

# Unaccompanied Housing Design Guide



UNITED STATES AIR FORCE

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# CHAPTER 1 INTRODUCTION

## A. EXECUTIVE SUMMARY

The intent of this guide is to provide the basic criteria to plan, program, design, and construct Air Force Pipeline Student Housing and Permanent Party Unaccompanied Housing. Previous guidance focused on E1-E4 requirements only and did not consider E5-E9 and officer Unaccompanied Housing requirements. This most recent inclusion of Non-Commissioned Officers (NCO), Senior Non-Commissioned Officers (SNCO), and officer requirements provides installations and Major Commands the opportunity to ensure consistency and flexibility in design and construction while enhancing quality of life. While this guide focuses on permanent party Unaccompanied Housing requirements, basic requirements for Recruit Housing & Training (RH&T) and Pipeline Student Housing are also included.

Guidance provided for Dorms-4-Airmen module configuration and space allocation is prescriptive. Guidance for E5-E9 and officer Unaccompanied Housing is more descriptive in nature with an emphasis on flexibility and installation specific requirements. Conceptual plans developed for these grades emphasize an increased Net Living Area (NLA) within individual modules and take precedence over other Air Force guidance.

Chapter 2 Planning and Programming addresses specific considerations for Unaccompanied Housing construction standards and space requirements and describes authorized variations in scope and criteria including installation specific requirements. Chapter 3 Facility Design introduces general site and building design considerations including conceptual module plan and building plan configurations. Chapter 4 Resources and Links provides a comprehensive list of resources and links to be used in conjunction with this guide.

## B. SPECIFIC GUIDANCE

### 1. Dorms-4-Airmen

E1-E4 guidance was developed from the Office of the Secretary of Defense (OSD) E1-E4 enlisted Unaccompanied Housing design standard, called the “1+1” standard issued on 6 November 95, and modified by OSD letter dated 25 June 01. The OSD changes provide excellent opportunities for the Air Force to improve the quality of life for airmen living in Permanent Party Unaccompanied Housing. Adoption of this guidance allows the Department of Defense (DoD) additional flexibility in the design and construction of Unaccompanied Housing with use of comparable industry standards. More importantly, eliminating the module gross area restriction allows DoD to best use limited space to increase the individual room spaces in each module. The previous 11 M<sup>2</sup> limitation on room size for E1-E4 airmen is eliminated, allowing greater flexibility and livability; however, the new criteria changes do not permit increased costs over the previous criteria. The Gross Building Area (GBA) limitation remains unchanged, but flexibility within the building is enhanced.

The four-bedroom module design (Dorms-4-Airmen) developed for E1-E4 Unaccompanied Housing is based upon increased and enhanced Air Force criteria, detailed analysis of square footage requirements and constraints, and prototype development. Conceptual module plans are provided in this guide for both new construction and renovation and shall be used as the new standard for Air Force E1-E4 construction.

## **2. NCO/SNCO/Officer**

This revision provides conceptual guidance for Unaccompanied Housing occupied by E5-E9 and officer personnel, allowing projects to be scored and programmed similar to E1-E4 Unaccompanied Housing requirements, with results rolled into the Air Force dormitory program. These types of dormitory facility requirements and projects were historically excluded from the Air Force dormitory program. The guidance presented in this document will provide the tools necessary to program all Unaccompanied Housing categories, emphasizing flexibility and conceptual planning guidance to enhance quality of life for the residents.

Similar to the development of the Dorms-4-Airmen module plans, a detailed analysis of square footage requirements and constraints led to the development of conceptual module plans for E5-E9 and officer Unaccompanied Housing. Existing officer MILCON designs and Dorms-4-Airmen configurations were considered to ensure flexibility based on installation requirements. All of the plans developed are conceptual and are provided to ensure a consistent level of quality during design and construction. A recommended Net Living Area (NLA) for NCO, SNCO, and officer grades was established based on existing MILCON construction and increased Air Force criteria. This recommended NLA takes precedence over other Air Force guidance and encourages maximum module living area more comparable to Military Family Housing area allowances.

Conceptual plans included show variation in NLA of different module configurations while maintaining the maximum GBA. As a module configuration evolves from linear to elongated, additional NLA can be realized within the modules based on reduced building circulation requirements. Based on the recommended NLA and to provide a private apartment for NCO grades, a dormitory facility constructed solely for this grade will greatly exceed the maximum GBA allowed. Thus, recommend mixing higher grades with an increased GBA allowance with the construction of NCO modules to maintain the overall GBA for the facility. When considering the use of the Dorms-4-Airmen footprint and a mix of NCO modules within this footprint, the maximum GBA allowance of a NCO module must be balanced with a reduction in space elsewhere in the facility. A conceptual building plan using a mix of NCO modules within the recommended NLA on the third floor of a Dorms-4-Airmen dormitory will continue to exceed overall GBA.

## **3. Installation Requirements**

Installation specific requirements will impact floor plans and building configurations in Unaccompanied Housing design and construction. Geographical location requirements such as sub-arctic climates, high-rise construction, host nation requirements, and Collective Protection System (CPS) requirements are accounted for in *Chapter 2 Planning and Programming*. Other variations within criteria, scope, and program dollars for new construction will require approval from HQ USAF /ILEH. Variations in NLA and GBA for renovation projects based on site specific requirements are allowed based on OSD letter dated 6 November 1995 and do not require further approval.

When an installation has Unaccompanied Housing requirements including various grades of enlisted and officer personnel, especially in OCONUS or remote locations, new dormitory facility design and construction may require greater flexibility to support a mix of residents. Mixing of modules for CGO (01-03) with SNCO (E7-E9) grades within the same dormitory facility is permissible if officer and enlisted separation within this facility can be maintained by building wing or floor configuration and if this mix is required for efficiency of construction, unit integrity, or other justifiable installation specific requirements.

## C. SCOPE AND USE

### 1. Application

This guide is applicable to all Unaccompanied Housing projects in the continental United States and overseas and applies to new facilities and renovation projects. This guide provides basic criteria for determining:

- Programming requirements
- Site selection and master planning
- Facility design
- Landscape design
- Interior design

The design criteria in this guide apply to all dormitory types (Corridor Access, Balcony Access, and Breezeway Access) unless noted otherwise.

### 2. Limitations

This document provides detailed general information needed to produce a programming plan or conceptual design for all projects. Use this guide in conjunction with other Air Force and Department of Defense (DoD) documents that give related guidance including those referenced in *Chapter 4, Resources and Links*. This is not a cost estimation document; consult Headquarters Air Force Civil Engineer Support Agency (HQ AFCESA) for cost estimation guidance. Reference the *HQ AFCESA Cost Engineering Program* and the most current Air Force Dormitory Master Plan for specific project planning guidance.

Unique design requirements of a specific project should be addressed individually at the local level. This design guide is not a substitute for research required by programmers and designers, and it recognizes that the Major Commands may and frequently do have special requirements for Unaccompanied Housing facilities. Adherence to installation and Major Command facility design standards and facility excellence guides is critical. Required minimum NLA and construction standards are mandatory as provided in *Chapter 2 Section B Specific Considerations* of this guide. All other programming and design requirements included in this guide are minimum standards and/or recommendations and are subject to local requirements and interpretation.

## D. GOALS

This guide sets overall Air Force policy, but includes flexibility to meet local needs to the greatest extent. This design guide serves to provide a better understanding of the many issues involved in quality housing for our unaccompanied enlisted and officer personnel. It also promotes cradle-to-grave teamwork in the project development and execution process from requirements identification through beneficial occupancy.

