensure long-term survival and success. Temporary irrigation during plant establishment should be viewed as an investment in minimizing plant loss and improving long-term success.

Strategies to minimize the impact of these natural resource-related constraints include:

- *Stormwater should be viewed as a resource, not a nuisance*
- *Appropriately-sized infiltration BMP's (rain gardens, bioretention cells, infiltration trenches) should be included in all new project designs and retrofitted into areas where drainage problems exist*
- *Conduct all Base and mission operations in a manner to protect local ground water sources*
- *Irrigate landscape areas with well-water so long as it can be sustainably "harvested". Consider use of reclaimed water to replace well-water if possible*
- *If well-water becomes unavailable, consider rainwater harvest systems or use of greywater for irrigation of key installation landscape areas like the Heritage Park or other people-intensive outdoor spaces*
- *Continue to use potable water efficiently*

[3.7] Green Infrastructure

Green infrastructure enhances the quality of life for people while mitigating negative impacts associated with land development and operations. It has been calculated that a single mature shade tree provides "services" to its surroundings that have an annual economic value of approximately $360.00. These services include reducing energy consumption for heating and cooling of adjacent structures, providing stormwater management/erosion control, improving wildlife habitat, cleaning the air, and providing carbon sequestration.

Existing parks, open space, undisturbed vacant land, natural drainage ways, and the Installation's landscape plantings comprise Moody AFB's green infrastructure. The Installation is located on the Gulf Coastal Plain. Annual temperature extremes and precipitation can vary greatly year to year. Multi-year periods of drought or excessive precipitation occur periodically, requiring the plantings to be resilient and adaptive. Use of species native to southern Georgia, and well-adapted non-native plant species, will improve the success of green infrastructure at Moody AFB. Supplemental moisture is needed to improve the survival rate of plantings during establishment and may be needed during extended times of drought to protect the investment in the Installation's green infrastructure *(see Figure 3.48)*.

- *Use of native plant species and noninvasive well-adapted introduced plant species will provide the greatest return on investment relative to green infrastructure*
- *Limit landscape irrigation to key civic green spaces that receive active use like the Heritage Park*

[3.7.1] Significant Green Resources

Certain green infrastructure resources extend beyond a single park or building site. These resources provide benefits that extend throughout an installation. The proper approach to managing these green resources is to make decisions on a community- or area-wide basis, rather than at the site level.

Figure 3.48
Specimen Tree

Moody AFB Urban Forest

The urban forest within Moody AFB will benefit the Base most if it is composed of a diverse number of tree and shrub species of varying ages. Creating an urban forest consisting of a diversity of species is critical to long-term success. An annual tree and shrub planting program would provide the greatest benefits to the Base. If this is not possible due to funding constraints, each site, street and facility construction project should include plantings within it to provide new and replacement plantings within the developed area of the Base *(see Figure 3.49)*.

- *Actively manage Moody AFB's urban forest to protect the health of its trees*
- *Increase the diversity of species through new tree and shrub plantings*
- *Create a forest of trees of all ages by including tree and shrub plantings in all site, street and facility construction projects, where possible*
- *Expands Moody AFB's urban forest where possible to achieve multiple benefits of providing shade, reducing glare, cleansing the air, and decreasing stormwater runoff*

Figure 3.49
Urban Forest

Moody AFB Street Trees

Trees planted along streets would enhance the aesthetic character of the entire Base and provide important services, like reducing the amount of rainfall reaching the ground to decrease stormwater runoff, shading pavement and walks to reduce the heat island effect, and decreasing glare from vehicles, reflective surfaces and lights. Systematic plantings of street trees should be implemented across Moody AFB in areas where it is appropriate. A master plan should be developed to guide this effort and provide a mechanism to ensure a diverse street tree collection. This master plan should be consulted during the design of new tree plantings in street construction projects.

The Base's street tree collection should extend into all POV parking areas. Tree islands in parking lots can dramatically improve local microclimate's and assist in achieving the stormwater management requirements of Section 438 of the Energy Independence and Security Act. Section 5.2 SITE DEVELOPMENT has additional information and recommendations on how best to include tree islands and other green infrastructure in parking lots.

Figure 3.50
Dormitory Courtyard

- *Implement a Base-wide street tree system that incorporates the goals of the Moody AFB Urban Forest*
- *Create a Base street tree master plan*
- *Include tree plantings in all street and parking lot construction projects*
- *Extend the street collection into parking lots*

Building Courtyards and Outdoor Spaces

These areas demonstrate the value of building forms which create and shelter outdoor spaces. The less exposed, partially shaded courtyards promote plant growth and increase human comfort while using these spaces *(see Figure 3.50)*.

- *New building projects should consider how building form and footprint could create viable outdoor spaces, integrating these spaces into the building design rather than simply attaching an outdoor space near an entry or at one end*

Recently Completed MILCON and Renovation Projects with Landscape Plantings

Green infrastructure is needed on new construction projects to comply with several Executive Orders regarding sustainable design and to attain LEED credits. Stormwater quality and quantity issues can be cost-effectively addressed using bioretention and bio-infiltration plantings.

- *All Installation building and infrastructure construction projects which are located outside of the operational side of the flight line should incorporate green infrastructure*

Open Space Adjacent to Central Portion of Flight Line
The one-block wide swath of green space that extends along Savannah Street from Dargue Boulevard to Burrell Street is an important green element in the Base's green infrastructure. This provides space for outdoor recreation, supports physical training activities, provides a buffer between the flight line and other land uses, decreases run-off, reduces glare, helps moderate the local microclimate, and adds a visually pleasing aesthetic to the Base. The green infrastructure value of this open space could be enhanced by adding plantings and investigating if bioretention features could be added to treat and infiltrate stormwater from adjacent impervious areas. Preservation of this key green space should be a priority due to the green infrastructure functions it provides.

Moody AFB Natural Forest
The native forest that surrounds Moody AFB provides a great number of green infrastructure benefits. The forest cleanses air of impurities, sequesters carbon, gives off oxygen, intercepts rainfall, decreases glare, and lowers noise levels. The forest areas include wetlands and upland areas which slow and cleanse stormwater before it is flows into local creeks and Mission Lake. The management of this forest in outlined in the Base's Integrated Natural Resources Management Plan (INRMP). Moody AFB can best protect the value provided by its natural forest by ensuring dense and compact development in the Base's central areas *(see Figure 3.51)*.

- *Manage natural forest areas per the Base INRMP document*
- *Minimize impact on the forest by maintaining a dense and compact cantonment*
- *Degraded areas of native vegetation should be restored to maximize the value of ecological services these areas provide to the residents and employees at the Base*

[3.7.2] Airfield Open Space

The acres of mown grass within the airfield may be able to be converted to shorter native or well-adapted introduced grass species, which will require less mowing and have fewer pest problems than most turfgrass species. These grasses may work best in "rough" areas of the airfield that are not immediately adjacent to the runway and can be mown at a higher height of 7 to 14 inches. Staff members of the USDA Natural Resources Conservation Service could provide assistance in identifying possible grass species.

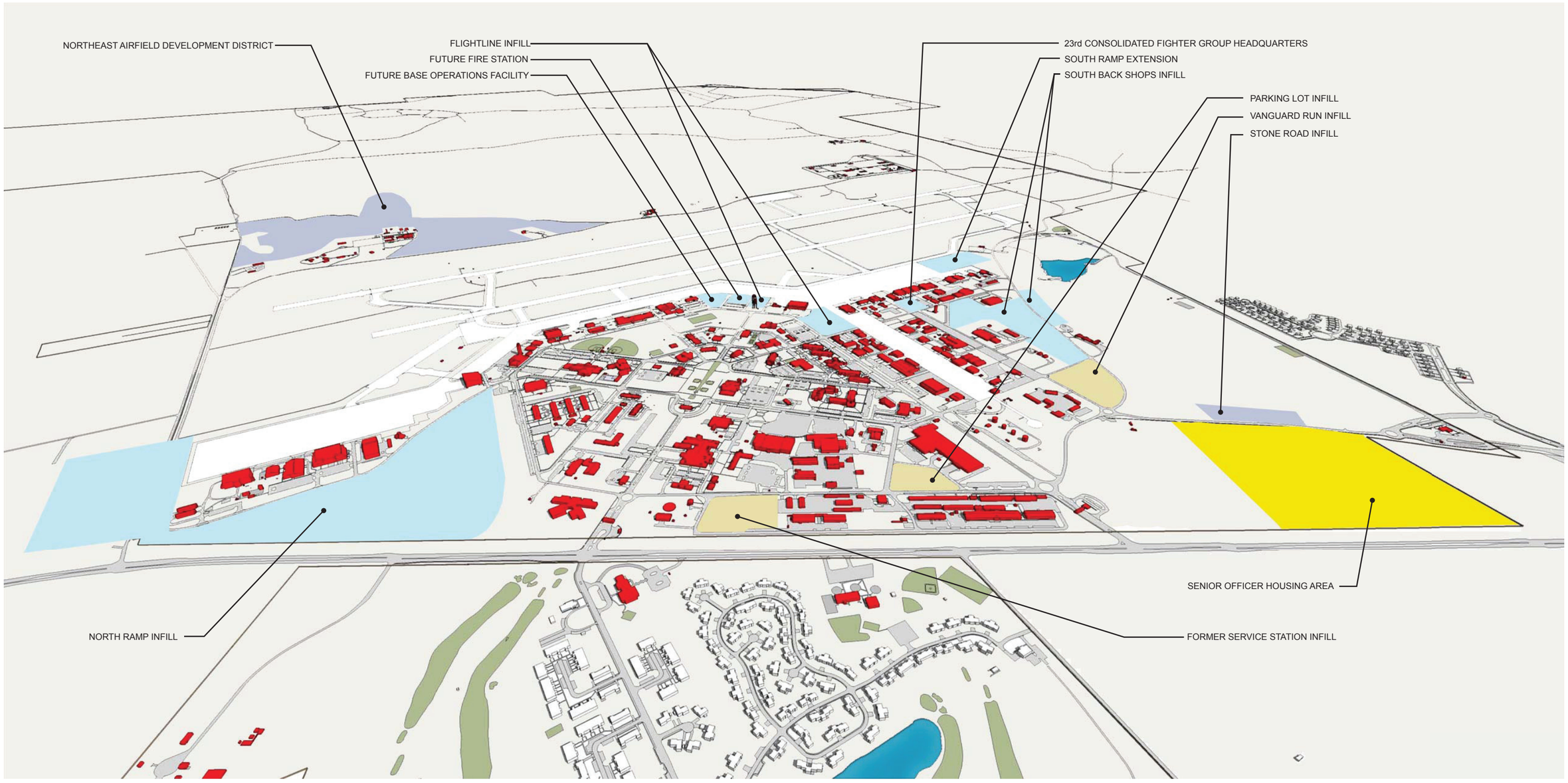
- *Study the feasibility of converting rough turfgrass areas on airfield to shorter native grasses*

Figure 3.51
Surrounding Natural Forest

[4.1] Illustrative Plan

The purpose of this section is to graphically illustrate the desired future state of the Installation at both a macro and micro scale. The key element of this section is the Illustrative Plan showing the desired changes in the Installation image elements, and the resultant urban form achieved following the ID2 guidelines. Building footprints, roadways, parking areas, and pathways are illustrated. The following illustrative plan(s) highlights the establishment of nodes, landmarks and links that create the future vision of the Main Base and Flight Line areas. Future development has been depicted in symbolic or notational form to guide implementation of new Base needs.

North



Illustrative Plan

[5.1] Sustainable Development & High Performance Green Buildings

Figure 5.1
Deep Roof Overhangs

Moody AFB uses the ACC SD&HPGB Scorecard (Scorecard) as its green building self-assessment metric. The Scorecard assembles and consolidates Executive Orders, Public Laws, and Federal Agency rulemaking on Sustainable Development and High Performance Green Buildings (SD&HPGB) design requirements with the LEED Rating System. Using the Scorecard is a way to achieve the desired LEED rating and meet critical statutory minimum requirements.

When applied in context, the Scorecard can illuminate opportunities for sustainable design, often with low- or no-cost choices. Some choices carry an upfront cost but provide long-term operational cost savings and are value-added building features. Scorecard requirements can guide and inform building projects towards lower lifecycle costs and enhanced sustainability.

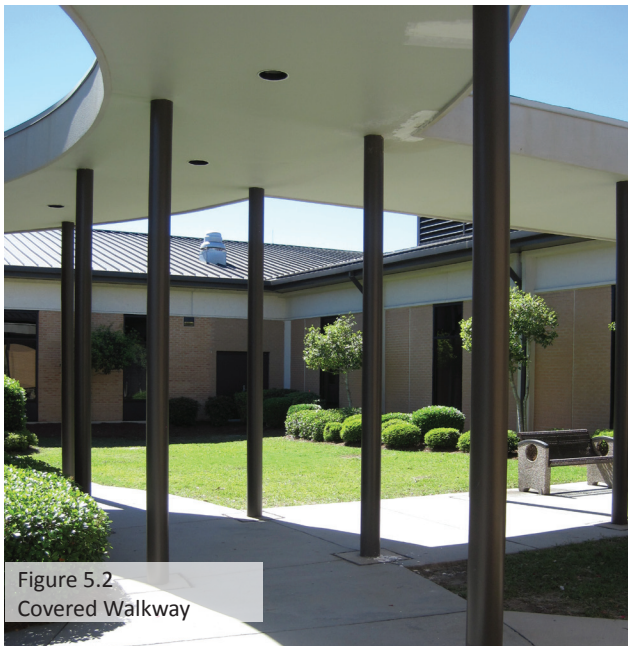


Figure 5.2
Covered Walkway

To be successful, sustainable development needs to fit within the parameters of the natural environment in which it is located. Similarly, successful high performance green buildings need to be designed and sited with regional influences, local climate, orientation, and surrounding land uses in mind. Existing development at Moody AFB will influence the degree to which new facilities can be placed to meet optimal building siting criteria, specifically in regard to solar orientation. Designers of new facilities should accept these limitations as challenges to be dealt with creatively during the design process.

Moody AFB is located in a warm and humid climatic zone, as defined by the International Energy Conservation Code. During the year, temperatures can vary from cool in the winter to excessive heat with humidity in the summer. Rainfall is fairly evenly distributed throughout the year, with sunny days giving way to afternoon rain showers. The built environment of Moody AFB needs to address these weather conditions, by providing shelter from sun and rain for both personnel and equipment. This can be accomplished through the use of deep roof overhangs, covered and arcaded walkways, shading devices at exterior windows, high-performance glazing, and outdoor amenities that provide sun and rain protection, such as picnic shelters and gazebos *(see Figures 5.1, 5.2, and 5.3)*. Including shade trees in the open spaces between buildings and within parking lots can provide multiple benefits. Trees can

Figure 5.3
Arcade

shade glazed portions of building facades, as well as partially shade roof areas, lowering heat gain. Trees can provide sun protection for pedestrian pathways and outdoor use areas. Within parking lots, air temperatures can be lowered by providing an adequate number of tree islands. Since cooling degree days vastly outnumber heating degree days, roofs with a high solar reflectance index (SRI) are encouraged. Similarly, light colored pavement with a high SRI would reduce the heat island effect, lowering the temperature of the Base.

- *Shelter buildings from sun through overhangs, covered walkways, and shading devices at exterior windows*
- *Plant shade trees to lower the heat island effect*
- *Install roofs with a high SRI*

Energy-efficient buildings can be achieved by proper building orientation, utilizing thermally-enhanced wall and roof construction, careful attention to sealing the building envelope, and careful selection of HVAC systems that incorporate the use of energy recovery. Reducing internal loads and installing energy-efficient equipment is critical in reducing energy consumption. Every facility design should include an analysis of life cycle costs of various optional HVAC systems. Solar hot water heating should also be analyzed on every project, as required by higher level guidance, and incorporated if life-cycle cost affective.

Building orientation should take into account the prevailing winds and sun angles, and building fenestration (openings in the building envelope, such as windows, doors, and skylights) should take full advantage of these natural resources. Operable windows could be utilized during moderate weather, depending on humidity levels, to allow natural ventilation. And every building should be designed with the idea that daylight and views should be available to all the occupants, as much as functionally possible. Transfer of daylight internally via clerestory windows, transoms, and glass lites is encouraged. Appropriate sun control measure should be incorporated into designs to limit heat gain and glare within the facility.

- *Optimize building orientation to take advantage of prevailing winds and sun angles*
- *Utilize thermally-enhanced wall and roof construction*
- *Provide daylight to building occupants*

Buildings should be designed to eliminate the proliferation of refrigerators, microwaves, copiers, and high-volume printers that populate most office and workstation environments. Instead, work toward solutions that economize by designing a few common work areas that incorporate these items to serve multiple users. Energy use is reduced, fumes can be removed properly, and these work areas can also serve as appropriate places to locate the necessary recycling centers *(see Figure 5.4)*.

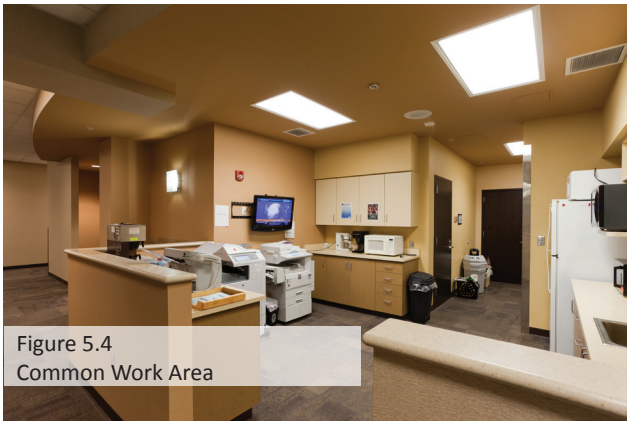


Figure 5.4
Common Work Area

Water saving features should be incorporated into facility designs as much as possible. Use of low flow fixtures and HVAC systems that minimize water use are all strategies to consider for decreasing interior water use.

- *Provide common work areas for printers, refrigerators, coffee machines, etc.*
- *Install water efficient plumbing fixtures*

Moody AFB's policy of irrigating only a handful of highly visible open spaces demonstrates an understanding of how to implement SD&HPGB concepts on the outside of buildings. While the older irrigation systems on Base rely on potable water for their supply, the new system serving the Heritage Park, 23rd Wing Headquarters, and AGOW Headquarters will use reclaimed water. All new irrigation systems should also use reclaimed water.

The majority of irrigation systems on Base require manual operation. While it requires manpower to operate these systems, it also means that Base Civil Engineering staff evaluate whether watering is needed before operating these systems. Existing irrigation systems with time clocks should have system controllers installed that track plant evapotranspiration and precipitation. These controllers use National Weather Service data to

Figure 5.5
Native and Well-Adapted Plants

calculate soil moisture needs and shut-down the irrigation system during periods of adequate rainfall. Additionally, soil moisture monitors can be installed and connected to the controllers to further improve their performance. If the existing manual systems are automated, the new time clocks should include system controllers.