Air Force facilities project quality by their appearance, ambiance, and fulfillment of functional requirements and mission objectives. Quality is derived from a professional commitment by users, planners, programmers, and designers to achieve understated excellence through the delivery of complete and usable facilities. To achieve quality results, Unaccompanied Housing shall satisfy the design intent, be durable, easily maintained, incorporate applicable force protection measures, and present a positive image of the Air Force in its role as caretaker of personnel as well as the environment.

Air Force Unaccompanied Housing projects will exhibit leadership in sustainable and environmentally responsible design and construction. These projects will also comply with the latest edition of the *DoD Minimum Antiterrorism Standards for Buildings*.

## CHAPTER 2 PLANNING AND PROGRAMMING



Buckley Air Force Base



Vandenberg Air Force Base

### A. OVERALL CONSIDERATIONS

Successful dormitory facilities require involvement of the entire facility delivery team early in the process to fully develop facility requirements to identify the appropriate cost, develop programming documents, and deliver the project on-time and within budget.

#### 1. Project Team

A number of people have an interest in the delivery of quality Unaccompanied Housing facilities. Each has their own criteria for what is important, and each plays a vital role in establishing design criteria. The following is a list of these team members:

- Unaccompanied Enlisted Personnel
- Unaccompanied Officer Personnel
- Command Chiefs
- First Sergeants
- Commanders
- Community Planners, Architects, Landscape Architects, Engineers and Interior Designers
- Operations and Maintenance Personnel
- Dormitory/Housing/Furnishing Management Personnel
- Fire Department, Security Forces and Safety Personnel
- Environmental and Bioenvironmental Engineering Personnel

#### 2. Project Initiation

The Air Force Dormitory Master Plan (DMP) is conducted under the direction of Headquarters, United States Air Force, Housing Division (HQ USAF/ILEH). The overall objective of the plan is to perform an Air Force-wide analysis of unaccompanied enlisted and officer personnel housing requirements, assess existing facility conditions, and provide future-year program renovation and new construction recommendations.



### 3. Project Definition

Early and accurate establishment of scope and cost is critical to the development of programming documents in support of dormitory projects. Requirements documents should be developed by a multi-discipline team (civil, architectural, structural, mechanical, electrical, communications, cost estimating, etc) and provide the designer and design agent with information used in negotiating the design contract and completing the project definition phase of the project. The information in this design guide provides the basis for developing the requirements.

Project definition includes space planning guidance found in *Chapter 2 Section B Specific Considerations* of this guide, as well as site design, building design and building systems guidance found in *Chapter 3 Facility Design*. Site selection has enormous affect on project costs, functionality, and customer satisfaction, and is generally part of the comprehensive planning process conducted at the installation level. Consideration to future demands placed on the capacity of supporting infrastructure and utilities in support of the project is critical and may also impact costs.

Unique local requirements concerning building program, design criteria, and code compliance should also be identified at this stage. Overseas projects shall consider requirements of host nations to ensure requirements for certification of compliance are met. Include separate line items and describe these requirements in DD Form 1391 including CPS and sub-arctic climate construction. If requirements change during later phases of design that affect scope and/or cost after project programming approval, authorization of changes must be obtained from the appropriate Major Command.

Information required for the preparation of DD Form 1391 is found in the Air Force Dormitory Master Plan which is based upon this design guide. Such information includes the functions, space allowances, overall building size, site evaluation, and special factors to consider in developing cost estimates. This guide provides data and criteria needed at each stage of the Air Force project development process. Further guidance on project definition may be found in the *Air Force Project Manager's Guide to Design and Construction*.

### 4. Project Siting

Locate Unaccompanied Housing facilities within a reasonable walking distance of all community facilities and services, such as dining facilities, fitness centers, postal service centers, base exchanges, commissaries, pedestrian circulation systems, bike paths, and mass transit routes. Programmers shall address the capacity of existing community facilities and existing infrastructure, and accommodate any additional requirements incurred by the proposed dormitory increase. The proximity of dormitory facilities to community services shall be balanced with the need for quiet and privacy.

Provide separate and distinct enlisted and officer Unaccompanied Housing areas when possible as a consideration during site selection. To achieve the optimum site plan, each design discipline shall work in concert with one another. All design disciplines involved in the site planning

process shall coordinate their design concepts to ensure the dormitory project presents a professional image of the Air Force, and encourages pride of ownership. Site planning is also influenced by base leadership through the Facilities Board. There are many factors that may influence dormitory siting decisions:

- Compliance with the General Plan
- Development and Expansion potential
- Force protection considerations
- Environmental considerations
- Proximity to existing community facilities
- Existing topography and landscape
- Available installation infrastructure
- Adjoining land uses
- Off-base communities and adjoining neighborhoods
- Vehicle circulation system, including public transportation access
- Existing Unaccompanied Housing facilities
- Availability of Unaccompanied Housing resident parking
- Existing walkways, designated bike and jogging paths
- Facilities requiring demolition
- Other factors as might be determined by the design program, such as density, the development of a campus atmosphere, obtaining Leadership in Energy and Environmental Design (LEED) certification, etc.

### **Organization and Circulation**

Critical in site development are planning factors including building orientation, mass and scale. Develop a sense of order, arrival, orientation and community in planning the site. Consider orientation and placement to ensure that dormitories are not overwhelming. Site dormitories in relationship to each other to create outdoor spaces that can be used as passive or active recreational areas.

Most dormitory facilities are three stories in height. Although this configuration requires force protection progressive collapse construction, this density ensures an efficient use of available land while avoiding additional fire protection requirements, inconvenience to occupants, and structural and life safety cost associated with buildings over three stories in height. In locations where land is constrained and force protection set back criteria severely limits configuration opportunities, high rise construction may be used to meet requirements while ensuring that other site considerations are achieved.

Achieve spatial balance and scale through thoughtful placement and arrangement of structures, landscaping and landforms. Consider availability of resident parking, especially in OCONUS locations. An illustration utilizing professional site development concepts for a typical Permanent Party Unaccompanied Housing campus is included below.



Typical Dormitory Campus Area Development Plan

### **Planned Expansion and Infrastructure**

Expansion potential for dormitory facilities usually includes the addition of more living units. It is generally impractical to build an addition onto an existing dormitory building. If the potential for adding additional living units to a dormitory project is identified during the initial programming stage, allow space in the site development plan for additional structures and size the site utilities accordingly.

### **Climatic Considerations**

Dormitory design and building orientation should consider local climate conditions and geographical requirements such as seismic or hurricane force wind design, flooding, extreme daylight or darkness conditions, and areas prevalent to forest fires. Balcony Access dormitory facilities with exterior balconies provide solar shading in warm and temperate climates where heat gain through windows is a concern, but tend to suffer from poor natural daylighting. Corridor Access dormitory facilities with central hallways are more energy efficient due to the limited number of openings to the outdoors. Where practical, use passive solar construction techniques to reduce energy consumption. Local climate conditions shall be considered as well as other site organization issues such as the creation of outdoor space, building scale or orientation to other facilities, when determining the best project site.

Site new dormitory facilities to take advantage of positive features of the site. Provide protection from undesirable winds and glare, shading from excessive sun in warm climates, and orient operable windows to take advantage of summer breezes. Solar gain and prevailing

winds can enhance energy conservation and yield significant cost savings. Consider solar heating systems where appropriate as an alternative source for domestic hot water. Building placement and design should also take advantage of views that are scenic, pleasant, or interesting. Designers shall be sensitive to the approaches to the facility and strive to create a clear sense of arrival for newcomers.