- *Use reclaimed water for landscape irrigation*
- *Install systems controllers on existing irrigation systems that track plant evapotranspiration*

A variety of innovative site development and landscape solutions could be used to achieve interesting, varied landscapes that further respond to sustainable site design principles. Two key principles underlie sustainable site design concepts. The first is to minimize the extent of impervious surfaces, in order to minimize the volume of stormwater created as a result of these surfaces' inability to absorb precipitation. Opportunities exist within every construction project that can help limit new impervious surfaces. The most obvious is to minimize the building footprint with a resultant decrease in the size of the facility's roof. Where feasible and practical, creating multi-story buildings can dramatically reduce building footprints. Moody AFB's new Airman's Dormitory is a successful example of applying this principal.

Another opportunity to decrease impervious coverage within new projects is to limit the amount of new parking areas. For all new building projects, an inventory of existing parking stalls within a 300- to 500-foot radius of the new project site should be made. This distance equates to a one- to two-minute walk assuming a four mile per hour pace. The level of use for the parking within the radius should be analyzed to determine if existing parking can be shared with other facilities. The analysis should examine use times for the new and existing facilities to determine if parking needs are compatible or conflict. If existing parking lots cannot be shared, then the minimum amount of new parking needed should be provided.

The second principle is to use native and well-adapted plants that are accustomed to regional climatic conditions and local soils. Moody AFB Base Civil Engineering staff has identified native and well-adapted plant species that can be successfully grown on site. The Base Forester evaluates the performance of new and existing plantings to continually update and improve the plant list. Proactively applying these two principles provides the foundation for successful and sustainable sites *(see Figure 5.5)*.

- *Minimize impervious surfaces*
- *Minimize construction of new parking stalls*
- *Install native and well-adapted plants*

Since not all impervious surfaces can be eliminated from a project, new methods of stormwater management must be incorporated into the design of sustainable sites. One is the concept of infiltrating stormwater into the ground as close as possible to the location where it is created. This concept is now required on all federal projects that have a footprint that exceeds 5,000 square feet, by EISA 2007 Section 438. Section 438 requires projects "to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume and duration of flow".

The soils at Moody AFB have an ability to take up and hold water, although the rate of water uptake, or permeability, may vary across the Base due to disturbance of the site's soils during past development. Percolation tests should be performed at each project site so designers can properly size the stormwater Best Management Practices (BMP's) used on each project. High groundwater conditions at Moody AFB may limit the use of some infiltration BMP's. In those cases, consider pre-treatment of stormwater in BMP's to cleanse and release stormwater prior to flowing into area streams and wetlands.

Creative use of a combination of methods, including limiting the extent of impervious surfaces, green roofs, bioretention/rain gardens, rapid infiltration trenches, underground infiltration chambers, and

other innovative stormwater BMP's will need to be incorporated into all construction projects. Bioretention gardens make excellent places to plant species that require more water. Water infiltrated into these areas will also benefit local groundwater conditions, potentially providing water to deeply-rooted trees that are nearby. If properly sized, all water directed to these gardens will infiltrate into the ground within 24- to 48-hours.

- *Incorporate BMP's to manage stormwater, such as bioretention/rain gardens, rapid infiltration trenches, and underground infiltration chambers*

[5.5.1] Sustainability Recommendations

The recommendations described below are derived from specific information contained in the Moody Air Force Base Installation Sustainability Assessment (ISA). They are intended for further definition, and to assist in the development of projects that would have a direct and viable impact on the sustainability of the Installation.

- *Develop strategies to decrease the commuting carbon footprint by encouraging carpooling, public transportation, and high efficiency/non carbon-based fuel vehicles.*

- *Continue to improve on energy efficiency by using fuels such as natural gas to reduce total carbon-based fuel consumed. This can be accomplished by assessing existing building systems via the retro-commissioning process and by improving existing systems.*

- *Complete sub-metering in order to capture and analyze the data to facilitate focused direction on future projects that will impact energy usage, carbon footprint, water conservation, etc.*

- *Continue to reduce small appliance duplication, replace low efficiency motors, and change light fixture types at buildings. These efforts should be analyzed on a building by building basis to establish the return on investment.*

- *Continue to implement the required 2% reduction per year of water consumption based on the Executive Order by implementing the next generation of low flush toilets and urinals, and introducing automatic faucets on hand wash sinks.*

- *Incorporate composting practices with a garbage hauler in lieu of sending waste to the landfill.*

- *Analyze if existing parking can be shared with new facilities on all new and remodel construction projects. Build the minimum amount of parking if new parking is needed.*

- *Remove unused or excessive areas of pavement, parking lots and roads to reduce heat island effects and to decrease the total volume of stormwater created on Base.*

- *Incorporate pervious concrete pavements in parking areas and sidewalks where feasible.*

- *Add tree islands within existing and proposed parking lots at Moody AFB.*

[5.2] Site Development

Site development at Moody AFB should incorporate both traditional standards of good site planning and emerging technologies of sustainable design. These design philosophies have much in common – a high level of functionality, thoughtful use of land, and careful use of natural resources. Adding "green design" to good site design will only improve how well a site functions.

One important factor in green design is that stormwater is viewed as a resource to be utilized rather than a nuisance to be quickly conveyed and disposed off elsewhere. This change in viewpoint has vast implications on site design and development. These are discussed in this section and the preceding section.

[5.2.1] Parking

Avoid Over-Development
When constructing new facilities or renovating existing facilities, a review of existing available parking near the project site should be conducted to determine if some or all of the required new parking can be provided by using existing parking lots. Shared parking between two or more facilities might be possible at some locations. This option is very desirable because it consumes less land for AT/FP standoffs than having separate lots for each facility, and helps decrease runoff from impervious areas.

The most sustainable parking stall is one that is used on a daily basis. When determining the number of parking stalls for projects, follow the guidance in Air Force Handbook (AFH) 32-1084. Avoid over-sizing parking lots. Seldom-used parking stalls consume land, require expensive periodic maintenance, contribute to the heat island effect, and generate stormwater runoff.

To encourage car/vanpooling and the use of low-emitting vehicles and compact vehicles, provide designated, preferred parking stalls located near building entrances. This strategy should be applied in all new construction projects, as well as on existing parking lots when they are restriped. Typically, 5% of parking stalls are designated for car/vanpools and 5% for low-emitting vehicles. This criterion meets the intent and requirements of LEED. Providing stalls for compact cars encourages the use of smaller vehicles with lower carbon footprints. The percentage of compact car stalls typically varies from 25% to 50%, based upon the total number of stalls in the lot. At Moody AFB it would be reasonable to designate 10% to 20% of stalls for compact vehicles due to the other types of proposed designated parking.

One additional strategy to consider that can help reduce the size of parking lots is to install bicycle racks at all facilities to encourage biking to work and community facilities, and for recreation. This simple improvement would improve the Base's sustainability, lower its carbon footprint and help decrease both stormwater runoff and heat island effect.

- *Analyze parking needs thoroughly for new and existing facilities*
- *Consider feasibility of shared-use parking lots*
- *Establish number of parking lot stalls for projects using AFH 32-1084*
- *Avoid constructing seldom-used parking stalls*
- *Allocate 5% of stalls for car/vanpools*
- *Allocate 5% of stalls for low-emitting vehicles*
- *Allocate 10% to 20% of stalls for compact vehicles*
- *Provide bicycle racks at all facilities*

Green vs. Piped Drainage Systems
Keeping stormwater on the surface until it can be routed to infiltration areas or allowed to percolate into permeable or porous pavements is more sustainable than traditional piped storm sewer systems. Green solutions, such as the use of rain gardens or bioretention, address stormwater quality and quantity issues. Research has shown that green solutions can provide cost savings over piped solutions. Regulatory testing of water cleansed using green solutions is often less rigorous or not required.

Including bioretention features within parking lots provides several benefits. Stormwater is intercepted and cleansed near to where it falls. Plantings in these gardens break-up the massive expanse of larger parking lots. Plantings mitigate the heat island effect created by pavement, and can provide shade for vehicles and pedestrians walking to their cars *(see Figure 5.6)*.

Figure 5.6
Implement Plantings within Parking Lots

The new Airmen's Dormitory (Buildings 545-549) includes water-quality infiltration ponds. The performance of these features should be monitored to develop a lessons-learned document. The state of the art for these types of green features is rapidly evolving. Improvements in the design of bioretention gardens, infiltration basins, and other features are being made on a continual basis. New techniques are being developed to improve infiltration, simplify design and lower costs. The Department of Landscape Architecture at the University of Georgia has nationally-recognized faculty who could serve as a resource regarding the techniques and features that will work best in southern Georgia *(see Figure 5.7)*.

- *Infiltrate stormwater into the ground near where it's created*
- *Use stormwater as a resource instead of viewing it as an expensive nuisance*
- *Avoid piped solutions except in intensely developed areas*
- *Incorporate green solutions (bioretention gardens, bioswales, rain gardens, etc.) in parking lot designs, to provide multiple benefits*
- *Monitor projects on Base to determine which types of features perform best at Moody AFB*

Figure 5.7
Infiltration Area

Figure 5.8
Pervious Concrete at Airmen's Dormitory

Permeable and Porous Pavements

Innovative pavement systems, which allow stormwater to drain through them, are becoming more common. A key factor of success in using these materials is having soils under them that drain well and an adequate depth to groundwater. According to USDA Natural Resources Conservation Service soil maps, soils at Moody AFB are well drained and moderately permeable. Further investigation will be needed at each project site to determine if soils conditions meet the criteria needed for successful infiltration of storm water.

Another application of permeable and porous pavements is to use the voids in the pavement for temporary storage to lower the peak rate of water leaving a site, or to provide water to a rain garden or bioretention cell whose plants could use it for evapotranspiration. Use of permeable and porous pavements should be considered when site size constraints prevent using green infrastructure to accomplish the same goals. Porous concrete is not appropriate for areas used by heavy vehicles or in truck loading areas, where trucks turn on a continuous basis. It is appropriate for most POV or small vehicle parking areas, which constitute a large portion of pavement on most bases.

The new Airmen's Dormitory (Buildings 545-549) includes pervious concrete in both of its parking areas *(see Figure 5.8)*. The performance of this pavement should be monitored to develop a "lessons-learned" document. The state of the art for pervious and permeable pavements is rapidly evolving. Pervious concrete mix design and installation methods change on an annual basis. Recent research has shown that the jointing used in the dormitory parking lots is not needed and can contribute to unraveling of the pavement surface near these joints. This condition was observed in the west dormitory parking lot.

In every situation, site designers should design pavement areas to meet functional needs, with the minimum amount of pavement necessary. This lowers construction costs, lowers long-term maintenance expenses, and decreases the amount of storm water generated, thereby creating a triple bottom-line benefit for the Base.

- *Consider use of permeable or porous pavements where traffic loads permit*
- *Limit the extent of pavement to the least amount required to meet functional needs*
- *Monitor pervious and permeable pavements to evaluate their performance*

Green Infrastructure in Parking Lots

New and reconstructed existing parking lots should incorporate green infrastructure concepts. Moody AFB requires a minimum of 10% landscape area be included in all parking lots. Bioretention gardens planted with native plants should be used to capture, cleanse and infiltrate runoff. Shade trees could be planted within the bioswales to shade vehicles and pavement. A continuous bioswale, approximately twenty feet wide, should be placed every two bays of parking in large lots. Pavement should be sloped to drain to the bioswales. Along the pavement edge, a flush band of crushed rock should be placed to collect debris and petroleum in the first flush of run-off. Vehicle wheel barriers would be placed along the pavement edge to allow unconcentrated sheet flow into the bioswales *(see Figure 5.9)*.

In parking lots less than two parking bays wide, or where a continuous bioswale island isn't possible, bioswale openings can be designed into the pavement areas. These non-paved areas should be the same size as four standard parking stalls, to provide adequate area for shade tree root development. Pavement surfaces would slope to these openings, demarcated with curbing that has 3 to 4 wide openings in several locations around the island. Native grasses, shrubs and well-adapted shade trees could be planted in the openings to cleanse runoff.

Figure 5.9
Bioswales along Parking Areas

Soils in the rain gardens, bioretention cells, and bioswales should be amended to be equal portions by volume of sand and compost. This soil mixture will allow rapid infiltration of stormwater, while retaining moisture to support plant growth during dry periods. Deep-rooted plants increase the infiltration rate of these bioswales, gardens and cells over time, improving their performance. The organic matter in the compost will serve as a filter to remove or retain certain contaminates.

During design, the depth to groundwater and permeability of local soils will need to be evaluated at each location where green infrastructure is proposed. Percolation tests should be performed at the locations where BMPs are going to be located. This should include a determination of the normal depth to groundwater. If highly compacted clay soils are encountered, the use of vertical sumps (12 inch diameter borings backfilled with pea gravel) that extend below the compacted layer should be included in the BMP design to improve infiltration. Knowing this information, the BMP best suited for the site can then be selected.

In some locations the use of green infrastructure may not be possible due to space constraints. In these cases, structural, non-biologic Best Management Practices (BMP's) should be incorporated into the design. Structural BMP's include hydrodynamic separators which remove debris and sediment from stormwater, and underground storage systems to detain stormwater for later release. While these structures provide similar benefits to green infrastructure, they have a higher initial construction cost and may require frequent maintenance.

- *Manage stormwater within and immediately adjacent to parking lots where possible*
- *Properly prepare soils in bioswales and retention gardens to ensure long term success*
- *Use deeply-rooted native plant species in plantings to improve infiltration over time*
- *Include green solutions in parking lot reconstructions as well as new construction*
- *Evaluate groundwater conditions and soil permeability at all green infrastructure sites during design*
- *Incorporate structural BMP's into projects when space constraints prevent the use of green infrastructure*
- *Create a lessons learned document of green infrastructure/ structural BMP's for Moody AFB*

Rainwater Harvest Systems
Collection of rain water from building roofs for use as gray water within buildings or as purple water for supplemental irrigation on high-visibility landscape areas should be considered in future construction projects. These systems require careful design and adherence to current building codes. Their primary benefit is that they turn water which could be viewed as a liability into a usable asset.

Access and Accessibility
Vehicle access to a new or redevelopment site should use best practices relative to traffic flow and distance of site entry and exit points to existing road intersections. At most areas of Moody AFB, site accessibility requirements can be easily met.

Accessible parking stalls should be placed near building entrances while meeting AT/FP standoffs, to provide safe travel routes for persons with disabilities *(see Figure 5.10)*. When a POV parking lot with accessible parking stalls is separated by a street from the facility it serves, a clearly-marked pedestrian crossing should be established to provide a reasonably direct travel route for persons using the lot.

- *Locate POV parking near new facilities when possible while meeting AT/FP standoffs*
- *Provide clearly-marked pedestrian crossings when remote parking is required*
- *Conform to applicable federal guidelines to ensure that all individuals have full use of the Base*

Figure 5.11
Outdoor Barbecue

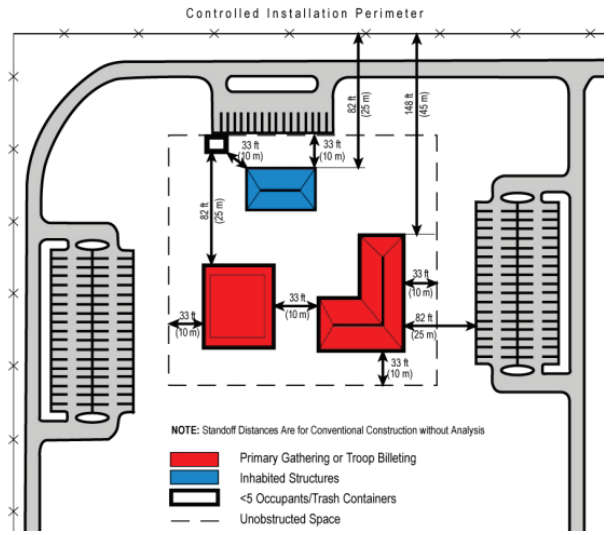


Figure 5.10
AT/FP Standoff Distances

[5.2.2] Open Space and Recreation

An overriding consideration in the development of new open spaces or the renovation of existing open spaces should be to focus on a level of quality that can be sustained at Moody AFB. Wind, sun and temperature extremes during the year provide clues on what features are needed for successful site development at the Base. Shade structures and overhead canopies of trees provide shelter from hot and intense sunlight. Plantings can also buffer the wind during the cooler months.

To improve environmental conditions near the various sport fields, shade trees should be added to provide shade for spectators and participants, shade parking areas, and help define spaces surrounding the fields. Creating an urban forest on Moody AFB will provide green infrastructure benefits of reduced heat island effect, reduced stormwater runoff volume, and improved microclimate to encourage active lifestyles. Certain areas of the Base are not good candidates for development of an urban forest, including the airfield and portions of the Base's industrial areas. All plantings on Base should be reviewed relative to BASH concerns.

All structures, including break or picnic shelters, gazebos, outdoor break areas, smoking facilities or other constructed features must be approved by Base Civil Engineering prior to construction *(see Figure 5.11)*.

- *Create sustainable outdoor areas at Moody AFB that include structures and plantings which provide shade and buffer seasonal winds*
- *Provide shade by creating an urban forest on Base to increase use of sidewalks, trails and outdoor recreation areas*
- *Provide shade trees at all sports fields to shade spectators*

[5.2.3] Landscape Plantings

To survive at Moody AFB, landscape plant selections for community open spaces should be native or well-adapted plant species. All species used in plantings at Moody AFB must be on the Base's approved plant material list. Clustering plantings in close association will be more successful in this setting than attempting to create a landscape consisting of singular, specimen plants *(see Figure 5.12)*.

Long-term success for landscape plantings is directly tied to proper site preparation. Inadequate site preparation will result in landscape plantings that will never reach their potential, and in many cases do not reach maturity. Depending upon soil conditions, this may require little more than correctly digging the planting hole and carefully backfilling soil around the plant roots. In other cases, it may require a complete removal and replacement of existing site soils with prepared soils, to improve drainage or provide a more conducive environment for plant roots. Correcting compacted soil conditions is necessary on most construction sites.

A chronic problem occurring with landscape planting at most Air Force bases is improper pruning as part of on-going maintenance. Plant spacing in projects should be based on the plant's ultimate size and the designer's intent. Shrubs trimmed into geometric shapes greatly reduce a plant's ability to thrive. Shrubs should be pruned in a manner to enhance their natural form or to elevate the height of lower branches on young trees. To alleviate the issue of improper planting, the landscape architect on each project should be required to provide a sketch showing the mature plant size and form relative to the building façade. This drawing would help Base Civil Engineering confirm that the size of mature plantings match the architecture and fit within the available space. While this drawing will not prevent bad pruning, it would convey design intent and set a standard to be followed relative to pruning. This would also lower landscape maintenance costs over the long-term, improving the financial sustainability of maintaining an attractive and healthy Base landscape.

- *Use native or well-adapted plant species*
- *Cluster plantings to create naturalistic communities of plants*
- *Prepare sites correctly prior to plantings*
- *Match planting space to mature plant size*
- *Require landscape architects to provide elevations showing desired mature plant sizes and forms to guide landscape management efforts*

Figure 5.12
Clustered Plantings

[5.3] Architectural Design

Moody AFB is located in south central Georgia, approximately 10-miles northeast of the city of Valdosta and 30-miles north of the Florida border. The Base consists of four distinct areas: the base proper; the privatized housing areas; the undeveloped areas; and the Grassy Pond Recreational Area. This Installation Development and Design (ID2) guide will only address the base proper.

Moody AFB has strived for a professional military image, with simple structures constructed of low-maintenance and durable materials. The Base has maintained a consistent design in the different zones, and has benefited from what appears to be a fairly continuous building campaign through the years. The Base prefers to renovate older structures, rather than demolishing and building new, which is evident by the lack of neglected buildings on Base.

Perhaps the most striking visual aspect of the Base is the natural beauty of the region. Mature trees draped in Spanish moss provide shade and shelter and a sense of enclosure within the built environment. The wetlands and forests to the south and east of the Base provide opportunities for outdoor recreation. And it is obvious that the Base takes great pride in maintaining a clean and orderly environment, consistent with the tenets of a military installation.

The following goals should guide all levels of design at Moody AFB:

- *Low Maintenance: Use permanent low maintenance exterior materials that are complementary to the natural and man-made environment.*
- *Environmental: Design facilities in ways to enhance environmental quality and minimize consumption of natural resources.*
- *Layouts: Provide functional layouts that satisfy user needs.*
- *Cost: Reduce life cycle costs.*
- *Labor: Reduce labor-intensive maintenance procedures.*

The recommendations contained in this ID2 Handbook should be considered for all new construction and renovation work at Moody AFB. These recommendations incorporate the good design practices already in use on the Base, while at the same time affording the designer the latitude to explore new and unique solutions to the specific design issues at hand. At all times, sustainable design and high-performance green building principles should inform the design decisions regarding a specific project.

[5.3.1] Zoning

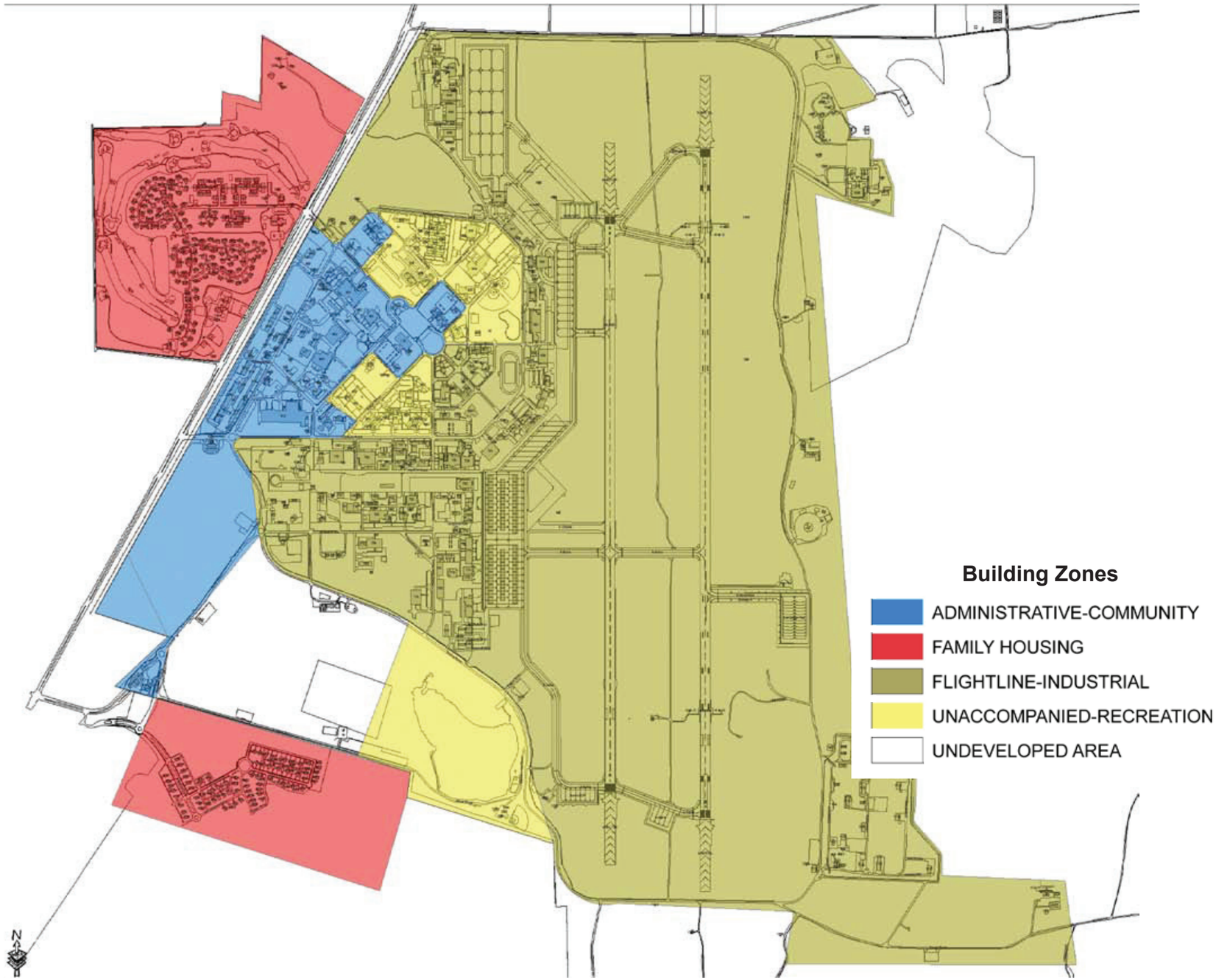
Moody AFB is segregated into five (5) zones, three (3) of which occur within the main area of the Base: Administration/Community; Unaccompanied Housing/ Recreation; and Flight Line/Mission. The architecture in each zone needs to respond to the unique requirements of the facilities located within it, as well as the overall context of the Base. Building forms, massing, scale, and siting will vary from zone to zone, while still maintaining an overall sense of cohesiveness within the Base through the use of materials and detailing.

The two (2) building zones outside of the main base area are the Family Housing and Undeveloped areas. These, along with the Grassy Pond Recreational Area are not addressed in the ID2

Administration/Community Zone
The Administration/Community Zone is the core of the base area. Facilities in this zone include headquarters buildings, community center, shopping, medical, and worship facilities. Located near the main gate, it is the most public-oriented area and the first image of the Base for most visitors.

The recently completed 23rd Wing Headquarters is located in this zone, with the Air Ground Operations Wing Headquarters currently under construction on the other side of the Heritage Park *(see Figure 5.13)*.

Figure 5.13
23rd Wing Headquarters - Administration/Community Zone



Moody AFB Building Zones

Figure 5.14
Airmen's Dormitory - Unaccompanied Housing/Recreation Zone

Unaccompanied Housing/Recreation Zone
There are two Unaccompanied Housing/Recreation Zones on base that are separated by the Administration/Community Zone. The north area is defined by Coney Street, Burrell Street, and Robinson Road. The south area is defined by Robbins Road, Davis Street, George Street, and Schrader Street. Facilities in these areas include Airmen Living Quarters, Visiting Quarters, Fitness Center, Dining Hall, and Bowling Center.

A recently completed dormitory is notable in this zone, which achieved a LEED Gold Certification and incorporates on-site storm water retention. Also, existing dormitories are in the process of being renovated, and a road has been closed to form a pedestrian street *(see Figure 5.14)*.

Flight Line/Mission Zone
The Flight Line/Mission Zone comprises the largest developed area on base. It consists of facilities adjacent to the runways and aprons. 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 runway, is also included in this Zone.

Figure 5.15
71st Squadron Operations Facility - Flight Line/Mission Zone

The extensive aprons at Moody AFB facilitate dense development of the Flight Line/Mission Zone, while still maintaining proximity to the other Zones *(see Figure 5.15)*.

[5.3.2] Architectural Order

Plan Complexity and Geometry
Typically, the existing facilities at Moody AFB are fairly simple in plan and geometry. This is a function of the utilitarian uses of most of the buildings, such as the hangars. Furthermore, facilities tend to be fairly square or rectangular in plan, with the interior functions not really informing the exterior massing. Exceptions to this are the recently completed Child Development Center and the Fitness Center, which has skillfully accommodated building additions through the years as well as connection to adjacent facilities *(see Figure 5.16)*.

Figure 5.16
Fitness Center

Future construction projects should attempt to articulate more the building footprint, which could serve a number of functions: to allow more daylight and views into the occupied portions of the building; to create sheltered exterior plazas and courtyards; and to create plans more functionally responsive to the programmatic requirements of the facility. Whereas each of the aforementioned concepts might be achieved with a square plan, a square or rectilinear plan should not be the default design solution *(see Figure 5.17)*.

Figure 5.17
Child Development Center

When designing a new facility, consideration should also be given to future additions to the facility. Oftentimes, a more complex plan geometry lends itself better to future additions than a more formal geometry. Whether large or small, additions should not appear as add-ons, but rather parts of a unified whole.

- *Incorporate daylight into facility interiors*
- *Use floor plan articulation to create exterior courtyards and plazas*
- *Consider future additions*

Building Scale and Proportion

The building scale of the existing facilities at Moody AFB mostly conforms to the programmatic requirements of the facility. For example, a hangar is sized to accommodate the aircraft to be housed there. This concept of scaling facilities to meet their programmatic requirements should be continued in future building projects.

Most facilities on Base are simple one-story buildings, since land is available and the terrain is relatively flat. However, future facilities should carefully consider multi-story solutions. A multi-story solution may more appropriately address the programmatic requirements of the facility over a single-story solution, as well as present more opportunities for daylight and views. Furthermore, facilities located near the flight line may benefit from the larger

Figure 5.19
Water Tower

massing of a multi-story solution in relationship to the large adjacent hangars. Of course, costs must be weighed in any design solution, but the additional cost of stairs and elevators in a multi-story facility may be offset by the reduced amount of exterior skin. Finally, multi-story solutions will allow the Base to maintain development density while at the same time preserving open space and the associated benefits for Base personnel and stormwater management *(see Figure 5.18)*.

Because of the predominance of one-story facilities, the relatively flat terrain, and the large over-story trees, there are few visual landmarks on Base. An exception to this is the parachute drying tower at the C-130 Squadron Operations building, which because of its height, becomes a landmark for the area. The Base water tower serves a similar purpose. Future multi-story facilities could help create landmarks on Base to facilitate way-finding, either through height or the sheer mass of the facility *(see Figure 5.19)*.

Figure 5.18
Readiness Center

Figure 5.20
C-130 Maintenance Hangar

Industrial buildings, such as the hangars and large warehouses, should utilize a fairly simple form and massing. Smaller additive forms can be utilized to convey a more human scale to the facility *(see Figure 5.20)*.

- *Consider multi-story solutions to address programmatic requirements with small site impact*
- *Scale new facilities to relate to adjacent context*
- *Incorporate smaller additive forms on large building masses to convey human scale*

Massing and Typical Bay Spacing

Owing to the fact that most existing facilities on Base are one-story and fairly square in plan, building massing has not been much of an issue. However, with the use of sloped standing seam metal roofs on most facilities, building massing plays a more important role, even for one-story facilities.

Care should be taken to assure the appropriate roof type is chosen for the facility, as this will impact the building's massing more than any other single element. Very large facilities, such as the exchange and commissary, should utilize low-slope roofs. Smaller facilities, especially those more rectilinear in plan, could utilize a standing seam metal roof to complement other such roofs on Base *(see Figure 5.21)*. The desired roof type for the building must be considered when designing a facility, and should be reflected in the solution's plan, both from a scale and constructability standpoint. A very geometrically complicated plan is difficult to cap with a sloped roof. Ultimately, the roofing solution will be an outcome of the development process, and should not be determined beforehand. A standing seam metal roof may be an appropriate solution for some facilities, as long as its use does not preclude achieving other sustainable design and high performance green building requirements.

Figure 5.21
Base Defense Group - Standing Seam Metal Roof

Examples of buildings which use sloped standing seam metal roofing are plentiful on this Base. A notable building that has used this roofing technique most successfully is the Child Development Center, which allows the interior spaces to contain elevated ceiling heights as well as utilizing daylighting techniques that are designed into the roofing shapes *(see Figure 5.22)*.

Figure 5.22
Child Development Center

Because most facilities on Base are designed to house the specific functions of the facility, bay spacing is not an apparent design issue. Whereas the Base has many hangar facilities, these are typically the only replicated facility, and other buildings are designed for their own specific use. This concept should be continued in future building projects, in that the buildings should reflect their individual programmatic requirements, and not some arbitrarily selected bay spacing or massing. However, both massing and bay spacing of a new facility should take into account adjacent facilities, in order to create a complementary design *(see Figure 5.23)*.

Figure 5.23
A-10 Phase Hangar

- *Select roofing design and materials to complement facility size and type*
- *Use building massing and bay spacing to address programmatic requirements and surrounding context*

Siting and Orientation

Facilities located in the Administration/Community and Unaccompanied Housing/Recreation Zones are aligned with the street system, but since the street system is based on a radiating octagonal concept, buildings are oriented in any number of directions. If there was an overriding orientation, it would be at approximately 45-degrees from north. In the Flight Line/Mission Zone, the buildings are aligned with the aprons, which somewhat follow the octagonal concept of the other zones. However, most facilities in the Flight Line/Mission Zone are aligned to the ordinal directions.

Figure 5.24
Clerestory at Child Development Center

Whereas orientation to the aprons is important in the Flight Line/Mission Zone, buildings in the other zones may benefit from an orientation closer to the ordinal directions from a solar perspective. Solar orientation will need to be analyzed when siting every facility. Although it is best to face structures directly into the sun, with proper analysis they can be rotated up to 30-degrees away from due south and lose only 5% of the potential energy savings.

When siting future facilities to be built on Base, sustainable design and high-performance green building principles need to be taken into consideration. HQ ACC has emphasized the importance of daylight and views within their facilities, as well as the performance of the exterior building envelope in regard to energy use reduction *(see Figure 5.24)*. Careful analysis of each facility needs to be conducted during the concept development process to verify the most beneficial orientation of the building, regardless of alignment with the existing street grid and adjacent facilities. Furthermore, sun control devices shall be incorporated into the design as appropriate, and as required to mitigate solar heat gain for those facilities which cannot be optimally oriented *(see Figure 5.25)*.

Efficient land use is another factor to consider when siting buildings, along with the requisite guidance relative to Anti-Terrorism and Force Protection (AT/FP). On this Base, the limited land available in the main base area makes efficient siting of facilities

Figure 5.25
Typical Dormitory - Balcony for Sun Control

Figure 5.26
23rd Wing Headquarters

more important than at a more typical base. It will be important to keep in mind that future buildings may share the standoff distances created between buildings, which will allow better utilization of the land and infrastructure of the Base.

- *Orient facilities to take advantage of sun angles and prevailing winds*
- *Incorporate sun control devices to address glare and solar heat gain*
- *Site facilities to maximize land use, while still complying with AT/FP requirements*

Symmetry and Hierarchy of Elevations

Moody AFB has few historical buildings, and as such, the concept of symmetry is not prevalent on Base. Building design has tended to reflect the prevailing trends when the facilities were constructed, with symmetry being a minor consideration. A more prevalent design concept on Base is the modern credo of "Form follows Function", with the building massing and fenestration reflecting the interior uses. An exception to this is the new 23rd Wing Headquarters facility, which while not symmetrical, certainly conveys a very formal presence *(see Figure 5.26)*.

Existing facilities on Base tend to emphasize the main elevation, with less attention paid to the remaining facades. Often times, this is a function of the facility's use, with the main elevation serving as access for Base personnel, and the remaining elevations abutting more industrial areas. A prime example of this are the hangars, with their large doors facing the runway apron, and little if any articulation of the remaining sides of the building *(see Figure 5.27)*. But many facilities within the Administration/Community Zone really do not have a "back door" because of the extensive street system, which requires articulation of all facades of a building to a certain extent. This articulation creates a more human scale on all sides visible to Base personnel. A good example of this is the Pararescue Squadron Operations Facility, which can be viewed and approached from any number of directions and looks equally good and inviting from each *(see Figure 5.28)*. Also, placement of antennae, disks, and outdoor storage and maintenance sheds needs to be carefully considered with the facility design, to screen these items from view.

Future construction and renovation efforts on Base should continue this trend of articulating the building facades that are accessible or visible to Base personnel. At all times, the main entry to the

Figure 5.27
Typical Hangar Doors

Figure 5.28
38th Rescue Squadron Facility

Figure 5.29
Fitness Center - Building Entrance

facility needs to be maintained as the primary focus of the exterior elevations, in order to enhance way-finding on the Base. There are many good examples of architectural solutions on this Base that enhance building entrance identification, such as the Fitness Center and the Readiness Center *(see Figures 5.29 and 5.30)*.

- *Articulate all building facades visible to Base personnel*
- *Emphasize building entry*
- *Incorporate antennae and exterior structures into facility design*

Figure 5.30
Readiness Center - Building Entrance

Open Spaces

Moody AFB is a fairly compact base, and does not have a surplus of open space within the main base area. What open space there is may not be accessible to Base personnel, such as that adjoining the runway, or may be disjointed and unusable. A notable exception to this is the new Heritage Park, which is creating a "front lawn" for the Base, and the Mission Lake area, which is used for recreation *(see Figure 5.31)*.

Figure 5.31
Heritage Park

Since land is at a premium, particular attention needs to be paid to the spaces between buildings to assure that these areas are not filled with concrete. New buildings should be sited in relationship to the surrounding facilities, in order to create opportunities for usable exterior spaces. Parking should be shared between facilities, and should be subservient to the pedestrian entry procession into a building.

Protected outdoor employee break areas, picnic shelters, and park shelters should be included in new projects when justified by building occupancy. These shelters should complement the architectural style of the facility, while at the same time fitting into the overall context of the Base *(see Figure 5.32)*.

Figure 5.32
Picnic Shelter

Another concept of open space is the courtyard, usually created by the siting of more than one building. A courtyard creates a sheltered space, and allows landscaping to be concentrated in one area, where it is easier to maintain and enjoy by Base personnel. Landscaping requires less water, and the concentration of development becomes a focal point for the surrounding buildings, both visually and functionally. A current example of a successful courtyard is located at the 820th Base Defense Group Headquarters *(see Figure 5.33)*.

Figure 5.33
Base Defense Group Courtyard

Future construction and renovation efforts on Base should focus on the exterior spaces around the buildings, as well as the spaces between buildings. There is opportunity to create a sense of community by siting adjacent buildings to take advantage of the exterior space between them, as well as to create areas to concentrate landscaping. By concentrating landscaping in certain areas on Base that relate to the buildings, pleasant exterior environments can be created for the enjoyment of Base personnel, and the landscaping is easier to maintain. A good example of developing the spaces between buildings is located within the North Airmen's Dormitory complex, and includes passive recreational activities for the airmen *(see Figure 5.34).*

- *Create exterior environments, such as courtyards or plazas*
- *Concentrate landscaping in specific areas most accessible to Base personnel*

Figure 5.34
North Airmen's Dormitory Recreation Space

[5.3.3] Architectural Elements

Materials

Exterior building materials should be chosen for their durability, color and appearance retention, and ease of maintenance. Furthermore, materials should be chosen to support the sustainable design principles of regional materials and recycled content, including fly ash as an additive in masonry products

Figure 5.35
Flight Simulator Facility

The predominant exterior wall material on Base is masonry. In the Administration/Community Zone, face brick in beige to brown tones is used, with precast concrete detailing and stucco soffits and upper wall elements *(see Figure 5.35)*. The architectural precast concrete is typically in a limestone color, and the stucco in a warm neutral to blend with the face brick. In the Flight Line/Mission Zone, concrete masonry units in a medium tan color are used for smaller facilities and as the base for larger facilities. These masonry units include split-face, burnished, smooth, and fluted styles *(see Figure 5.36)*.