Design roof overhangs to work with sun angles to provide solar shading. This configuration is a built-in by-product of Balcony Access dormitory facilities. Achieve mutual shading by sensitively arranging adjacent structures. Avoid excessive east or west-facing glass and design for maximum cross-ventilation where feasible. In sub-arctic climates, consider the inclusion of heated or covered walkways to provide protection for the residents.

## **5. Codes and Standards**

### **Antiterrorism/Force Protection**

Follow the most current version of the *DoD Minimum Antiterrorism Standards for Buildings* for guidance on dormitory design and construction. Refer also to the *Air Force Installation Force Protection Guide* for additional information. Coordinate force protection counter-measure standards throughout the design process to ensure aesthetic consideration and compatibility. Landscape and landforms may be used to soften the impact of visual and physical barriers, as well providing buffer and set-backs, but should consider ease of maintenance. Architectural design can integrate required building and site components into the building and campus design to enhance the success of the overall project.

### **Collective Protection Systems**

Reference the most current version of the *DoD Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings* for guidance on construction standards in OCONUS locations where Collective Protection Systems (CPS) are required. CPS development is continuing to evolve and each CPS should be custom designed and built for the specific facility application. Consider the impact of these criteria and the necessary gross building area necessary to support these requirements.

### **Sustainability**

Sustainability is defined as the responsible stewardship of our natural, human and financial resources through a practical and balanced approach. Sustainability requires changes to the facility delivery process to ensure the “best fit” of the built environment to the natural and cultural environment. Sustainability integrates “green” or environmentally responsible practices into the process from the very beginning. Sustainable practices are an investment in the future. Through conservation, use of renewable building materials, improved maintainability, recycling, reduction, reuse and other actions and innovations, we can meet today’s needs without compromising the ability of future generations to meet their own.

Reference USAF policy letter *Sustainable Development Policy*, dated 19 December 2001, for direction on all dormitory projects. This memorandum states that: "It is Air Force policy to apply sustainable development concepts in the planning, design, construction, environmental management, operation, maintenance and disposal of facilities and infrastructure project,

consistent with budget and mission requirements." The *USAF Environmentally Responsible Facilities Guide* is a resource to aid in the development of new dormitory design and construction using the LEED™ Rating System as its organizing framework. The *Air Force Application Guide for Lodging Using the LEED™ Green Building Rating System* provides specific guidance for lodging facilities, but is directly applicable to dormitory facilities as well.

For further information on sustainable design, reference the *Whole Building Design Guide* (WBDG) for comprehensive and current information on sustainable design strategies and technologies. The WBDG is supported by DoD and serves as a primary source for sustainable development information and methodologies.

### **Access for Persons with Disabilities**

The design of Unaccompanied Housing should specifically accommodate the needs of able-bodied military residents. Although military dormitory facilities are exempt from accessible requirements per *Uniform Federal Accessibility Standards (UFAS)*, real world requirements necessitate provisions for persons with disabilities in a small percentage of living units on the ground floor of each dormitory facility to assist personnel with specific requirements. Additionally, temporarily disabled airmen can be assigned to accessible lodging units. The number of accessible units will be established on a project by project basis. In all projects, provide access by persons with disabilities to all public spaces on the first floor of a dormitory building. Provisions to accommodate such access include:

- Access ramps
- Sufficient door widths, appropriate hardware, and controls for ease of opening
- Proper fixtures and clearances in the public toilets
- Mounting height of drinking fountains and public telephones
- Mounting height of fire alarm pull stations and visual alarms for the hearing impaired
- Designated parking spaces with convenient access to the main entrance

Specific requirements for providing access and accommodating the special needs of persons with disabilities are published in the *Uniform Federal Accessibility Standards* (UFAS) and the *Americans with Disabilities Act Accessibility Guidelines (ADA/ADAAG)*. In case of conflicting guidance, the stricter guidance should be followed.

## **6. Design Process**

Designs are generally developed using the pre-established project requirements and data are normally prepared in the following sequence: Project Definition (10 – 20% design), Conceptual (30% design), Intermediate (45 – 60% design), Pre-Final (95% design), and Final working drawings (100% design). Designs shall conform to the requirements, scope, and costs identified in Air Force Dormitory Master Plan, plus the criteria defined in this guide, and in any Major Command approved supplemental standards or processes. Based on Project Definition, project approval also becomes integral step in the design process. Designs may be accomplished by a variation on this sequence, or through a Design-Build process. Further guidance on the design process may be found in the *Air Force Project Manager's Guide to Design and Construction*.

<b>Air Force Dormitory Design Development</b>	
	Project Award/Notice to Proceed
	10-20% Design - Project Definition
	Definition, Requirements, Site Selection, Charrette
	30% Design - Conceptual Design
	Development of floor plans, site plans and elevations
	45-60% Design - Design Development
	Floor Plans/Site Plans fully developed
	95% Design - Pre-Final Design
	Substantially complete; SID/CID complete
	100% Design - Final Design
	Construction Documents complete

Design must include requirements, scope, and costs identified in the Air Force Dormitory Master Plan, criteria defined in this guide and base or MAJCOM standards.

## 7. Air Force Dormitory Categories

Unaccompanied Air Force enlisted personnel typically transition through three distinctly different types of dormitory facilities during their career, starting with Recruit Housing and Training, followed by Pipeline Student Housing, and ending with traditional Permanent Party Enlisted Dormitories. Unaccompanied Air Force officer personnel typically occupy dormitory facilities based on assignment, mission requirements and/or geographical locations.

When an installation has Unaccompanied Housing requirements which include various grades of enlisted and officer personnel, especially in OCONUS or remote locations, new dormitory facility design and construction may require greater flexibility to support a mix of residents. Mixing of modules for CGO (01-03) with SNCO (E7-E9) grades within the same dormitory facility is permissible if officer and enlisted separation within this facility can be maintained by building wing or floor configuration and if this mix is required for efficiency of construction, unit integrity, or other justifiable installation specific requirements.

### Basic Programming Requirements for Air Force Unaccompanied Housing

<b>Grade Rank</b>	<b>Recommended NLA Per Person</b>	<b>Cat Code</b>	<b>Max Gross Building Area Per Person</b>
Grade E1 Basic Trainee	6.7M <sup>2</sup> (72 SF)	721-311	12.3 M <sup>2</sup> (132 SF)
Grade E1-E3 Tech Trainee	9.17M <sup>2</sup> (98 SF)	721-313	25.2 M <sup>2</sup> (269 SF)
Grade E1-E4	12 M <sup>2</sup> (129 SF)	721-312	33 M <sup>2</sup> (355 SF)
Grade E5-E6	30.7 M <sup>2</sup> (330 SF)	721-314	33 M <sup>2</sup> (355 SF)
Grade E7-E9	42.8 M <sup>2</sup> (460 SF)	721-314	66 M <sup>2</sup> (710 SF)
Grade 01-03	42.8 M <sup>2</sup> (460 SF)	724-415	66 M <sup>2</sup> (710 SF)
Grade 04-10	46.5 M <sup>2</sup> (500 SF)	724-415	66 M <sup>2</sup> (710 SF)

## 8. Net Living Area and Gross Building Area

### Net Living Area

Net Living Area (NLA) is defined differently based on grade. For E1-E4 Dorms-4-Airmen module construction, the NLA is defined generally as the floor area of the individual bedroom space of each resident, measured to the inside face of the room walls, as indicated by the shaded areas on the following Dorms-4-Airmen module plans. For E5-E9 and officer grades, the NLA is defined generally as the floor area of the living area, bedroom (if separate), bath, and kitchen area measured to the inside face of the room walls as indicated by the shaded areas on the following SNCO module plan. The width of a living/bedroom area in all cases should not be less than 3048 mm (10'-0"). The recommended minimum room width is 3353 mm (11'-0").