Figure 5.36
Base Defense Group Facility

Figure 5.37
38th Rescue Squadron Facility

Prefinished metal wall panels are utilized on larger facilities, such as the hangars. Standing seam metal roofs in a neutral tan or dark bronze color are utilized on a number of facilities, and will be addressed later in this section.

Exterior materials for new facilities should be selected to complement the overall aesthetic of the Base. Masonry in brown or tan colors, incorporating details and banding in complementary materials, is recommended. There are many examples at this Base of innovative designs utilizing this technique, such as the Base Defense Group Facility and the 38th Rescue Squadron Facility *(see Figure 5.37)*. Metal wall panels may be used as appropriate for the facility's function and scale, but should be protected from abuse at the building base and openings by incorporating a masonry wainscot. Other exterior materials, such as composite metal wall panels, cement board siding, and stucco, may be considered as appropriate to the building's architectural design. Exterior insulation finish systems (E.I.F.S.), due to their poor performance history and lack of comprehensive manufacturer's warranty, are prohibited by HQ ACC, and may not be used at Moody AFB.

- *Use masonry colors that complement other adjacent architecture on Base*
- *Incorporate masonry detailing, banding and accents to provide a human scale*

Fenestration

Building fenestration, or the openings in the building envelope such as windows, doors, and skylights, should be designed to enhance the exterior image of facilities, as well as to incorporate daylight and views into the building interior. Primary concerns regarding building fenestration are its effect on the building envelope performance, as well as its compliance with Anti-Terrorism/Force Protection (AT/FP) requirements.

In the design of new facilities, prominence of the building's main entrance must be achieved. The main entrance must be welcoming, sheltered, and visible to the building's occupants to enhance security. Glazed aluminum swinging doors are the standard on Base, oftentimes with surrounding sidelites and transoms. This type of entrance should be continued with future building projects. All building entrances must be handicap accessible *(see Figure 5.38)*.

Figure 5.38
23rd Wing Headquarters

Figure 5.39
Fitness Center

The majority of buildings on Base utilize thermally-broken aluminum frame windows, with high-performance glazing. Examples of fixed and operable sliding windows are evident on Base. The type of window selected should serve the user's requirements. Operable windows are encouraged where appropriate, to enhance the indoor air quality of a facility, and to give the building's occupants greater personal control over their thermal environment. All operable windows should be provided with insect screens.

The type of glazing selected for exterior windows and doors should be carefully analyzed in regard to thermal performance and its effect on the overall building envelope. Whereas dark bronze tinted glazing is predominant on Base, clear glazing or lighter tints may be considered where appropriate for the individual project. Clear or lightly tinted glazing at aluminum entrance doors and sidelites creates a more welcoming impression when entering a facility, and alleviates the uncertainty of opening a door with limited transparency. Additional glazing coatings, beyond the standard Lo-E coating, should be considered to improve glazing performance, as well as the inclusion of various gases in the interstitial space in insulating glass units. Triple glazing, for sound control, should be considered for use along the flight line and in Air Installation Compatible Use Zones (AICUZ). Finally, all exterior glazing must comply with AT/FP requirements.

Figure 5.40
Indoor Swimming Pool

The predominant aluminum finish on Base is dark bronze anodized. Continued use of dark bronze or black anodized finishes is discouraged, because research has shown that dark window frames increase interior glare. Other aluminum finishes should be considered as appropriate to the overall aesthetic of a new facility.

Daylight and views must be analyzed when designing the fenestration of a new facility. Meeting HQ ACC's requirements for daylight and views may require a much greater amount of glazing than is found in the typical building on Base, and these recommendations may inform the design of the building footprint as well. Long, linear buildings, as well as multi-story facilities, have greater opportunities for introducing daylight and views into the building interior, and these concepts should be considered in the initial concept development phase of a project *(see Figures 5.39 and 40)*.

Sun control at exterior windows may be required for enhancing the interior environment of a facility. On past projects, the Base has tended to rely on heavy window tinting to control solar heat gain and

Figure 5.41
Exterior Sun Control

glare at work surface level. However, other sun control concepts should be explored, such as deep roof overhangs, exterior sun shading devices at the windows, or sun control films incorporated into the insulating glass units *(see Figure 5.41)*. Light shelves installed on the interior of clerestory glazing can bring sunlight further into the interior of the building, and should be considered. Consider the use of north-facing clerestory windows to reduce lighting demands and associated cooling loads. In all, a combination of vision glazing and clerestory glazing should be utilized to maximize daylight and views within the facility, while at the same time controlling unwanted glare and heat gain *(see Figure 5.42)*.

Figure 5.42
Child Development Center Lobby

Another option for introducing daylight into a facility is the use of insulating translucent panels, which may be used both for vertical applications or skylights. These panels have been successfully used at many existing facilities on Base, such as recently completed Hangar renovation projects. The benefit of this type of product is that the thermal performance is greater than a typical insulating glass unit. Furthermore, these units provide opportunities for natural daylighting within facilities, but because they are not glass, they do not present hazards to occupants in the case of an explosive event *(see Figure 5.43)*. Unlike traditional glazed assemblies, translucent panels have been approved for use by the US Army Corps of Engineers Protective Design Center, and no further design analysis is required. Pre-manufactured translucent skylight assemblies are encouraged; however, translucent panels shall not be used as part of a roof assembly without prior coordination and concurrence of HQ ACC/A7PS. Wherever skylights are utilized on a facility, careful detailing must be included to prevent water leakage, etc. Insulating glass unit skylights should be avoided because of their tendency for water spotting and dirt build-up.

- *Use thermally-enhanced glazing products*
- *Incorporate daylight and views into building interiors*
- *Provide sun control devices to avoid glare and solar heat gain*
- *Consider use of insulating translucent panels in both vertical and sloped applications to provide interior daylight*

Figure 5.43
Translucent Panels

Roof Features and Forms

Building roofs should be designed to achieve the following: to maintain a weather-tight barrier; to facilitate ease of maintenance; to maintain color and appearance retention for those roofs exposed to view; and to provide a long life-span. On-going roofing maintenance is a major concern to the Base, and alleviating these maintenance issues should be the primary function of roof design.

The type of roof system selected for a project should be a direct reflection of the building form. Buildings with large floor plates should consider a low-slope membrane roofing in a light color, complying with reflectivity requirements of sustainable design and high performance green building principles. As an

Figure 5.44
Readiness Center

option, a sloped standing seam metal roof may be used, such as those currently installed on many of the hangars. Because of the shear mass of these hangar facilities, the additional height of a sloped roof does not dwarf the building below. For smaller facilities, a sloped standing seam metal roof may be used, provided that the geometries of the building floor plate do not create an overly complicated roof form, which would be prone to water infiltration. For these types of facilities, a low-slope membrane roofing may be more appropriate in providing a long life-span and low maintenance roof. Standing seam metal roofs on existing facilities, except for the hangars, are typically a dark bronze color, which could be used on new building projects. As an option, the designer may consider a lighter roof color to comply with reflectivity requirements of sustainable design and high performance green building principles. A lighter color may significantly impact the solar heat gain of the roof, potentially reducing the costs of cooling a facility. Ultimately, the exposed roof color should complement the overall aesthetic of the building *(see Figure 5.44)*.

The roofing solution will be an outcome of the development process, and should not be determined

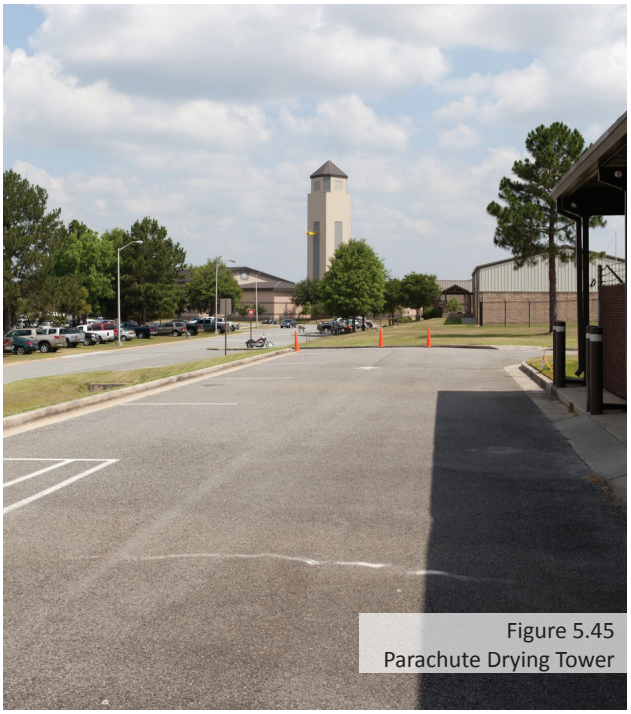


Figure 5.45
Parachute Drying Tower

beforehand. A sloped standing seam metal roof may be an appropriate solution for some facilities, as long as its use does not preclude achieving other sustainable design and high performance green building requirements *(see Figure 5.45)*.

Fascia design becomes especially critical if broad overhangs are used. If pronounced fascias are used on metal roofs, the fascia material should match that of the roof. Seam treatment between fascias and roofs may vary, but the color and material should match. A metal fascia should never extend above the edge of a sloped roof. In no case should a metal fascia be used on a flat-roofed building. All fascia, gutter, and roof trim material should be made of prefinished metal, and should be designed to prevent deformation (oil canning) due to expansion and contraction *(see Figure 5.46)*.

Figure 5.46
Rapcon Facility

Figure 5.47
Dormitory Deep Soffits and Balcony Overhangs

Deep soffits and roof overhangs should be considered to provide sun control at exterior windows, and shelter at secondary entrances. The design of the overhangs and windows needs to be studied to verify the shading will function to mitigate glare and solar heat gain *(see Figure 5.47)*.

Avoid locating equipment on the roof that would be exposed to view. Roof-mounted equipment should be screened to avoid visibility from the ground. Avoid mounting vents and equipment on standing seam metal roofs to the greatest extent possible. If unavoidable, insure proper detailing of curbs and flashing to create a weather-tight enclosure.

Facilities on Base have utilized roof features over the main entrance, often times to great success. These roof features both announce the location of the main entrance, as well as provide protection from the elements. This design feature should be encouraged in future projects. Care should be taken to insure any exposed structure is not conducive to roosting birds *(see Figure 5.48)*.

- *Select roof system to accommodate building form and massing*
- *Utilize roofing systems that are low-maintenance and provide a long life-span*
- *Incorporate roof elements at building entries*

Other Building Features

Other building features which must be considered in the design of new facilities are as follows: gutters and downspouts; porticos; canopies; overhead sectional doors; and louvers. These building elements must be integrated into the overall design of any new facility. Of special concern are downspouts, which often times become much more of a design element in the finished product than the designer considered. Downspouts should be incorporated into the overall aesthetic of a facility in such a way that they do not cause maintenance concerns in the future. Eliminating gutters and downspouts on new facilities is an option, as long as the roof water is controlled as it hits the surrounding grade and does not splash onto the building or sidewalks.

The design of porticos and canopies should complement the facility architecture, as well as provide opportunities to create pleasant exterior spaces adjacent to the facility. Porticos and canopies should provide protection from the elements, as appropriate, and should provide a sense of enclosure and space. These exterior "rooms" enhance the quality of life for Base personnel, and oftentimes create a more human scale for a facility *(see Figure 5.49)*.

Figure 5.49
Fitness Center Covered Walkways

Figure 5.48
Fitness Center Entrance

Overhead sectional doors and louvers need to be considered in the design of any facility. Their location is obviously dependent on the functional requirements of the building design, but care should be exercised not to locate these elements adjacent to the main facility entrance or on the main façade. Air intake louvers must comply with Anti-Terrorism/ Force Protection requirements. If these items must be located on highly-visible facades, they should be integrated into the overall aesthetic of the facility.

- *Integrate downspouts into the facility design*
- *Incorporate porticoes and canopies to create outdoor rooms*
- *Coordinate fabric awnings with Base Architect*

Other Site Features

Sheds, picnic and smoking shelters, and screen fencing shall be permanent construction. Smoking shelters are discouraged. "Self-help" projects will not be allowed. All sheds, picnic and smoking shelters, and screen fencing shall complement the facility design, and shall be integrated into the overall site design of the project *(see Figures 5.50 and 5.51)*.

Figure 5.50
Picnic Shelter

Poles for exterior speakers, discs, and/or antennae shall match the poles used for exterior lighting on a project, or the poles used for adjacent street lighting. Wood poles will not be allowed. Speakers and spotlights should attempt to utilize existing poles serving site lighting.

Permanent site-constructed barbecues will not be allowed.

Figure 5.51
Club Patio

[6.1] Acronyms and Abbreviations

AAFES	Army and Air Force Exchange Service
AB	Air Base
ABA	Architectural Barriers Act - Guidelines for Accessibility
ABB	A Manufacturer of Power Products or Systems
ABS	Acrylonitrile Butadiene Styrene
ACC	Air Combat Command
ACGIH	American Conference of Government Industrial Hygienists
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Architectural Guidelines
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AFCESA	Air Force Civil Engineer Support Agency
AFFF	Aqueous Film Forming Foam
AFH	Air Force Handbook
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational Safety and Health
AFPM	Air Force Pamphlet Manual
AFR	Air Force Requirement
AHJ	Authority Having Jurisdiction
AIC	Alternate Intensity Current
AICUZ	Air Installation Compatible Use Zone
AMDS	Aerospace Medicine Squadron
ANSI	American National Standards Institute
ARPA	Archaeological Resources Protection Act
ARR	Appearance Retention Rating
ASCA	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
ATFP	Anti-Terrorism Force Protection
AWWA	American Water Works Association
BCE	Base Civil Engineer (Commander)
BX	Base Exchange
BTU	British Thermal Unit
CADD	Computer Aided Design Drafting
CATV	Community Area Television
CBC	California Building Code
CCB	Construction Criteria Base
CE	Civil Engineer
CEF	Base Fire Chief
CEP	Programs Flight
CER	Communications Equipment Room

CFM	Cubic Feet per Minute
CEO	Operations Flight
CES	Civil Engineer Squadron
CEV	Environmental Flight
CMU	Concrete Masonry Units
COE	Corps of Engineers
COMM	Communications
CPSC	Consumer Product Safety Commission
CPT	Cone Penetration Test
CRC	Criteria Review Conference
CS	Communications Squadron
CSC	Consolidated Support Center
CSP	Corrugated Steel Pipe
dBA	Decibels (acoustic)
DCG	Design Compatibility Guide
DDC	Direct Digital Control
DGS	Deployable Ground Station
DOC	Department of Commerce
DoD	Department of Defense
DODDS	Department of Defense Dependents Schools
DOE	Department of Energy
DX	Direct Expansion
ECP	Entry Control Point
EIA	Electronic Industries Association
EIAP	Environmental Impact Analysis Process
EIFS	Exterior Insulation Finish System
EMCS E	Energy Monitoring Control System
EO	Executive Order
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
ETL	Engineering Technical Letter
FF	Federal Flammability
FFA	Federal Flammability Agency
FFE	Finished Floor Elevation
FGS	Final Governing Standards
FM	Factory Mutual Global
FOC	Fiber Optic Cable
FOD	Foreign Object Damage
FR	Flame Retardant
FS	Federal Standard
FSP	Final Sketch Plan
GFI	Ground Fault Interrupter
GIS	Geographical Information System
GPG	Grains per gallon
GPS	Global Positioning System
HDPE	High Density Polyethylene
Hi-X	High-Expansion
HM/HW	Hazardous Materials/Hazardous Waste

HQ	Headquarters
HVAC	Heating, Ventilating and Air Conditioning
IAPMO	International Association of Plumbing and Mechanical Officials
IAW	in accordance with
IBC I	International Building Code
IDS	Intruder Detection System
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IEQ	Indoor Environmental Quality
IESNA	Illuminating Engineering Society of North America
IP	International Protection
IPC	International Plumbing Code
IR	Infrared
ISO	International Organization for Standardization
IWW	Industrial Waste Water
LAN	Local Area Network
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
LPS	Lightning Protection System
LSC	Life Safety Code
LV	Low Voltage
MCP	Military Construction Program
MDOS	Medical Operations Squadron
MUTCD	Manual on Uniform Traffic Control Devices
MV	Medium Voltage
MWR	Morale, Welfare, and Recreation
NAGPRA	Native American Graves Protection and Repatriation Act
NEC	National Electrical Code
NEMA	National Electrometric Manufacturers Association
NESC	National Electric Safety Code
NFC	National Fire Code
SD&HPGB	Sustainable Design & High Performance Green Buildings

[6.2] Installation Functional Constraints and Considerations

6.2.1 General

The following Section 6.3 provides installation-centric background information and identification of functional-technical considerations necessary for a fully successful design. It identifies preferred systems and technical components and is intended to describe best practices related to planning, architecture, engineering and interior design. It identifies materials, furnishing, systems, practices, approaches, and finishes historically used and having proven success over time. It is not intended to serve as a comprehensive list of all applicable building codes, regulations, directives or references, or to identify facility centric or unique user requirements. Functional-Technical Constraints and Considerations need to be specifically addressed in the Basis of Design analysis written during the concept development phase and the design development phase. Understanding the driving forces behind these constraints and considerations will greatly contribute to a successful project outcome.

6.2.2 Brand Name References

References to equipment, materials, articles, or patented process by trade name, make, or catalog number shall be regarded as establishing a standard of quality and not construed as limiting competition.

[6.3] Moody AFB Architectural/Engineering Design Guide

Updated: 31 March 2010

INTRODUCTION

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 of Moody Air Force Base 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 and Grassy Pond recreation area.

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 my 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, 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.

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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 SpecsIntact 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

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” mylar 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 200 . 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 As Builts shall be turned over to the owner as part of the close out documents.

1.2 VISUAL AREAS

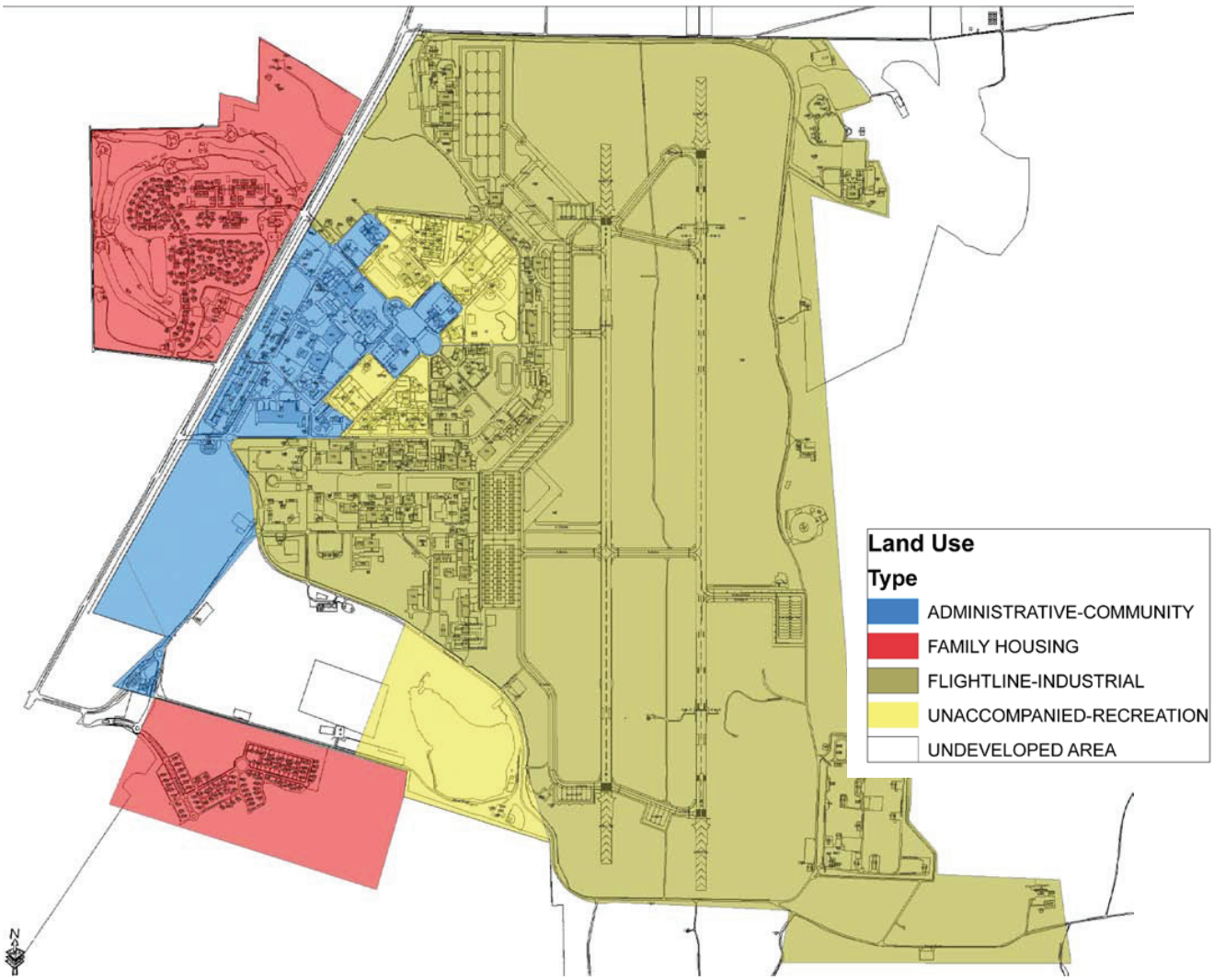
The Moody Architectural/Engineering design guide organizes the physical environment of the base into six visual areas. There are three zones within the main cantonment area of the base:

- *Admin/Community*
- *Unaccompanied Housing*
- *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 35 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.



1-2a Visual Zone Map

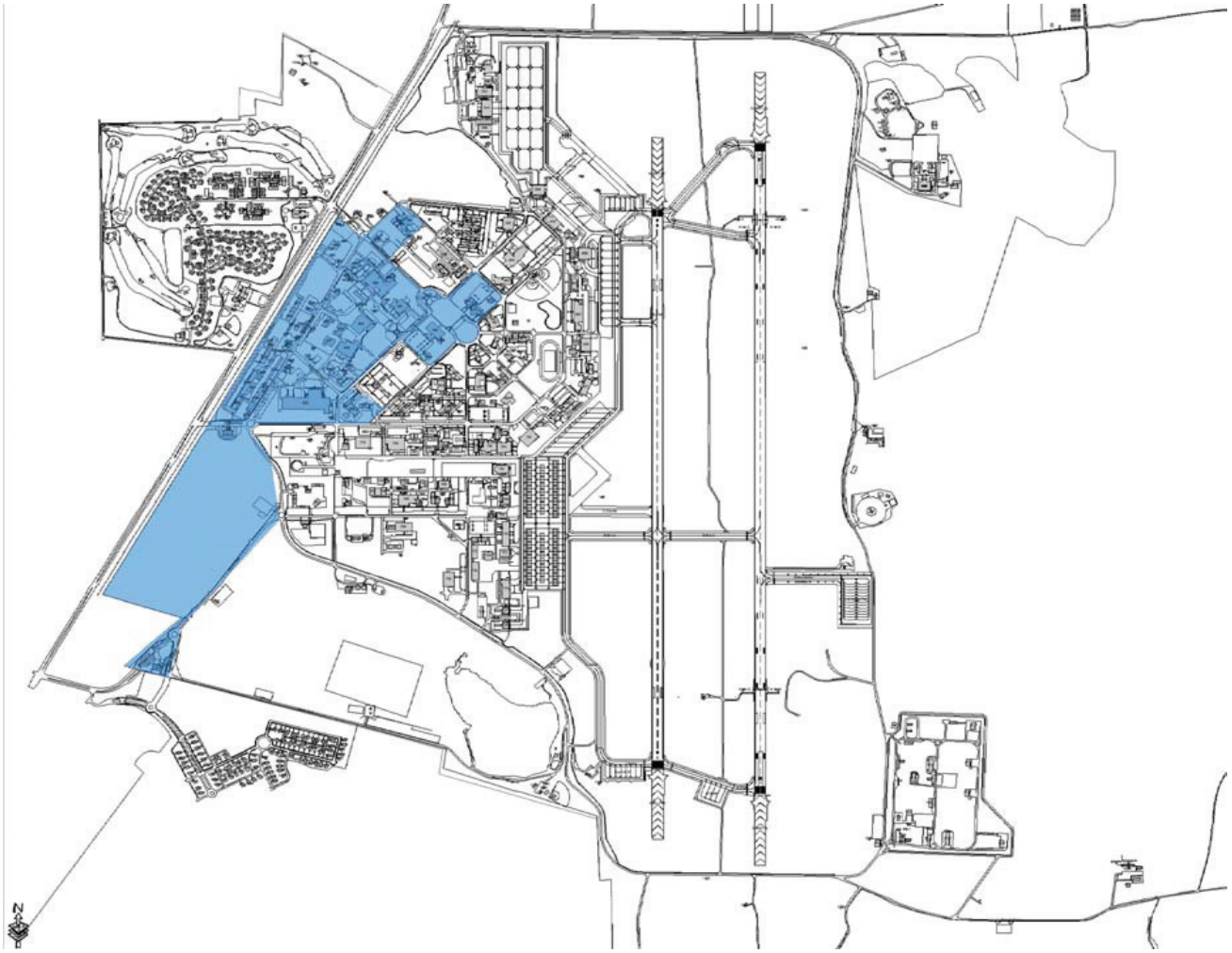
1.2.1 Administration-Community Area

The Administration-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 main gate, it is the most 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 several 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.

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

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.



1.2.1a Administrative-Community Visual Area

1.2.1.1 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.

1.2.1.2 Building Form

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

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

1.2.1.3 Not used

1.2.1.4 Exterior Walls

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

1.2.1.5 Not used

1.2.1.6 Doors and Windows

Aluminum operable windows shall be horizontal sliding.

Primary entrance shall be storefront.

Secondary doors shall be hollow metal.

1.2.2 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.

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 Moody Inn and Linen Exchange building are brick that has a range of colors from cream to dark brown with flat roofs and large beige stucco fascias. One building in the North Unaccompanied Housing area is beige brick with a low sloping asphalt shingle roof.

1.2.2a Unaccompanied-Recreation Visual Area

1.2.2.1 Site Planning

Focus on pedestrian circulation. Provide safe, convenient paths linking living areas with popular destinations (Figure 1.2.2b).

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

1.2.2.2 Building Form

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.

1.2.2.3 Not used

1.2.2.4 Exterior Walls

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

1.2.2.5 Not used

1.2.2.6 Doors and Windows

Aluminum windows and storefront shall be anodized.

Secondary doors shall be hollow metal.

1.2.2b Dormitory, 7251 Woolsley Street

1.2.2c Convenient, well-lit paths encourage pedestrian circulation

1.2.2d Red Brick and dark bronze metal roof on the Library/ Education Center

1.2.3 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 Van Guard. 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 buildings in the Weapons Storage Area are metal storage buildings and bermed facilities.

The C-130 complex, located west of the runways, and the 71st 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.

1.2.3a Flight Line-Industrial Visual Area

1.2.3.1 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.

1.2.3.2 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.

1.2.3.3 Roofs

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.

1.2.3.4 Exterior Walls

Pre-finished metal wall panels may be used on hangars and large industrial buildings with approval of ACC and 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. (Figures 1.2.3a, 1.2.3b, 1.2.3c).

1.2.3.5 Not used

1.2.3.6 Doors and Windows

Aluminum windows and storefront shall be anodized (Figure 1.2.3a).

Secondary doors shall be hollow metal.

1.2.3b Rescue Squadron Building 663

1.2.3c Wash Rack in C-130 Building 642

1.2.3d Buildings in the C-130 Complex use concrete masonry base with beige metal wall panels above, and dark bronze metal roofing

1.2.3e Building 730. Downspout color matches roof color.

1.2.4 Family Housing

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 Administration/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.

1.2.4a Family Housing Visual Area

1.2.4.1 Site Planning

Site new housing with consistent front yard setbacks.

Provide off-street parking for at least two cars per unit.

Locate parks and play facilities within a five- minute walk of every house. Provide playgrounds for tots, youth, and teens.

Develop safe pedestrian circulation systems.

Provide sidewalks on both sides of streets.

Locate utilities in side yard or in least used and least visually objectionable area.

1.2.4.2 Building Form

Gabled or hipped roof building forms that suggest the appearance of upscale private sector housing developments.

1.2.4.3 Roofs

Asphalt shingles with minimum 20-year warranty. Minimum 3:12 pitch.

1.2.4.4 Exterior Walls

Brick to match one of the existing color schemes.

1.2.4.5 Trim

Provide brick mould around doors and windows to match window color. Mould shall be a minimum 2" wide. Colors shall be a neutral earth tone and shall be approved for use by the Base Architect during design.

1.2.4.6 Doors and Windows

Pre-finished aluminum or vinyl windows with high performance insulated glazing and thermal break. Color shall be approved by the Base Architect.

Steel doors shall be used at entrances. Specify galvanized steel with factory-applied paint finish.

1.2.4b Streetscape in Family Housing

1.2.4c One-Story Brick and Vinyl Siding Unit

1.2.4d Two-Story Brick and Vinyl Siding Unit

1.2.5 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.

1.2.5a Undeveloped Visual Area

1.2.5.1 Grassy Pond

Owned by Moody AFB, Grassy Pond Recreational Area is located approximately 35 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 1.2.5d).

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 1.2.5b, 1.2.5c). 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 1.2.5c). 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.

1.2.5b Dock and Boathouse on Grassy Pond

1.2.5c Lakeside Screened Pavilion

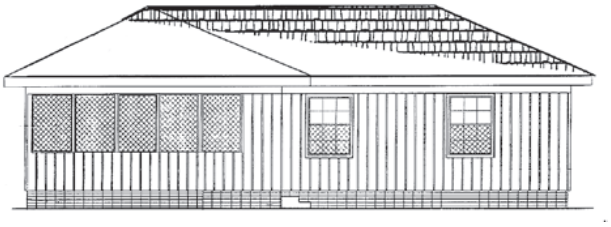
1.2.5d Lakeside Screened Pavilion

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.

1.2.5.2 Cabins and Pavilions

For economy and compatibility with the existing rustic context (Figure 1.2.5e), 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 1.2.5f).

1.2.5e Rental Cabins



1.2.5f Rental Cabin - Prototypical Elevation

1.2.5.3 Picnic Shelters

New shelters shall be similar to existing log frame structures with brown asphalt shingle roofs (Figure 1.2.5g). 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.

1.2.5.4 Large 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 1.2.5h).

1.2.5g Picnic Shelter Overlooking Grassy Pond

1.2.5h Restroom Facility

2.0 LANDSCAPING

The quality of landscape architecture at Moody has a significant influence on the visual character of the base.

Provide an attractive, low-maintenance, landscaped environment which promotes pride and reflects the highest standards of environmental stewardship.

A unified, fully developed landscape allows compatible buildings to look their best and can mitigate the negative visual impact of older, incompatible buildings (Figure 2-0a).

Carefully designed plantings create functional benefits by conserving water, decrease of pest or insects, increasing energy efficiency of buildings, improving air quality, and encouraging pedestrian circulation.

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.

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 landscaping with varied contours and drought-tolerant plantings.

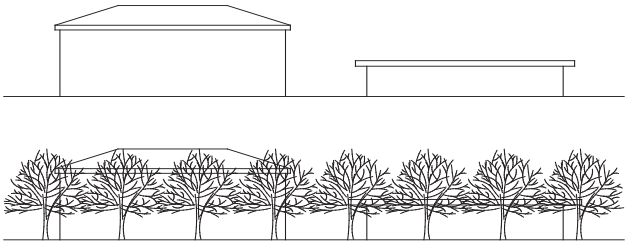
The use of appropriate trees and other landscape plantings adds beauty to the base, promotes energy efficiency, inhibits erosion, reduces noises, and enhances safety.

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

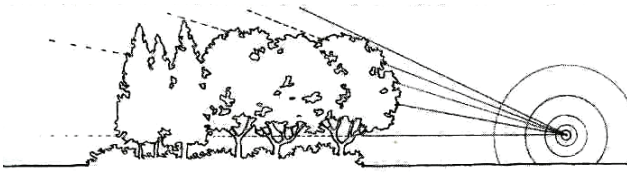
Promote security: Configure paths and design landscaping to permit surveillance of pedestrian circulation routes.

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

Landscape walkways, and provide shade trees along paths.



2-0a Trees Can Reduce the Negative Impact of Incompatible Buildings



2-0b Landscaping for Sound and Noise Reduction

2-0c Mission Lake

Develop functional rather than purely visual landscapes.

Concentrate on landscaping at locations and facilities which have the highest profile.

Landscaping shall be required for all new facilities and an irrigation system shall be included where appropriate.

2.1. REGIONAL DESIGN

2.1.1 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.

2.1.2 Surface Runoff

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

2.1.3 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 2-1a).

Use landscape to reduce energy cost, shade to prevent heat and glare, and windbreaks to lessen air infiltration.

2.1.4 Street Trees

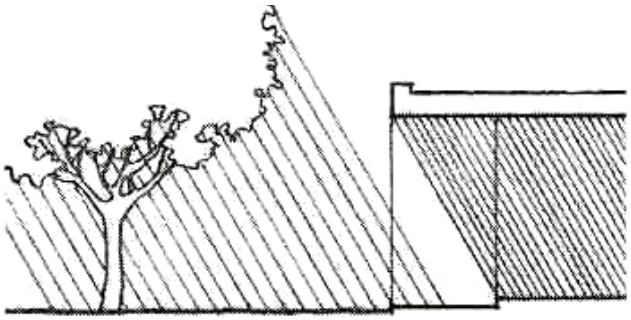
Plant street trees to delineate roadways, reduce pavement temperature and provide shade on sidewalks (Figure 2-1b & 2-1c)

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

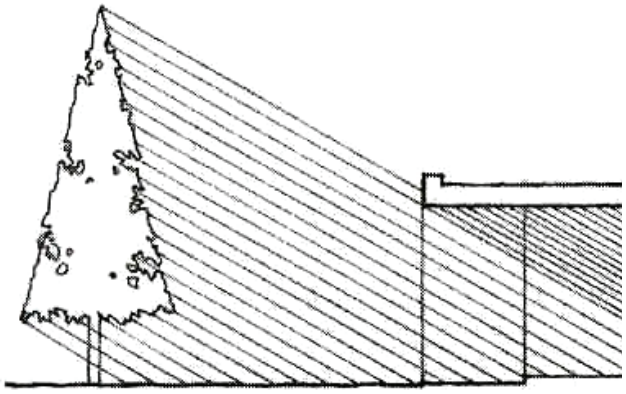
Base wide, a variety of tree species should be used to avoid monoculture. A predominance of one tree type is more susceptible to pest and disease damage.

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



2-1b Planting for Winter Energy Conservation.

2-1c Street Trees and Low-Maintenance Juniper Ground Cover in Median Strip.

2.1.5 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 2-1d).

2.1.6 Parking Lot Landscaping

Landscape approximately 10 percent of the parking area.

Separate parking areas from major streets through the use of natural topography. (Figure 2-1e).

Use a combination of trees and shrubs to provide both a visual screen and shade (Figure 2-1f).

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

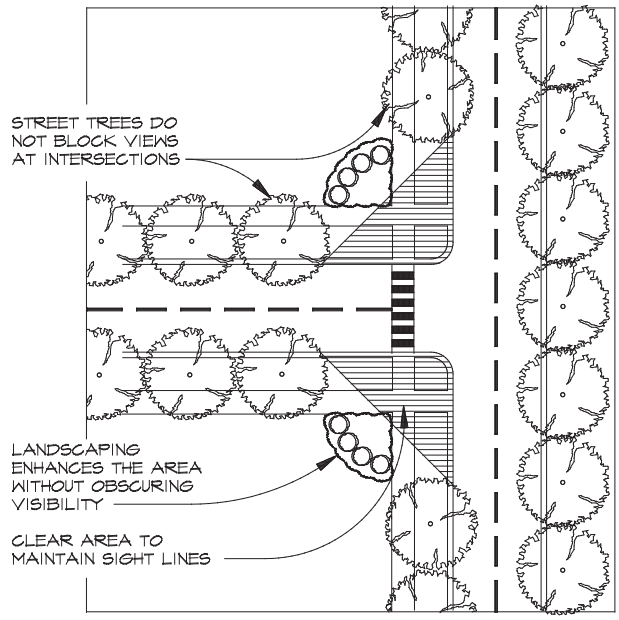
Provide landscaped islands in parking areas to add shade, articulate vehicular circulation, and visually break up large expanses of paving (Figures 2-1e, 2-1g).

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)



2-1d Maintain Clear Sight Lines at Intersections.

2-1e Parking Design at Enlisted Dormitories Incorporates Landscaping to Define Circulation

2-1f Use of Both Trees and Shrubs Provides Shade and Screens Parking from the Street

2-1g Landscaped Islands Improve the Appearance of Parking Lots while Providing Shade and Directing Circulation

2.1.7 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 2-1h & 2-1i).

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

Retain existing natural habitat as a buffer between housing and commercial or industrial uses.

2.1.8 Equipment Screening

Screen utility equipment, dumpsters, and storage areas. Use walls and mature landscaping or berms. Do not use chain-link fence. Exterior recycling bins should be treated and screened as trash dumpsters.

Use evergreen plants to screen equipment, transformers, storage areas, and other visually objectionable areas when a fence is not required (Figure 2-1h).

Maintain required airflow and maintenance clearances between plant materials and screened equipment.

Plantings around masonry enclosures or metal screens will help integrate these elements with the surrounding site.

Minimize the use of equipment screening near buildings where force protection measures dictate.

2.1.9 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.