Items **included** in Net Living Area calculations:

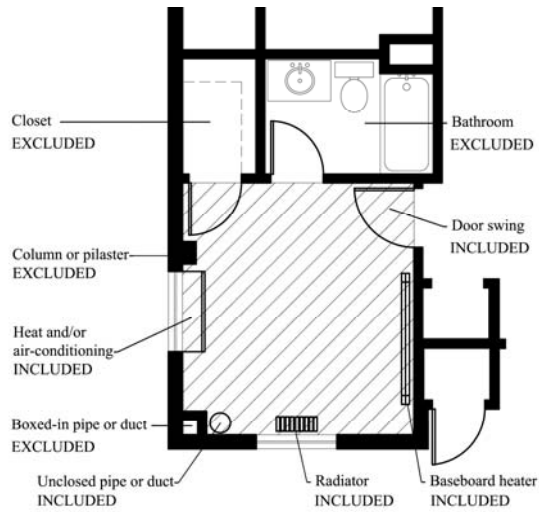
- All door swings that encroach upon the living/bedroom area/bath areas
- Mechanical equipment that occurs within the living/bedroom/bath areas (HVAC units, radiators, and baseboard heaters)

Items **excluded** from Net Living Area calculations:

- Items extending from floor to ceiling, which have been boxed-in and extend into the room from the wall plane (such as columns, pilasters, vertical pipes, mechanical chases, air ducts, etc.)
- Closets and Baths in Dorms-4-Airmen modules

In Dorms-4-Airmen modules, provide a recommended total of between 12 and 14M<sup>2</sup> (129-150 SF) Net Living Area in each bedroom. In no case should the NLA per person within Dorms-4-Airmen modules be less than 12M<sup>2</sup> (129 SF). In E5-E6 modules, provide a required minimum of 30.7 M<sup>2</sup> (330 SF) Net Living Area. In E7-E9 and 01-03 officer modules, provide a required minimum of 42.8 M<sup>2</sup> (460 SF) Net Living Area. For 04 and above, provide a required minimum of 46.5 M<sup>2</sup> (500 SF) Net Living Area.

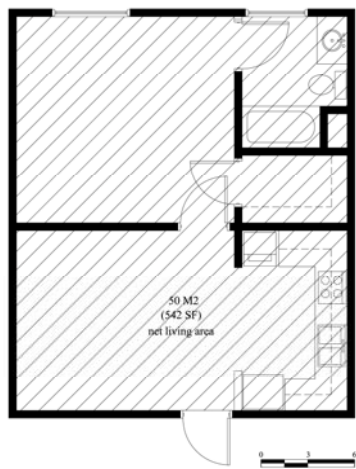
The recommended range of 12 -14 M<sup>2</sup> (129-150 SF) for individual bedrooms and/or combined living room areas, regardless of grade, should allow sufficient flexibility for the NLA requirement to be met for renovation projects as well as for newly constructed dormitory facilities. There may be physical limitations present in existing dormitory facilities, such as load-bearing walls, that affect the flexibility of the module layouts, but most existing dormitory configurations will permit meeting the minimum NLA requirements.



Net Living Area – Dorms-4-Airmen Bedroom



Net Living Area – Dorms-4-Airmen Modules

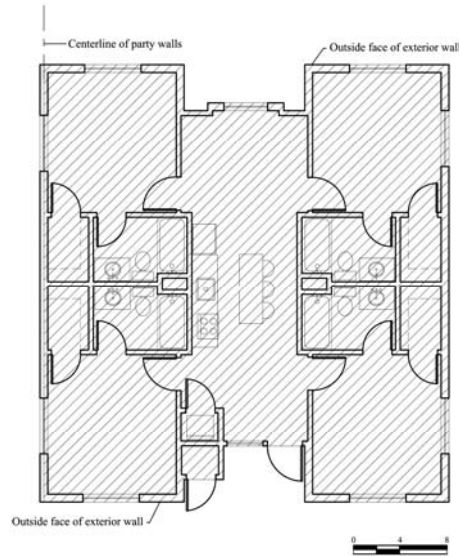


Net Living Area – SNCO Module

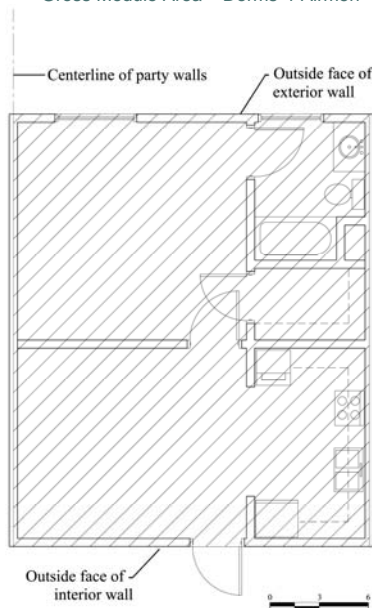


### Gross Module Area

Gross Module Area (GMA) is not restrained to a specific area measurement for newly constructed or renovated dormitory buildings, but is restrained based on Gross Building Area (GBA) limitations while satisfying all functional and minimum area requirements required for the spaces within the facility. Designers must remember that the difference between the GMA and the GBA must accommodate all of the dormitory functions that occur outside of the module, such as circulation, common functional areas, utility spaces, and exterior wall thickness. For Dorms-4-Airmen, a recommended range for GMA is 26.5 – 28.5 M<sup>2</sup> (285-307 SF) per person. In E5-E9 and officer modules, ranges will vary based on module configurations.



Gross Module Area – Dorms-4-Airmen



Gross Module Area – SNCO Module

### **Gross Building Area**

Gross Building Area (GBA) is measured to the outside face of the exterior enclosure walls.

Items **included** in Gross Building Area calculations:

- Exterior covered areas such as balconies count as half scope and are measured from the face of the enclosure wall to the edge of the covered area.
- Exterior unenclosed stairs count as half scope per floor that they serve, but interior stairs and elevator shafts count as full scope per floor that they serve.

Items **excluded** from Gross Building Area calculations:

- Normal roof overhangs, generally less than three feet wide, and unsupported by columns.
- Installation specific requirements such as:
  - Collective Protection Systems (CPS) requirements
  - Sub-Artic design and construction requirements
  - High-rise requirements including elevator construction
  - Host nation specific requirements such as codes requiring separation between the kitchen and living areas within a dormitory module

The GBA for permanent party Unaccompanied Housing E1-E6 shall not exceed 33 M<sup>2</sup> (355 SF) per person. The GBA for permanent party Unaccompanied Housing E7-E9 and officer grades shall not exceed 66 M<sup>2</sup> (710 SF) per person. These limitations may be increased up to 5 M<sup>2</sup> (54 SF) per person to support installation specific requirements including high-rise construction (4 stories or more), sub-artic climate construction, or for dormitory facilities with site-specific programming requirements. Although the inclusion of Collective Protection Systems (CPS) in OCONUS dormitory facilities is not counted as part of the GBA calculation, a not to exceed amount of 5 M<sup>2</sup> (54 SF) additional per person may be required to support this requirement also. To exemplify this, a total of 10 M<sup>2</sup> (108 SF) additional GBA per person is allowable for installations requiring CPS and located in a sub-artic climate. Include separate line items and describe these requirements in DD Form 1391 during the programming phase of the project. Funding will need to be requested to support additional GBA for these installation specific requirements and use of additional GBA will need to be authorized by the appropriate Major Command.

Newly constructed projects shall comply with the design and construction guidance establishing the minimum recommended size for Net Living Area and the maximum limitation of Gross Building Area. To ensure cost-effective dormitory renovation projects, these projects shall also strive to comply with the minimum recommended Net Living Area. Gross Building Area may be exceeded if necessary during renovation based on pre-existing conditions and building footprint. Such conditions and waiver requests shall be coordinated and approved by the responsible MAJCOM.

## **9. Special Considerations for Renovation Projects**

It is very important to avoid noticeable disparity in Net Living Area and functional space requirements between newly constructed dormitory facilities and newly renovated dormitory facilities. The criteria in this design guide are applicable to both new construction and renovation and are intended to produce similar facilities.

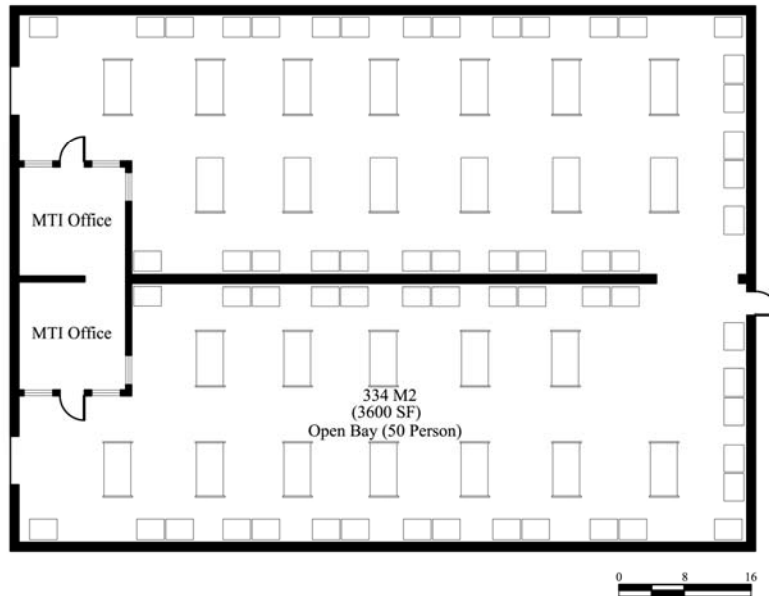
Renovations of dormitory facilities range from building and system upgrades to complete gutting and reconfiguration. The requirements and recommendations set forth in this design guide apply to new construction and to renovations, and every attempt to meet these standards should be made. Flexibility in these construction standards such as two/three-bedroom module designs for Dorms-4-Airmen configurations may be considered based on pre-existing conditions such as type of construction, location and character of load bearing walls and columns, and other physical limitations. When possible and to ensure cost effective renovation projects, these projects shall meet the same Net Living Area and functional space criteria applicable to new dormitory construction. In some cases, criteria waivers are necessary due to existing conditions that cannot be altered. Such conditions and waiver requests shall be coordinated and approved by the responsible MAJCOM.

If renovation cost exceeds 50% of the replacement value, the cost of renovation versus replacement shall be carefully considered. Construction cost for progressive collapse in facilities three stories and higher and the inclusion of Collective Protection Systems (CPS) where required must also be included. These additional requirements can influence renovation costs by 20-40%, quickly exceeding prior renovation to replacement thresholds.

## B. SPECIFIC CONSIDERATIONS

### 1. Recruit Housing and Training

Basic Military Training (BMT) trainees are housed in Recruit Housing and Training (RH&T) facilities in an open-bay configuration with approximately 50 trainees per bay. RH&T dormitory furnishings are limited to bunk beds and lockers for personal gear. Net Living Area is shared, but is based on 6.7 M<sup>2</sup> (72 SF) per person. The Gross Building Area (GBA) for RH&T dormitories is 12.3 M<sup>2</sup> (132 SF) per person.



Recruit Housing and Training Bay Plan

### 2. Pipeline Student Housing



Kessler Air Force Base – Pipeline Dormitory

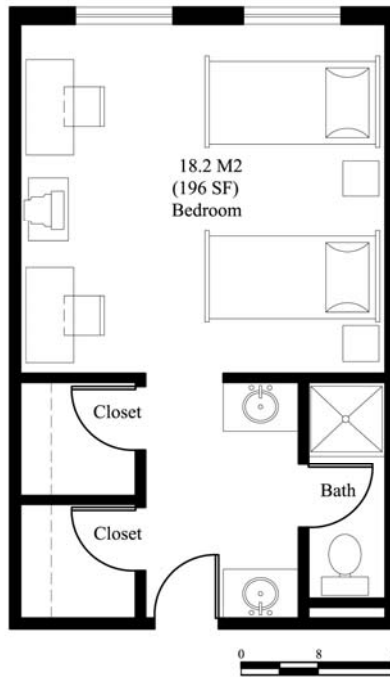
Pipeline Student Housing is designed and constructed to meet the needs of a specific category of personnel. These dormitory facilities are utilized to house students who are recent graduates of Basic Military Training (BMT). Although they have completed BMT, they are still in a training atmosphere and shall adhere to strict discipline and control. The Pipeline Student Housing dormitory design provides this atmosphere.

Although many concepts in Pipeline Student Housing are similar to Permanent Party Unaccompanied Housing, there are differences in their physical layout and construction,

including construction as individual structures to control entry. The general concepts applicable to Permanent Party Unaccompanied Housing will apply to Pipeline Student Housing unless specifically altered by this chapter.

The area and occupancy requirements listed in the following tables are construction standards for Pipeline Student Housing, not assignment standards. There is no direct correlation between assignment standards and construction standards. Normally, Pipeline Student Housing will be constructed in increments of 100 rooms. The optimum size will depend on the squadron size at each installation.

Access to Pipeline Student Housing rooms will be from interior double-loaded corridors. Modules are based on a standard of 18.2 M<sup>2</sup>(96 SF) living space. All Pipeline Student Housing will be of a standard design.



Typical Pipeline Student Housing Floor Plan

### Construction Standards - Pipeline Student Housing

Net Living Area per Person	9.1 M <sup>2</sup> (98 SF)
Maximum Number of Persons per Room	2
Bathroom Configuration	1 per room shared by 2 students
Dormitory Configuration	central corridor

### Required Spaces - Pipeline Student Housing

Functional Space	Required Minimum Net Living Area	Maximum Net Living Area	Recommended Net Living Area
Living/Bedroom Area - 2 per module	18.2M <sup>2</sup> (196 SF)	18.2 M <sup>2</sup> (196 SF)	18.2 M <sup>2</sup> (196 SF)
Shared Bathroom -1 per room (1 toilet/1 shower)	2.3 M <sup>2</sup> (25 SF)	Based on available area	2.3 M <sup>2</sup> (25 SF)
Private lavatory vanity - 2 per room, integral top, separate from shared bath, immediately adjacent to the bathroom	900mm (3 LF) per lavatory/vanity	Based on available area	Approx 900mm (3LF) per lavatory/vanity
Closets - 2 per room	1.86 M <sup>2</sup> (20 SF)	1.86 M <sup>2</sup> (20 SF)	1.86 M <sup>2</sup> (20 SF)
Laundry Facilities (minimum of 1 washer/12 persons and one dryer/8 persons) - may consist of small laundries per floor or single laundry serving entire building	Based on number of resident	Based on number of resident	1.95 M <sup>2</sup> (21 SF) per appliance - circulation and access inclusive
Bulk Storage	Not required	Not required	Not required
Utility	As required	As required	Dependent on local conditions
Mail Service - 1 box per student (inside building)	As required	As required	Dependent on local conditions/force protection requirements
Circulation space	Dependent on layout	Dependent on layout	7.4 M <sup>2</sup> (80 SF) per room, varies with layout