2-1h Landscaping to Screen Transformers and Equipment.

2-1i Dense Evergreen Plantings Visually Screen Service Area.

Reduce the need for pruning by planting the right size plant for a space.

Provide regular watering, feeding, and pruning to ensure the health and growth of all plant materials.

Planting beds should be designed with weed stop barrier and pine straw used as mulch, pine bark is not permitted.

2.1.10 Foundation Planting

Planting must take Force Protection into consideration.

Landscape to help direct pedestrian movement

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

To achieve a natural appearance, layer planting designs: place groundcovers in front, followed by small shrubs; tall shrubs or small trees should be planted at some distance away from the building.

Planting near buildings shall not exceed limits set forth by the USAF Installation Force Protection Guide. Ensure plant selection will allow that mature plants will maintain a 1' clearance from the structure to reduce maintenance and help prevent pests.

Define planting areas with walkways, edging, and concrete curbs.

2.1.11 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.

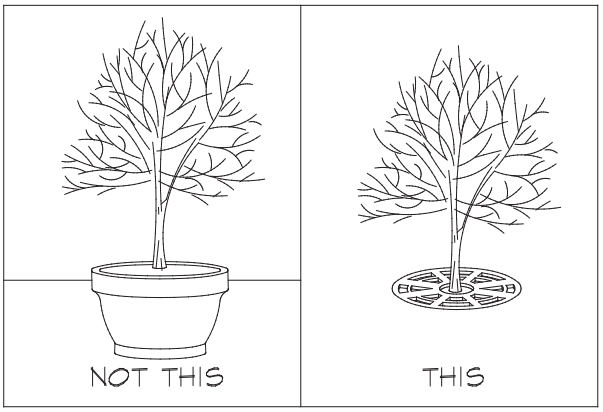
Specify centipede grass for turf around facilities. Sod is preferred where economically feasible; otherwise specify sprigging to establish grass near facilities.

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.

Turf and ground covers

Use turf only at recreation areas, courtyards or other places where it provides a benefit to personnel. Limit turf and keep it free of obstructions which require trimming.



2-1k Use tree gates in Lieu of Planters.

Use ground covers to reduce maintenance, water and chemical requirements.

UFC 3-201-02, 23 Feb 09, is the governing DoD document for Landscape design in conjunction with UFC 4-010-01 for ATFP factors in landscape design.

(Ref: UGA plant list at http://pubs.caes.uga.edu/caespubs/pubscd/B987/B987-contents.html)

2.1.12 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 2-1k).

Consider fabric barriers that contain an effective pre-emergent herbicide that will provide protection for many years.

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.

Select landscape materials with low maintenance requirements.

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.

Place pine straw beds around all trees and shrubs.

2.1.13 Courtyards and Entrances

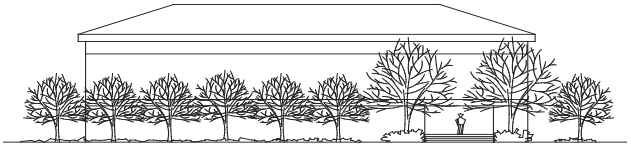
Use landscaping to enhance the entry sequence from the street or parking area to the building's main entrances.

Use of mass plantings to define outdoor spaces is highly encouraged , place plants as outlined in ATFP.

Create landscape patterns that accentuate building entrances (Figure 2-1l).

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.



2-1l Landscape to Accentuate Building Entry.

2.1.14 Planting Beds

Provide protective mowing strips or metal edging around all planting beds.

Use mulching fabric, covered by thick mulch, to reduce weeds in planting beds.

Mulch: Pine straw; Maintain a 1' non-organic barrier between structure and planting beds.

2.2. EXTERIOR SIGNAGE

UFC 3-120-01, Air Force Sign Standard, and ACCi 32-1054, 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.

2.2.1 General

All exterior signs will be consistent throughout each installation. Do not use moving signs.

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.

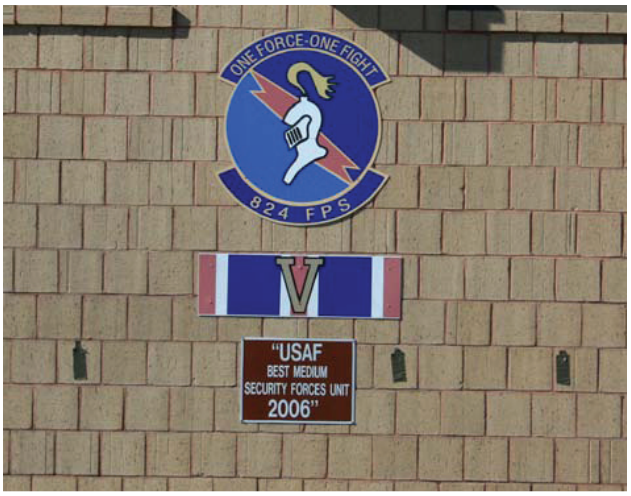
Lettering shall be Helvetica Medium type style, except Helvetica Regular type style shall be used for subordinate information on building and organization identification signs.

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.

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



2-2b Squadron Identification

2.2.2 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 glass use frosted white pressure sensitive letters. (Figure 2-2d)

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:

- Use white letters on brown background and brown posts
- 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.

2-2c Dark Bronze Dimensional Numerals Identify Facility Number

2-2d Entry Way Glass with Street Address

2-2e Base Ops Free-Standing Identification Sign

2.2.3 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 2-2f & 2-2g).

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.

2-2f Building Mounted Identification Signage

2-2g Building Mounted Identification Signage

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

- Format shall be AAFES logo followed by facility name

- 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.

2.2.4 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.

2.2.5 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 2-2h) 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 2-2i)
- 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.

2-2h Directional Sign

2-2i Street Sign at Intersection

2.2.6 Street Name Signs

Street name signs shall conform to ACCi 32-1054.

2.2.7 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.

2.2.8 Regulatory Signs

Posts for all regulatory signs shall be galvanized steel.

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

Traffic regulation signs (Figure 2-2l) 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.

2-2j Sign Posted at Grassy Pond

2-2k Parking Sign at Grassy Pond

2-2l Examples of Regulatory Signs

2.3.0 SITE DESIGN & SITE WORK

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

2.3.1 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.

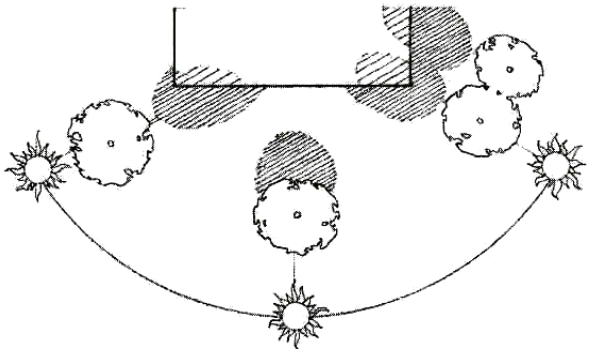
On gutterless roof lines provide a gravel or crushed stone splash area in the design to prevent mud splatter on lower outside walls.

Site design shall conform to the requirements of ABA. The most stringent requirements shall apply.

2.3.1.1 Site Work:Utility

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

Utilities shall be bored under streets.



2-3a Siting of Trees to Provide Adequate Shading of Buildings and Other Areas

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)

2.3.2 SITE

For more Site Planning info, see Section 3.4.0.

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.

2.3.2.1 Effective Site Planning and Design
Address every aspect of an installation

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

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

Encourage walkable communities.

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.

2.3.3 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 2-3b).

Provide curb and gutter at all new pavement.

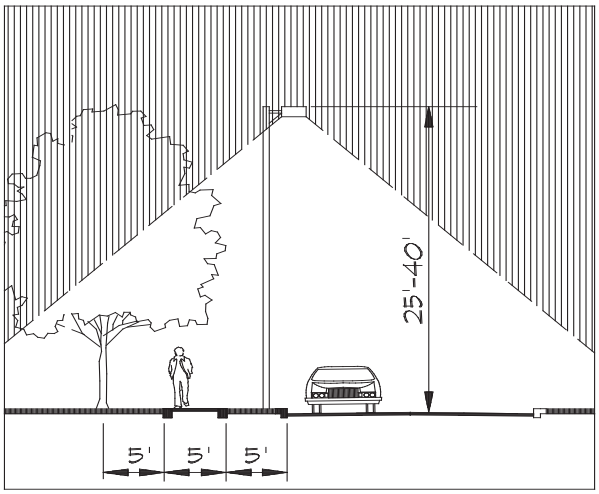
Separate vehicular and pedestrian circulation.

Locate utilities underground where feasible (Figures 2-3c and 2-3d).

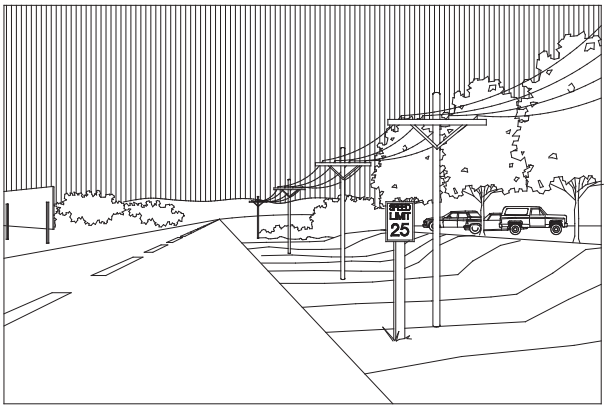
Provide maintenance vehicle access to building mechanical rooms where feasible. Pavement or reinforced sidewalks are acceptable for vehicle access.

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

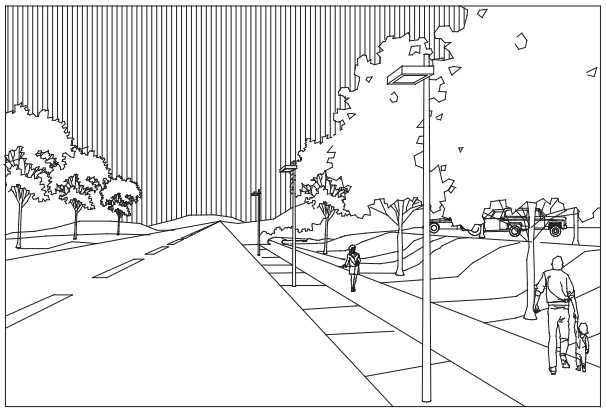
Ensure handicapped access is provided at intersections, crosswalks and wherever ABA require them to be.



2-3b Street Lighting and Sidewalks Improve Safety and Appearance



2-3c Streetscape before Improvements



2-3d Streetscape Improved with Underground Utilities, Sidewalks, Lighting, and Street Trees.

2.3.4 PARKING

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

The parking arrangement is a major factor in providing an orderly appearance

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

Provide curbs on all parking lots. Provide wide (3-4 foot wide) breaks in curbs to provide areas for drainage from pavement to sheet drain into adjacent bioswales and infiltration features. Provide rock cobble apron to slow water from pavement and catch debris. Provide landscaped islands within parking areas to break up the expansiveness of pavement and provide areas to locate stormwater BMPs.

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

Use consistent angles in all parking areas.

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

- Parking areas shall be designed to meet ATFP requirements and reduce the negative visual impact and allow opportunity for additional landscaping.

2.3.4.1 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 2-3e).

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 sited 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.

2-3e Sidewalks Leading from Parking Lot to the Main Building Across the Street.

2-3f Parking Lot Connected by Crosswalks and Sidewalks to the Building Across he Street.

2.3.4.2 Screening

Use buildings, natural topography and landscaping to screen parking from the primary street (Figures 2-3g).

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.

2.3.4.3 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.

2.3.5 PEDESTRIAN CIRCULATION

2.3.5.1 Paths

Provide safe, convenient paths to encourage bicycle and pedestrian circulation (Figure 2-3e).

- 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 (Figure 2-3f).

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.

Avoid placing utility poles or signs too close to sidewalks.

2.3.5.2 Sidewalks

Add sidewalks to existing roadways where possible.

Provide sidewalks on at least one side of every street and between all facilities. Provide sidewalks on both sides of the street in the cantonment and family housing areas.

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 2-3h).

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

Landscape walkways, and provide shade trees along paths.

2-3g Landscaping Screens Parking Lot from Adjacent Roadway.

2.3.6 PAVEMENTS

Pavements include streets, parking lots, sidewalks, and airfield pavement.

Use separate smaller parking lots of 50 cars of less rather than one large lot. 10% of a large parking lot should be landscaped.

For vehicle parking areas use economical asphalt for parking and concrete for sidewalks (Figure 2-3m) and curbs. Provide a landscape buffer between all buildings and paved areas (Figure 2-3l).

For streets, avoid utility or other cuts in pavement. Whenever possible use tunneling technologies to go under pavement with conduits or piping. Streets should intersect at right angles and offset intersections should be avoided. (Figure 2-3n)

All streets and all parking lots should be paved with integral concrete curbs and gutters (Figure 2-3l). Painted curbs are prohibited because they are very difficult to maintain. Provide mower ramps for access to grass areas.

Design paved areas to minimize drainage. Drain into natural water course, detention, and retention ponds.

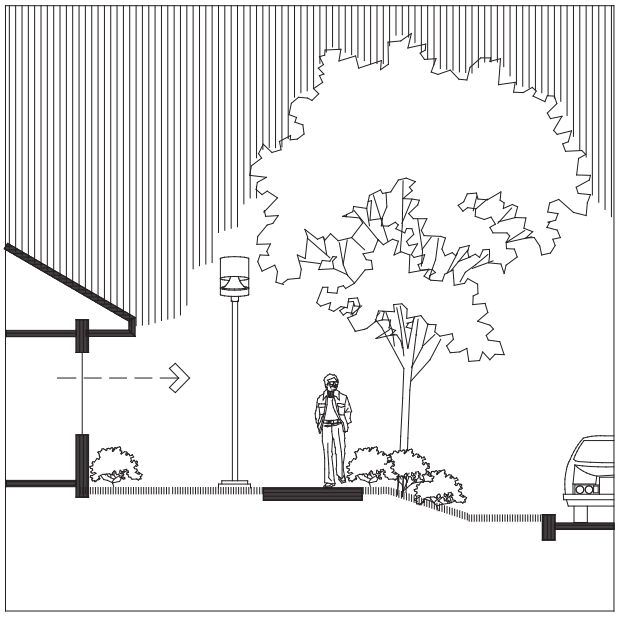
Consider special unit pavers for courtyards, plazas, entrances, and other high-profile sites. Make repairs in the same color and style of pavement for the original construction.

Do not allow pavements to come up directly to facilities except for especially selected, purely industrial uses.

Use a 4-inch wide, single white stripe to mark parking spaces. Use parallel 24-inch wide, reflective white stripes to denote crosswalks, and locate crosswalk stripes parallel to the roadway.

2-3h Well Lighted Paths Encourage Pedestrian Circulation.

2-3i Covered Walkway Connecting the New Gymnasium Building to the Old Gym.



2-3j Passive Surveillance of Paths Increases Pedestrian Safety

2.3.7 CIVIL

2.3.7.1 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 3000psf compressive strength at 28 days.

2.3.7.2 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'.

2-3k Landscape Buffer Between Paved Street and Civil Engineering Building

2-3l Concrete Curb and Gutter Example

2-3m Walkways/Sidewalks in Front of Headquarters

2-3n 90-Degree Street Intersection

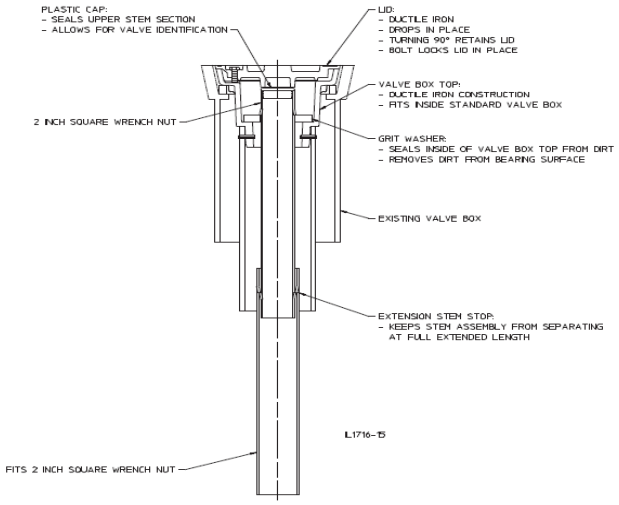
Airfield pavements shall be designed according to Unified Facilities Criteria (UFC).

2.3.7.3 Valve Boxes

Valve boxes shall be provided for all buried valves. Valve boxes shall be an assembled unit composed of the valve box, extension stem, and a self-centering alignment ring. All moving parts of the extension stem shall be enclosed in a housing to prevent contact with the soil. Valve box assembly shall be adjustable to accommodated variable trench depths.

The upper and lower pipe shall be made of minimum ¼" heavy wall high density polyethylene. All components shall be joined with a permanent locking design. The valve box top section shall be adaptable to fit inside a standard valve box upper section. Valve box operation shall be checked & approved by contract representative or the utilities shop personnel.

The stem assembly shall be of a telescoping design that allows for variable adjustment length. The material shall be galvanized steel square tubing. The stem assembly shall have a built-in device that keeps the stem assembly from disengaging at its fully extended length. The extension stem must be torque tested to 1,000 foot-pounds. Valve box shall be American Flow Control's Trench Adapter or equal. (Figure 2-3o).



2-3o American Flow Control's Trench Adapter.

2.3.8 SITE LIGHTING

2.3.8.1 General/Design

Create a unified appearance on base by selecting light fixtures of a consistent design and lamp type. Fixtures shall be low maintenance and vandal resistant.

Metal halides lamps are preferred for most areas, but sodium lamps may be used where necessary.

- Avoid bright finishes and trendy mountings.
- Avoid use of low-pressure sodium lamps.

LED lighting for Street lighting, obstruction lighting or parking lot lighting is unauthorized on Moody AFB.

2.3.8.2 Area, Street, and Parking Lights

Parking lot and area lighting shall be metal halide, rectangular cut-off (shoebox) fixtures. Lamps shall be 250W MH on 30-foot poles. Poles shall be round/square, tapered aluminum shaft. Color shall be dark bronze anodized finish (Figure 2-3p).

Cobra-head fixtures on dark bronze anodized tapered poles are preferred for street lights in all visual areas except Family Housing and Grassy Pond.

- Street lights in Grassy Pond Recreation Area shall be cobra-head fixtures mounted on wood poles.

Fixtures for pedestrian circulation and area lighting shall be mounted on 12' to 15' high posts (Figure 2-3q). Fixture shall be standard shoe box dark bronze anodized.

Solar lighting shall be considered in remote areas only.

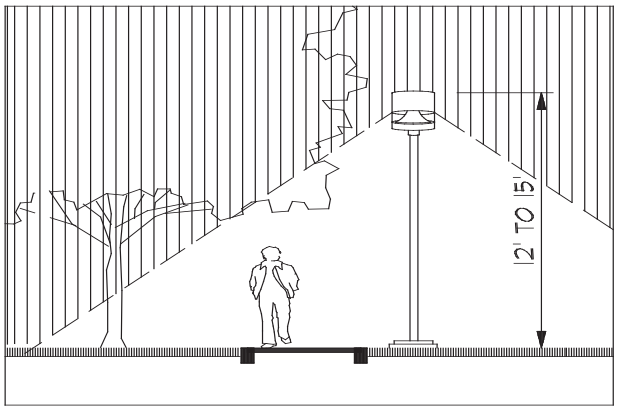
2.3.8.3 Special Purpose and Other Lighting

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 2-3r), extruded aluminum, 36" high, 7" diameter, 70W metal halide lamp, individually fused, and photo control.