### Optional Spaces - Pipeline Student Housing

Functional Space	Minimum Net Living Area	Recommended Net Living Area
Multi-Purpose Area (may be programmed as meeting/study room, television rooms, fitness rooms, etc.)	13.9 M <sup>2</sup> (150 SF) for each multi-purpose area	.19 M <sup>2</sup> (2 SF) for each room for each multi-purpose area
Game Room	28 M <sup>2</sup> (300 SF)	.19 M <sup>2</sup> (2 SF) per room
Vending	18.6 M <sup>2</sup> (200 SF) per floor	18.6 M <sup>2</sup> (200 SF) per floor
Accessible Public Toilets (ground floor location)	46.5M <sup>2</sup> (500 SF) per dormitory	46.5 M <sup>2</sup> (500 SF) per dormitory
Supply Storage Area	18.6 M <sup>2</sup> (200 SF) per dormitory	26.4 M <sup>2</sup> (284 SF) per dormitory
Administration Area	1.4 M <sup>2</sup> (15 SF) per room	1.4 M <sup>2</sup> (15 SF) per room
Public Telephone Area	18.6 M <sup>2</sup> (200 SF) per floor	18.6 M <sup>2</sup> (200 SF) per floor

### **3. Permanent Party Unaccompanied Housing – Dorms-4-Airmen**

The area and occupancy requirements listed in the following table are construction standards for permanent party enlisted Unaccompanied Housing E1-E4, and not assignment standards. Programmers shall use the anticipated number of occupants established by the current approved Dormitory Master Plan process as the first step in developing a dormitory design.

#### **New Construction – Dorms-4-Airmen**

##### **Background**

Considerable detailed analyses have been conducted in the preparation of this design guide to determine the optimal configuration and basic requirements for Permanent Party Unaccompanied Housing for E1-E4 airmen. Various analyses focused on space requirements, programming limitations, comparative construction costs, building proportions, and many other factors. Enlisted dormitories have traditionally been based on a “2-room” concept. For many years, the Air Force built what were known as “2+2” dormitories, which featured two-room modules with two airmen assigned to each room, and a shared bath within the module serving the four residents. Each shared room provided approximately 8.4 M<sup>2</sup> (90 SF) per person. This standard was changed to the “1+1” concept in 1996 which provided two small private rooms in each module with two persons sharing a bath and a small kitchen. OSD established a rigid Net Living Area requirement of 11M<sup>2</sup> (118.4 SF) for each of the two rooms, and placed a 47 M<sup>2</sup> (506 SF) limit on the gross area of the module. Additionally, a limit of 66 M<sup>2</sup> (710.4 SF) per module (33 M<sup>2</sup> per person) was placed on the gross building area of the dormitory. The new OSD guidance under which this guide was developed allows a range of 11 to 17 M<sup>2</sup> (118.4 to 183 SF) for Net Living Area, eliminates the gross module area limit, but retains the 33 M<sup>2</sup> per person gross building area limit.

##### **New Criteria and Constraints**

The Air Force conducted several dormitory workshops to develop specific guidance toward the development of this design guide for E1-E4 airmen. Dormitory Management, Major Command, Air Staff, and Command Chief representatives provided excellent input, but it quickly became evident that it would be very difficult to include all the desired space and amenities and still remain within the gross building area limit. Under the previous 1+1 criteria, designers were particularly challenged in accommodating all the functions of a dormitory within the maximum gross building area. Modules could be no larger than 47 M<sup>2</sup> with the gross building area limited to 66 M<sup>2</sup> per module, leaving only 19 M<sup>2</sup> per module for circulation space, common areas, wall thickness, exterior covered areas, utility chases, etc. While modules can now be larger, dormitory buildings are still constrained in their maximum gross area. This creates even greater difficulty in accommodating required spaces outside of the modules.

##### **Prototype Development**

Goals established at the workshops included the need for larger bedrooms, private baths, shared social spaces, and laundry areas within each module. Numerous prototypes were developed to explore the ramifications of meeting these goals within

the modules while staying within the maximum gross building area. Two-bedroom, three-bedroom, and four-bedroom modules were developed for Corridor Access, Balcony Access, and Breezeway Access dormitories, respectively. These modules were then used to create conceptual 96-person dormitory building prototypes. A 96-person dormitory was purposely chosen acknowledging that smaller dormitories have a tighter ratio between the area taken up by the modules and the maximum gross building area. Also, this is the smallest dormitory the Air Force typically builds. The assumption was made that the successful application of the programming criteria for a smaller dormitory could certainly be repeated for larger dormitories as the building's efficiency increases. Additionally, three other two-bedroom Corridor Access prototype modules and their resulting dormitory buildings were developed exploring the impact of retaining shared baths, providing laundry facilities on each floor, or providing a single consolidated laundry room within the building core. Comparative parametric cost estimates were prepared for all the prototype buildings.

### **Analysis**

Initial efforts to include all the functional goals within each of the prototype building configurations resulted in most prototypes exceeding the maximum gross building area limit. A second revision reduced all but one of the prototypes down to 33 M<sup>2</sup>per person, but only by eliminating functional shared social spaces in the two-bedroom and three-bedroom modules. These modules still included a nominal sized shared kitchen/entrance foyer area, but offered no space for shared dining or seating areas. Additionally, the NLA/ bedroom size of these two-bedroom and three-bedroom modules were minimum due to linear two-bedroom building configurations and inefficiencies within the three-bedroom module designs. Thus these units did not benefit from either larger bedroom sizes or the addition of a shared common area within the module as referenced in the table below.

### **4 Bedroom Modules – Dorms-4-Airmen**

Only the four-bedroom modules successfully incorporated all of the Air Force goals while meeting the gross building area requirement. Further consideration justified the four-bedroom concept from an operational viewpoint. Airmen of mixed grades can be assigned to a module to encourage mentoring of the junior airmen by the more senior residents.

The table below confirmed that while it is slightly more expensive to provide private baths than shared baths; this cost is offset by only providing half as many shared kitchen spaces in a four-bedroom module than are required for two-bedroom modules. The cost of constructing new dormitories to meet this new standard is comparable to the cost of 1+1 dormitories, since the overall building size has remained constant. Additionally, the goals of the Air Force to provide larger private rooms with private baths, shared common areas including a kitchen, shared social space and laundry within each module, are emphasized with the introduction of the four-bedroom module as the new standard for Air Force Dormitory construction.



### USAF Dormitory Prototype Analysis 2, 3, and 4 Bedroom—Balcony Access

Description	1+1 Dorm Balcony	2bdm/ Balcony	3bdm/ Balcony	4bdm/ Balcony
Gross Building Area	33M <sup>2</sup> (34,088SF)	33M <sup>2</sup> (34,088SF)	33M <sup>2</sup> (34,088SF)	33M <sup>2</sup> (34,088SF)
Number of Baths	48	96	96	96
Number of Kitchens	48	48	32	24
Net Living Area per Person	11M <sup>2</sup> (118 SF)	12M <sup>2</sup> (129 SF)	13M <sup>2</sup> (139 SF)	12.4M <sup>2</sup> (132 SF)
Gross Module Area per Person	24M <sup>2</sup> (253 SF)	26.5M <sup>2</sup> (284 SF)	26M <sup>2</sup> (280 SF)	28.5M <sup>2</sup> (305SF)
Building Plan Efficiency	71%	80%	80%	86%

#### Renovation – Dorms-4-Airmen

##### Prototype Development

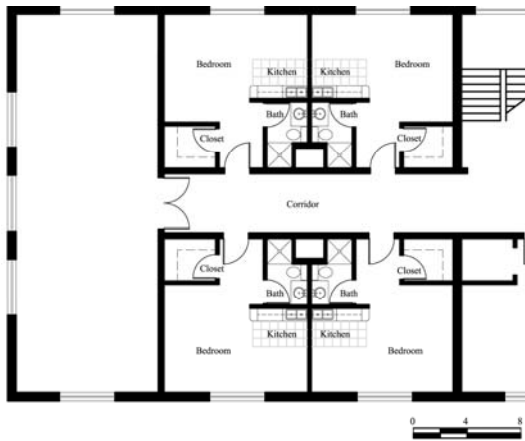
The four-bedroom module design (Dorms-4-Airmen), developed for new construction and based upon the improved and increased Air Force criteria, has also proven valid for renovation, based upon additional analysis and prototype development. Numerous module plans were developed based on two existing building configurations to explore the possibility of incorporating the same standards and benefits of the four-bedroom module design into renovation standards. Using a typical Balcony Access dormitory and a typical Corridor Access dormitory for background building plans, combinations of Corridor Access, Balcony Access, and Breezeway Access dormitories were studied. Based on the configuration of a four-bedroom module within an existing building footprint, new Balcony Access plans and Corridor Access plans were developed, with an option for the Corridor Access plan to incorporate interior or exterior Breezeway Access concepts dependent upon the installation’s location and climate.

##### Analysis

The existing Balcony Access plan adapted well to a new Balcony Access configuration, allowing the exterior shell and stairwells to remain intact. A Corridor Access configuration was also developed, but requires the addition of interior stairwells to access module entrances. The existing Corridor Access plan, while also keeping the exterior shell in place, required a new balcony system to be introduced within the building configuration for a Balcony Access plan. This plan adapted best to a Corridor Access configuration, although requiring the existing interior stairwells to be relocated within the footprint, which will impact overall project costs. This plan does allow the most efficiency, though, and greatly increases the number of modules per floor. In most configurations, the original occupancy of the building will be decreased with the new four-bedroom module design. These numbers will vary, though, based on building systems requirements and other local considerations.

#### 4 Bedroom Modules – Dorms-4-Airmen

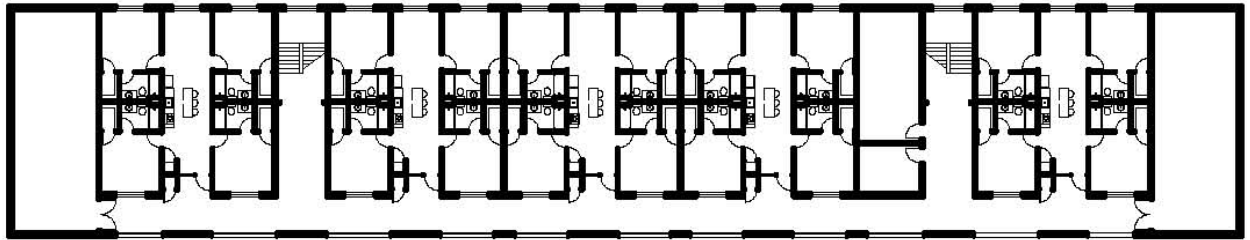
Although it is slightly more expensive to provide private baths than shared baths, this cost is offset by only providing half as many shared kitchen spaces in a four-bedroom module than are required for two-bedroom modules. The cost of renovating existing dormitory facilities to meet this new standard is comparable to renovation costs using the 1+1 standards, since in both configurations, the building would be significantly gutted, retaining only building shell and/or existing stairwells, and replacing all building systems regardless. Additionally, the goals of the Air Force to provide larger private rooms with private baths, shared common areas including a kitchen, shared social space and laundry within each module, are emphasized with the introduction of the four-bedroom module as the new standard for new and renovated Air Force Dormitory construction.



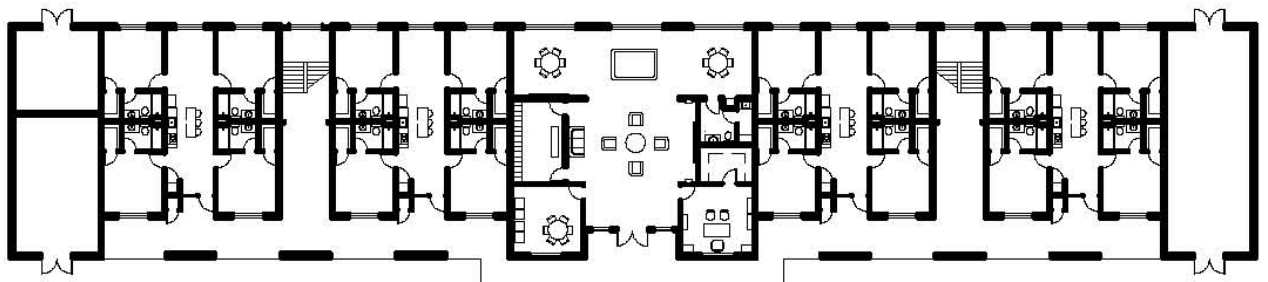
Existing Corridor Access Dormitory Plan



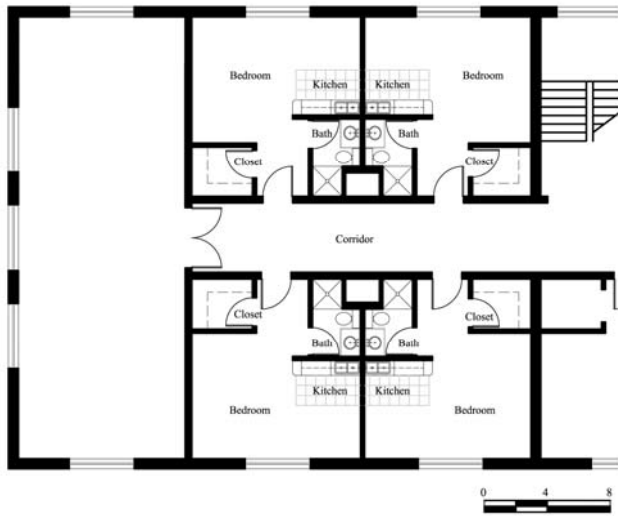
Renovation Balcony Access Module Plan



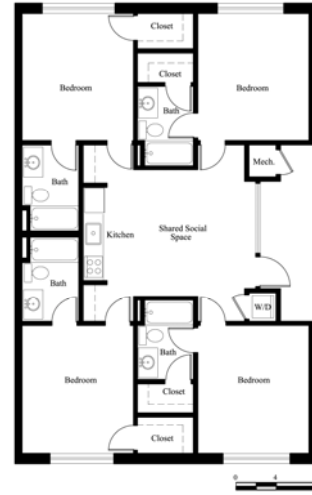
Renovation Balcony Access Building Plan - Second/Third Floors