2-3p Parking and Area Lighting Fixtures.



2-3q Paths Should be Well Lit for Safety and to Promote Pedestrian Circulation.

2.3.9 FENCES AND SCREENS

2.3.9.1 Screening

Provide screening around mechanical equipment, storage areas, trash dumpsters and other visually objectionable items. Limit use of screen walls in accordance with 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 2-3s & 2-3t); materials other than those that match the adjacent building shall be approved by the Base Architect. Masonry walls are preferred.

- When approved by the Base Architect, metal screen color shall be dark brown to match Fed. Std. 595b #30051 with semi-gloss finish.

2-3r Bollard Lighting Fixtures in Unaccompanied Housing Area

When screening mechanical equipment, ensure adequate clearance, as recommended by the equipment manufacturer, is provided to allow for proper air circulation and maintenance.

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 2-3u).

Dumpsters shall be screened with 3-sided masonry enclosures (Figure 2-3t & 2-3u), vinyl or metal panel fence. Slope dumpster pad to provide positive drainage.

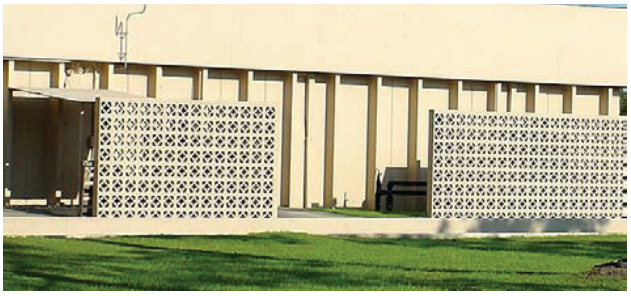
- Provide gates for trash enclosures or where accessibility or serviceability is an issue of concern/function.

2.3.9.2 Fences

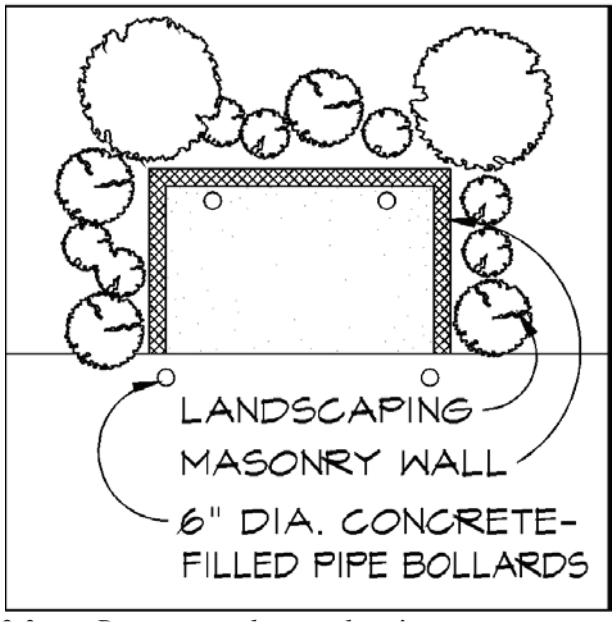
Use masonry walls or metal panel privacy fences to screen storage areas. Metal fence shall have factory finish with 20-year warranty.

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.



2-3s Screen Matches Adjacent Building in Administration/ Community Area



2-3t Dumpster Enclosure, Plan View

2-3u Dumpster Enclosure Matches Masonry of Near by Buildings

2.3.10 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.

Site components and the spaces in between buildings should be as carefully planned as the spaces within buildings.

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.

2.3.10.1 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.

2.3.10.2 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.

Tables and benches should be made from wood or recycled materials. Color shall be gray or brown tones (Figure 2-3v).

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 2-3w).

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

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.

2-3v Benches May be Made from Wood or Recycled Materials

2-3w Trash Can/Ash Receptacles at Commissary Entrance Constructed of Precast Exposed Aggregate Concrete with Tan Plastic Tops.

2.3.10.3 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 2-3x).

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.

2.3.10.4 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.

2.3.10.5 Newspaper Vending Machines and 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.

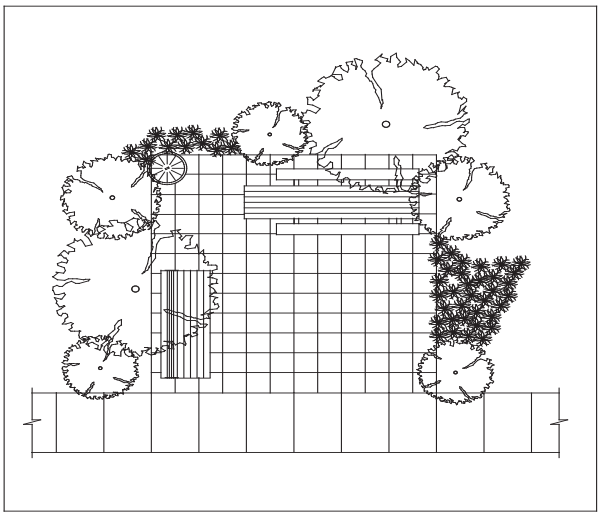
2.3.11 INFRASTRUCTURE

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.

Limit continued expansion of the infrastructure.



2-3x Seating Areas Provide Opportunity for Socializing Along Paths

2.3.11.1 Color

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

2.3.11.2 Screening

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

2.3.11.3 Lighting

Rectangular shaped luminaries are preferred for high-profile locations and dark colored cobra heads for outlying sites. Use consistent lamp types.

2.3.11.4 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 its 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.

2.3.11.5 Security

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

2.3.11.6 Fire Protection

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

2.3.11.7 Sewer

Gravity flow sewers are desired when siting multiple facilities.

2.3.11.8 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 fluorescent and high-intensity discharge lighting.

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

Avoid using incandescent lights for all interior and exterior applications.

CHAPTER 3.0 – ARCHITECTURAL

Our buildings and the areas around them provide not only our places of work and relaxation but also reflect our sense of pride in ourselves. As such, each building should be convenient 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 of the buildings and the influence of the site.

3.1.0 INTERIOR SIGNS

3.1.1 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.

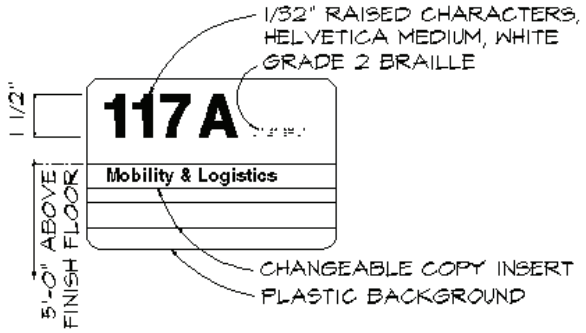
Neutral colors or brushed metals are preferred in most buildings.

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 3-1a).



3-1a Interior Room Identification Sign

3.1.2 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.

3.1.3 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.

3.1.4 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."

3.1.5 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.
- Sign centerline shall be 60 inches above the floor.

Permanent room number signs shall have 1½-inch high numbers raised 1/32 inch and Grade 2 Braille to comply with ABA requirements (Figure 3-1a).

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 3-1a). Lettering should be upper and lower case Helvetica Regular type style.

3.2.0 STRUCTURAL

3.2.1 Wind Speed Design:
All structures should be designed for a minimum wind speed of 100 mph.

3.2.2 Roof Live Load:
Design structures for a minimum 20-psf roof live load.

3.2.3 Wind Rating:
Design all roofs to meet UL-90 wind rating.

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

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

3.2.6 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.

3.2.7 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.

3.3.0 ARCHITECTURAL – GENERAL

3.3.1 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 (ETLs); 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 cognizant fire protection engineer (FPE), projects with little or no fire protection considerations may not require a fire protection design analysis.

100% Design Submission. The project FPE must review the 100% 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 100% 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.

- Demolish unusable buildings and avoid re-locatable buildings, metal sheds, and trailers.
- The reuse of temporary facilities is highly discouraged.

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.

3.3.2 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.

3.3.3 Additions

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.

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.

3.3.4 Force Protection/Anti-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.

Use distance in a positive way.

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

3-3a Building 590 Addition

Provide adequate lighting.

Place utilities underground.

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

3.4.0 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.

3.4.1 General

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

- Sites should permit open landscape space around buildings.
- 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.

3.4.2 Environmental Stewardship

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

Design Facilities in ways to enhance environmental quality. Site planning shall minimize the negative impact on the natural environment.

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

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.

3.4.3 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 3-5a)

- 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, sectionalizers 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.

3.4.4 Site Development Pattern

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

3-4a Utility Equipment and Trash Receptacles Located and Screened Appropriately

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.

3.4.5 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.

3.5.0 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 indigenous landscaping that requires little or no irrigation and little or no maintenance.

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.

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.

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

Wall panels must have sufficient intermediate supports to limit deflection under maximum design wind loads so as not to destroy weather seals.

Provide weather vestibules at main entrances.

3-5a Sloped Roof Forms and Simple Massing of 820th Security Forces Group Facility.

3.5.1 Industrial Buildings

Use simple functional forms for industrial buildings (Figures 3-7b & 3-7c).

Incorporate smaller additive forms to give human scale to larger building masses (Figure 3-7b).

3-5b Sloped Roofs and Additive Forms give Human Scale to Large Building Masses.

3-5c C-130 Wash Rack: Simple, Functional Form

3.6.0 ROOFS

3.6.1 Form

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.

3.6.2 Roof Material

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

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

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.

3.6.3 Not used

3.6.4 Roof Warranties

Use proven, cost-effective roof systems with high durability and weather resistance.

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.
- Fiberglass Reinforced Asphalt Shingles: 20 years

3.6.5 Clerestories

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

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

3.6.6 Gutters and Downspouts

Gutters may be exposed or integrated into the fascia design.

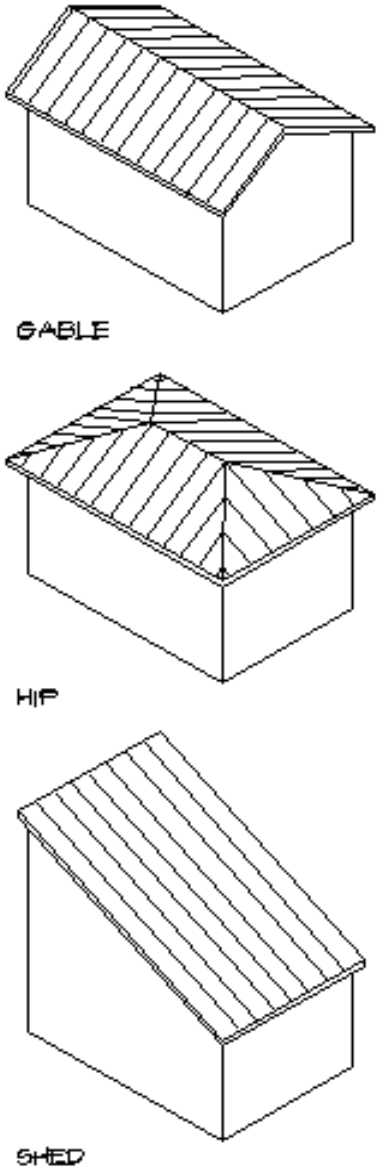
Downspouts may be exposed. Exposed downspouts shall be factory finished. Detailing to integrate downspouts into exterior wall design is encouraged (Figure 3-6b).

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.

If 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.



3-6a Basic Roof Forms

3.6.7 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 gray. 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.

3-6b 820th SFG Facility Incorporates Exposed Gutters with Downspouts Recessed into Pilasters

3-6c Roof Ventilation

3.7.0 ENTRANCES

3.7.1 Visibility

At least one building entrance must be clearly visible from the main viewing street and the parking area (Figures 3-8a & 3-8b)

Each building entrance must be readily identifiable.

3.7.2 Entry Sequence

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

3.7.3 Protective Cover

All 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.

3.8.0 FASCIAS AND SOFFITS

3.8.1 Soffits

Soffit material should be factory finished metal or Portland cement plaster.

An alternate soffit material 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 3-8c).

Consider use of deep soffits or roof overhangs to shade exterior walls and windows during summer months (Figure 3-8d).

3.8.2 Fascia and Trim

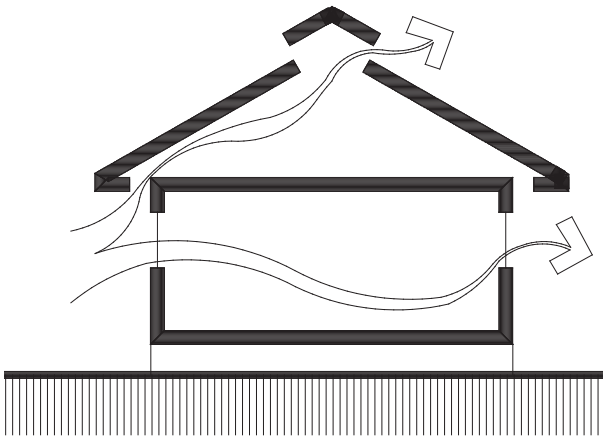
Fascia material shall be metal, factory finished.

- 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. (Figure 3-11a)

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

3-8a Commissary Entrance is Easily Identified from Parking Lot and Street

3-8b 820th Security Forces Group Building Entrance



3-8c Use Soffit Vents and Ridge Vents or Louvers to Ventilate Roof and Attic Spaces when Energy Code Allows

3-8d Deep Soffits and Balconies Shade Dormitories from Summer Sun.

3.9.0 EXTERIOR WALLS

3.9.1 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 3-11b & 3-11c)

- 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.

When painting fire exits and secondary doors, do not paint over any identification stickers or labels showing listed door fire rating.

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

3-9a Residential Structure at Grassy Pond, where Wood Fascia and Trim May be Used.

3-9b Examples of Acceptable Brick and CMU Usage on the 347th Security Forces Squadron Facility.

3-9c Examples of Acceptable CMU Usage on the Deployment Center Facility.

3.9.2 Materials (by Location/Area)

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

Administration/Community/Retail Area:
Primary exterior wall finish material shall be brick (Figure 3-12a & 3-12b).

Accent Material: Cast stone (architectural pre-cast concrete) may be used as an accent material on buildings. Color of cast stone shall be compatible with brick color and color of stucco fascias.

Flight Line/Industrial:
Primary exterior wall finish material shall be integrally colored and textured concrete masonry units.

Pre-finished metal wall panels may be used. The following requirements apply to use of metal wall panels:

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

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.

Grassy Pond Area: Unaccompanied-Recreation Area
Refer to Section 1.11.0 of the Architectural/ Engineering Guide for Grassy Pond requirements.

3.9.3 Not used

3-9d Furniture Store in the Administration/Community/ Retail Area

3-9e Administration/Community/Retail Area - Shoppette (BLDG 554)

3-9f BLDG 649 (Flight Line/Mission Area).

3.9.4 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 be used for detailing.

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 much as possible.

3.9.5 Wall Construction:

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

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

3.10.0 WINDOWS AND DOORS

3.10.1 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 operable windows in all occupied spaces. Specify insect screens and accessible hardware.

- 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.

3-10a Split-Face Concrete Masonry with Special Watertable Shape and Split-Rib CMU Base

3-10b 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

3-10c Future Buildings in the Administration/Community Area will Match the Brown Brick and Dark Bronze Metal Roof of the Class Six Facility.

3-10e Brick and Mortar Colors of the Existing Community Center Buildings Set the Standard for Exterior Wall Materials in the Administration/Community Visual Area

Incorporate overhangs, porches, colonnades, high performance glazing and other strategies to block direct summer solar gain (Figure 3-14a).

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.

Energy-efficient glazing for windows is required.

3.10.2 Materials

Windows shall have aluminum, thermal-break frames.

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

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

Secondary Exterior Doors and Frames: Specify hollow metal doors and frames on all facilities. Hollow metal doors and frames should be galvanized, factory primed, and field painted.

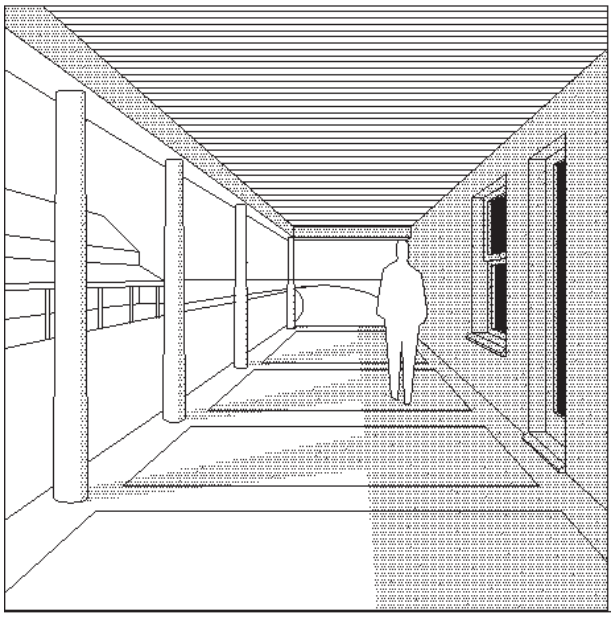
Primary Entrances: Aluminum storefront will be used at primary entrances.

- 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.

3.11.0 FINISH HARDWARE

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



3-10d Colonnades and Overhangs Shade Building Exterior and Reduce Cooling Loads.

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.

3.12.0 NOT USED

3-12a Main Hospital Building, 3280 Mitchell Blvd.

3-12b Existing Facilities in the Medical Campus

3.13.0 OUTDOOR PAVILIONS AND PICNIC SHELTERS

Where shelters are located near other buildings, materials shall ***complement*** adjacent building.

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. Underside of roof deck shall be considered a finished surface (i.e. exposed fasteners protruding through decking are unacceptable).

3-14a Outdoor Pavilion Matches Materials of Adjacent Buildings in Unaccompanied Housing Area

3-14b Picnic Shelter in an Outdoor Recreation Area

3.14.0 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.

3.14.1 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

3.14.2 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.

3.14.3 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.

3.15.0 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.

Provide an efficient HVAC system.

Incorporate natural and task lighting to minimize energy use; to add warmth and contrast, use recessed or indirect lighting

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.

Keep mechanical rooms clean and avoid using them for storage; paint walls, floors, equipment, piping, and conduit; maintain insulation and protection systems in good order

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.

3.16.0 PERMANENT FINISHES

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

Removal and re-installations of these finishes may be costly and may be a major disruption to the facility.

3.16.1 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.

3.16.2 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 shade.

3.17.0 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.

3.18.0 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.

3.18.1 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.

3.18.2 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.

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.

Using VCT, Sheet Vinyl, Laminate Flooring, etc:

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

3.18.3 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.

3.18.4 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.

3.18.5 Paint

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

3.18.6 Wainscot and Chair Rail

Wainscot is not recommended in most areas. A type II heavy duty vinyl wallcovering installed floor to ceiling will have a better effect.

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.

3.18.7 Doors and Door Frames

Depending on the quality of the doors, they may be either stained or painted.

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

3.18.8 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.

3.18.9 Ceilings

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

3.18.10 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.

Removable tack boards can be purchased in a colored or patterned accent fabric.

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

4.0 MECHANICAL

4.1.1 General

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

Asbestos containing materials (ACM) shall not be used, even 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, where possible.

Life cycle cost shall be considered in fuel choice.

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.

4.1.2 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.

4.1.3 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

4.1.4 Water, Gas, and Fuel Systems

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. (see 4.5.11)

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 UFAS 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.

4.1.5 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 larges piece of 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.

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

4.2.0 HVAC

4.2.1 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.

For air-to-air unitary heat pumps up to 19,000 btuh, the minimum SEER is 11.0. For units over 19,000 btuh, the minimum SEER is 13.0.

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

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.

4.2.2 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.

4.2.3 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 "balanceability."

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.

4.2.4 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 in necessary.

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

4.2.5 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.

4.2.6 Coils

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

Specify drainable and cleanable coils.

4.2.7 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.

4.3.0 REFRIGERANT EQUIPMENT

4.3.1 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.)

4.3.2 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.

4.3.3 HVAC Refrigerant Systems

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.

4.4.0 PIPING

4.4.1 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.

4.4.2 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.

4.4.3 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:	COLOR OR LETTERING:
Boiler feed water	*Yellow*	*Black*
Chilled water	*Green*	*White*
Condensate return	*Yellow*	*Black*
Condenser water	*Green*	*White*
Hot water supply/ret	*Yellow*	*Black*
Make up water	*Green*	*White*
Steam supply	*Yellow*	*White*
Fuel	*Yellow*	*Black*

4.5.0 PLUMBING
Code Compliance

Plumbing shall comply with the following codes.

- International Plumbing Code (IPC)
- International Building Code (IBC)

Provide schematic water & sewer layouts.

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

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

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

4.5.4 Pressure Testing
All piping shall be properly pressure tested.

4.5.5 Valve Installation
Install valves with stems upright or horizontal, not inverted.

4.5.6 Installing for Servicing and Cleaning
Install each fixture with trap, easily removable for servicing and cleaning. Provide all lavatory faucets with washerless dual controls in restrooms.

4.5.7 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.

4.5.9 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. External switch provided for quick connection of mobile emergency generator.

4.5.10 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.

4.5.11 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.

4.5.12 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.

5.0 - Electrical

5.1.0 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.

5.1.1 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. This will point out potential interference between different utilities.

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.

5.1.2 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.

5.2.0 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. MVA: At a minimum, use 400 MVA 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.

5.2.1 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.

5.3.0 EXTERIOR POWER

A. Underground:

Feed all new facilities underground.

1. All primary underground feeders and secondary feeders from the transformer to the service entrance shall be installed in concrete-encased duct as described below.

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.

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 Sectionalizers. Add one ¾" 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. Handholes 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 padmounted air switch to padmounted air switch, riser pole to padmounted air switch, 600 amp sectionalizer to 600 amp sectionalizer, or padmounted 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 Padmounted 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 sectionalizers: Use 3 - 1/C #2/0, 15 KV with #2 THWN neutral

   c. From existing 200 amp sectionalizers: Use 3 - 1/C #2/0, 15 KV with #2 THWN neutral.

E. Manholes and Handholes:

1. Primary manholes:

   Do not use manholes for pulling points or splices in a main line. Instead use sectionalizers as needed to keep cable connections/splices above grade with run lengths not more than 450 feet.

   Cable will wrap around inside manhole/ handhole allowing max amount of cable for slack purposes.

2. Primary (for #2, 15 KV cable only) and secondary handholes shall be 4' X 4' X 4'. All sides and bottom shall be concrete.

   a. Do not use handholes for main lines. Handholes may be only be used in single feeder runs from a sectionalizer or airswitch

to transformers as needed.

b. Turns of 90 degrees or more shall use secondary handholes or runs greater than 300'.

3. Core-drill all raceway openings in existing manholes/handholes 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. Padmount 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 deadbreak junctions

2. Dead front with 600 amp rated junctions.

3. Place 600 amp insulated protective caps on ends of all connectors and deadbreak 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 deadbreak 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.

5.4.0 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 padmounted transformers. Otherwise, feed from adjacent buildings served by the parking lots.

e. Parking lot and area lighting shall be 400w Metal Halide, 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

1. Only provide where adjacent parking lot lighting is insufficient for street level.

2. 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 High pressure Sodium, Cobra Head fixtures. Poles shall be round, tapered aluminum shaft

3. Fixtures shall be controlled by individual photocells on each fixture. Photocells shall activate at 3 foot-candles of ambient light.

4. Feed at 277 V. If feasible, feed by panelboards mounted adjacent to padmounted 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 -- Lithonia KBR6 series with 70-High metal halide 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 metal halide 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.

5.4.1 EXTERIOR LIGHTING SPORTS

All lighting shall be metal halide. Calculate lighting levels based upon IES (Illumination Engineering Society) for maintained levels. Type of sports facility shall dictate the type of control (photocell/ timer) needed

1. Type: All lighting shall be metal halide.

2. Poles - All pole construction shall be aluminum set in a concrete base.

5.5.0 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.

5.6.0 SYSTEM GROUNDING

A. Ground Electrode For Electrical Service:

For new construction., provide a tripod set of ground rods 20 feet apart with thermit-welded bare copper 4/0 wire between them. The closest ground rod to the facility shall be at least 10 feet from the facility.

5.6.1 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 ½ 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.: Receptacles 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 of 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.

5.7.0 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 reasonings 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.

5.8.0 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 recepticles, 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 recepticles, 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 minium 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 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.

5.9.0 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. Industrial Areas

   a. Highbay 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. Lowbay 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.

   d. All dimming systems shall employ switching scenes that will return emergency lights to full brightness upon loss of normal electric power.

5.10.0 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. Install an emergency light in each electrical and mechanical room.

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.

6. All dimming systems shall employ switching scenes that will return emergency lights to full brightness upon loss of normal electric power.

B. Exit Signs

1. For facilities greater than 25,000 SF, exit signs shall be connected to a central emergency unit.

2. For facilities less than 25,000 SF, exit signs shall contain an integral battery for 90 minutes of illumination.

3. All exit signs shall be LED type. Exit signs in lobby or vestibule shall be clear with red lettering.

4. Self-illuminating or reflective types are not allowed.

5.11.0 FIRE DETECTION AND ALARM SYSTEMS, INDIVIDUAL BUILDING MASS NOTIFICATION SYSTEMS (FOR NEW SYSTEMS)

A. General

1. Fire Alarm system shall be addressable Style 6 signal line circuits and Style Z indicating appliance circuits.

   Notifier NFS2-640 panel with Notifier FCPS-24S8 remote power extenders as needed for a combined fire alarm and mass notification panel.

   a. For Projects with Fire Alarm Only:

      Notifier NFS-320 (preferred choice for applications with 1 SLC loop), Notifier NFS2-640 (for cases that may desire 2 SLC loops), or Monaco M2.

   b. Radio Transmitters:

      For Projects with Fire Alarm and Mass Notification: Monaco BT-XM with associated antenna, mounting brackets, cabling, and surge arrestor.

   For Projects with Fire Alarm Only: Monaco BT-X associated antenna, mounting brackets, cabling, and surge arrestor.

   a. Remote (LOC) local operator console: Wheelock SP4-LOC with microphone and emergency HVAC button

   b. Remote digital display annunciator for lobby area.

2. Fire alarm and mass notification shall use the same speakers. Design the system in accordance with Fig. 4-1, UFC 4-021-01 dated 9 April 2008 but do not use any displays. The combined system shall use speakers for notification with clear strobes marked “ALERT”.

3. 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.

   a. In large open administrative spaces, speakers shall be evenly spaced throughout in the ceiling.

   b. 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.

4. Local operator console with microphone shall be located in an accessible location for local control of emergency messages.

5. 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.

6. 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

7. Qualifications:

   a. Provide all qualifications and certificates in the submittal.

8. Separate raceways shall be provided for the SLC loop.

9. SLC wiring shall use shielded wire. Wire sizes shall be determined based on voltage drop calculations in the shop drawings.

10. 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.

11. 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.

12. Use only two-conduit looped system with supply and return conductors separated by 1 foot vertical and 4 foot horizontal. Follow NFPA 72 recommendations on this as if this is a "shall" requirement in this standard.

    a. Fire alarm riser shall be drawn as a two-loop conduit 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 liquidtight 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 makings.

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.

6.0 FIRE PROTECTION

6.1.1 Code Compliance:

All fire protection systems should comply with the latest edition of the following codes:

- National Electrical Code (NFPA 70) w/ amendments.
- International Fire Prevention Code (NFPA 72)
- Life Safety Code (NFPA 101)
- Unified Facilities Criteria (UFC) Design: Fire Protection Engineering for facilities, UFC 3-600-01. (Dated 26 September 2006 with change 1, 14 July 2009)

Base Compliance:

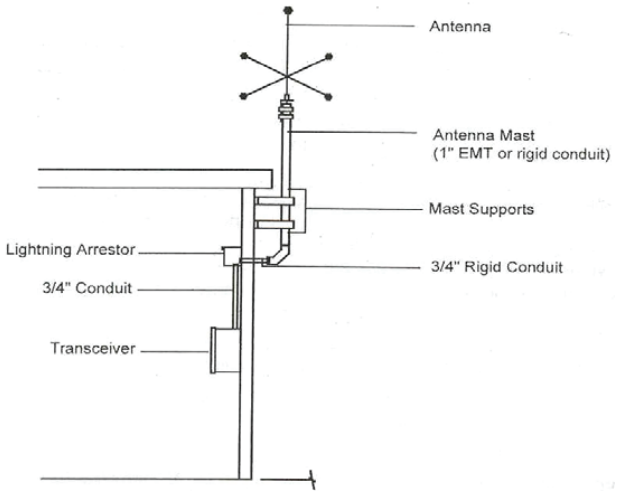
- Provide sprinkler system
- Provide sprinkler system test connection at the end of the most remote branch line.
- Do not use fixtures with wall-mounted battery packs unless it is unavoidable.
- 100% design submittal shall include a note that reads as follows. (100% DESIGN SUBMITTALS WILL CONTAIN A LETTER FROM THE PROJECT FIRE PROTECTION ENGINEER STATING "This design is in compliance with UFC 3-600-01, and all applicable criteria."

6.1.2 Fire Alarm Systems:

The building fire alarm control panel shall report alarm, trouble, or supervisory signal to the fire tower via a proprietary Monaco Fire Reporting System. The design shall provide a Monaco BT 2-7 transceiver, 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 6-1a).

Provide addressable fire detection systems in large buildings, non-addressable fire detection systems for smaller buildings. The size of the building shall be determined in the project Statement of Work.

Provide a full Spectrum Threat Response/ Mass Notification System when required in the statement of work. See Section 11.0 Full Spectrum Threat Response/Mass Notification System, FSTR/ MNS for requirements.



6-1a Diagram for Antenna Mount

Fire alarm control panel shall be installed in the mechanical room.

6.2.0 General:

The fire protection system(s), including standpipes, sprinklers, hoses, accessories, and extinguishers for both exterior and interior systems are to be completely described, drawn, and specified in conformance with appropriate technical manuals and NFPA codes.

The fire alarm requirement is to be coordinated with the electrical central alarm system.

The sprinkler system piping shall be designed to assure free draining to riser drain valves.

The fire alarm/detection system shall be compatible with the existing on-base system.

The design shall identify the required fire protection and life safety features such as protection of vertical openings, interior finishes, signaling systems, extinguishing systems, segregation or protection of hazardous conditions, smoke partitions, fire doors, and building service equipment.

The design shall provide for an adequate outside fire protection, including water supply/storage and accessibility by the fire department.

The locations of detail fire alarm system appurtenances and all automatic fire doors, fire

and/or smoke dampers, ceiling dampers, and fire protection means of similar nature associated with air duct systems are to be shown on the electrical and mechanical drawings.

The fire extinguishing system, smoke evacuation systems, and related systems and equipment are to be designed so that their proper operation does not depend upon a high degree of sophisticated maintenance. A highly reliable and easily maintainable, cost-effective system is the design objective.

Provide backflow prevention on domestic and fire suppression.

7.0 ENVIRONMENTAL

7.1.1 Hazardous Materials

Materials determined to cause a hazard to health shall not be used in construction at Moody Air Force Base.

7.1.2 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.

7.1.3 Permits:

The Architect/Engineer will obtain all permits necessary for the construction of projects.

This includes permits required by the Department of Health and Environmental Control, State Highway Department, Environmental Protection Agency, Corps of Engineers and other state and local governments.

Examples of the types of permits that the Architect/Engineer would have to acquire include the following:

- NPDES Permits
- Air emission permits
- Underground storage permits
- Water system construction permits
- Sewer system construction permits
- Highway construction permits

7.1.4 Off-Base Waste Material Disposal

When 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 Contract Manager so that they can keep a log of the amounts of construction debris that is deposited in the landfills.

Asbestos, lead-based paint and hazardous waste debris tickets should be submitted to the Civil Engineering Contract Manager.

NOTE: Ensure that this policy on waste disposal tickets is clearly written into the specifications, or else Moody AFB cannot enforce it.

7.1.5 Environmental Standards:

All design work should comply with all current environmental standards.

7.1.6 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

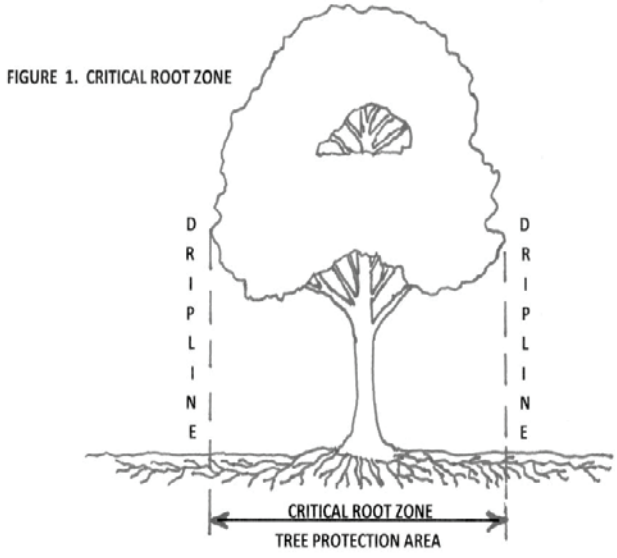


Fig 1. Critical Root Zone

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.

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."

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 in areas:

- where underground distribution system is heavily populated
- where obstructions are numerous
- when loss of service is unacceptable
- where planned growth of the underground distribution system requires ready access to cables and splices
- A manhole duct system shall be used when crossing under flight line areas (aprons, parking ramps, runways, taxiways, etc.).

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)

All equipment located in the CER shall have a minimum clearance of 36" on each side of the equipment

Location:

- Should be located on first floor with exterior wall
- Should not be collocated 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])

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)

Equipment

- Telephone backboards shall be 4x8 feet, ¾-inch

thick with two coats of insulating fire-retarding varnish.

Patch panels for CAT 6 cables shall be cabinet mounted copper patch panels with RJ45 connectors on the front and individual 110 or similar type termination on the back of each connector. Connectors must comply with EIA/TIA 568A Cat 6 requirements.

Each rack should also include a 20-Amp, 10-receptacle power strip.

Environmental control:

- All CER shall have a stand alone wall mounted, split system to control the temperature in this space

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)

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

Data

- Copper
  - » EIA/TIA 568A Cat 6
  - » Length (max. 295 ft [90m])
- Fiber
  - » ANSI/EIA/TIA-492AAAA

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 706) 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 wit ha 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 706 & 617, including software and screen-up dates

8.2.3 Existing Alarm Systems

Provide complete compatibility with existing fire alarm reporting system.

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

8.4 TELEPHONE SYSTEM

Provide ¾" exterior grade plywood back board for telephone equipment.

- Board shall be a minimum 4'widex8'tall.
- Provide adjacent convenience outlet for maintenance power tools.
- Provide electrical outlet in board for equipment.

Provide telephone pre-wiring in conduit to each location identified by the user.

X.1.0 PUBLICATIONS, CODES, COMPANIES, ETC:

AFCESA Library	http://www.afcesa.af.mil/library/etl.asp
Air Force e-Publishing Homepage	http://www.e-publishing.af.mil
ADA (Americans with Disabilities Act)	http://www.ada.gov/stdspdf.htm
AFI 84-105	http://www.e-publishing.af.mil/pubfiles/af/84/afi84-105/afi84-105.pdf
CENTCOM (US Central Command)	http://www.centcom.mil/
ETLs (Engineering Technical Letters)	http://www.afcesa.af.mil/library/etl.asp?Category=Engineering%20Technical%20Letters
Manual of Uniform Traffic Control Devices	http://mutcd.fhwa.dot.gov/
NFPA Standards	http://www.nfpa.org/index.asp
OSHA (Occupational Safety and Health Act)	http://www.osha.gov/
SOUTHCOM (US Southern Command)	http://www.southcom.mil/
UFAS (Uniform Federal Accessibility)	http://www.access-board.gov/ufas/ufas-html/ufas.htm
UFC (Unified Facilities Criteria)	http://65.204.17.188/report/doc_ufc.html
UFC 3-120-01 *(formerly AFPAM 32-1097)*	http://www.ccb.org/docs/UFC/3_120_01.pdf
USAF Installation Force Protection	http://www.afcee.brooks.af.mil/dc/dcd/arch/force.pdf
Air Force Irrigation Design Guide	--
USAF Xeriscape Design Guide	--
Best Lock Co	http://www.bestlock.com/
Grade 2 Braille	http://www.brailleauthority.org/def.html
IBC (International Building Code)	
EC (Electrical Code)	
IEC (International Energy Code)	
IEBC (International Existing Building Code)	
IFC (International Fire Code)	
IPC (International Plumbing Code)	
IMC (International Mechanical Code)	
SSD (Air Force Sustainable Design Development Policy)	http://www.afcee.af.mil/shared/media/document/AFD-080609-022.pdf
IFGC (International Fuel Gas Code)	

X.2.0 EXTERIOR MATERIALS, ETC:

Fluoropolymer factory finish/coating e.g. Kynar 500	http://www.kynar.com
Helvetica Medium style text	Helvetica
Georgia Power's "Good Sense Rule"	http://www.southernco.com/gapower/home.asp

X.2.0 INTERIOR MATERIALS, ETC:

Brown-tone or grey-tone neutrals.

VCT, Sheet Vinyl, Laminate Flooring, Stratica®, etc – mottled, flecked, speckled, wood, or stone pattern (avoid light tones).

Type II wallcovering.

Corian®, Avonite®, etc – Flecked, speckled, mottled, textured, or stone look in matte finish

Ceramic Tile, Porcelain Tile, Natural Stone and Cast Stone Flooring – mottled, flecked, or speckled pattern (med. to dark toned grout).

Carpet: Yarns of bold tweed must be in mid-range to dark tones in color.