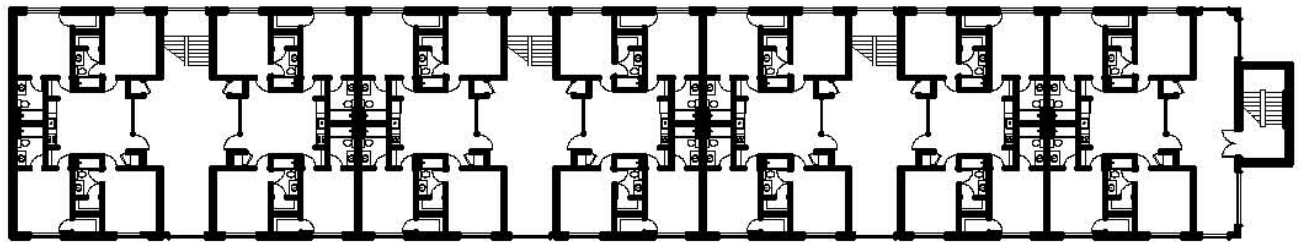
Renovation Balcony Access Building Plan – Ground Floor



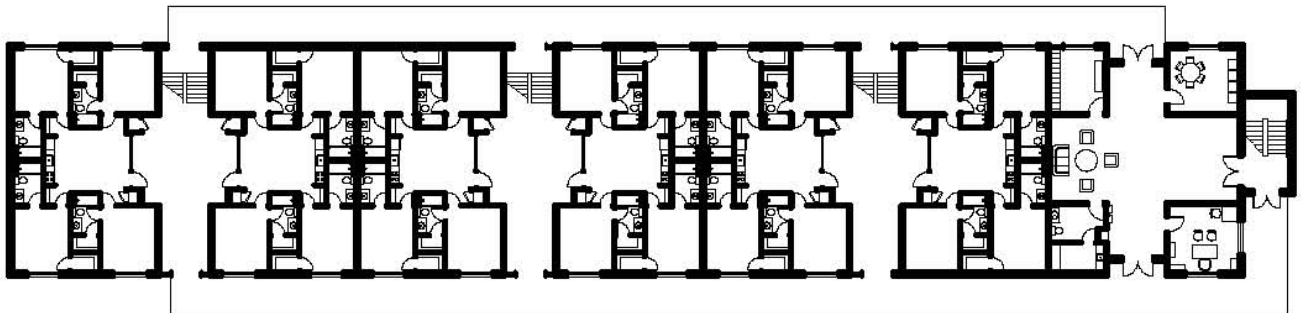
Existing Corridor Access Dormitory Plan



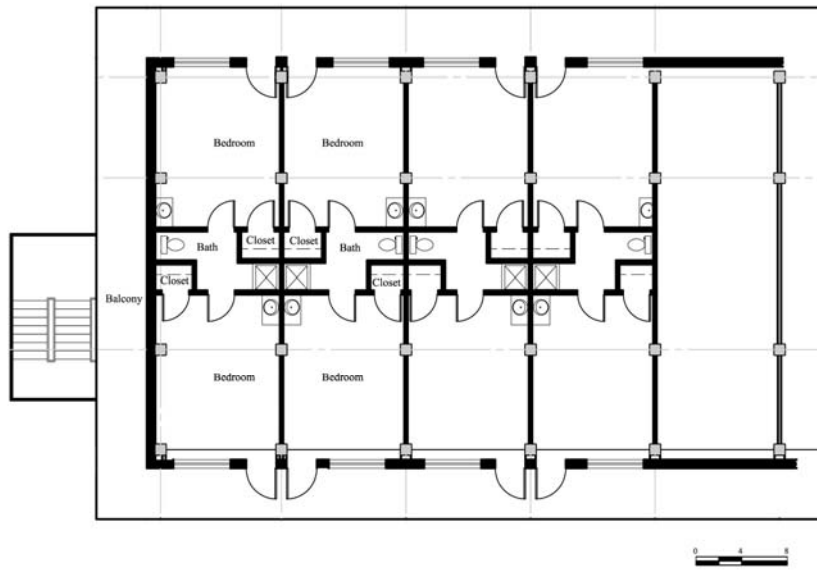
Renovation Corridor Access Module Plan



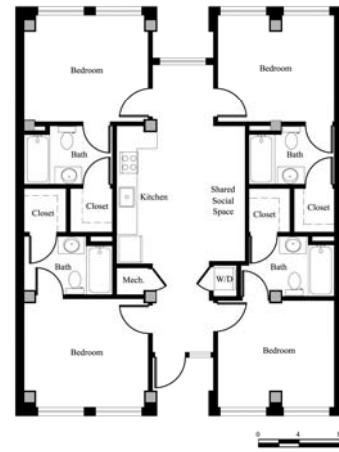
Renovation Corridor Access Building Plan – Second/Third Floors



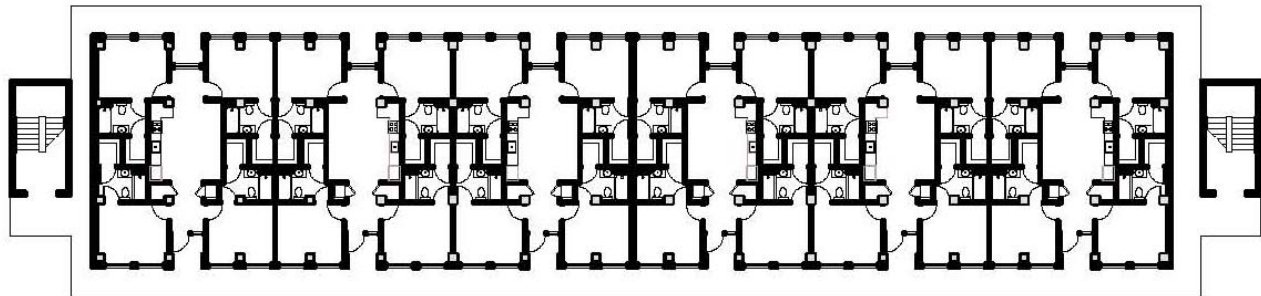
Renovation Corridor Access Building Plan – Ground Floor



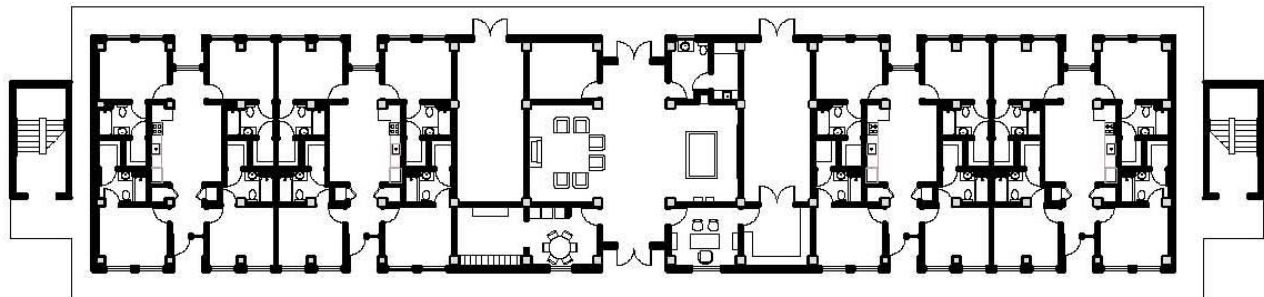
Existing Balcony Access Dormitory Plan



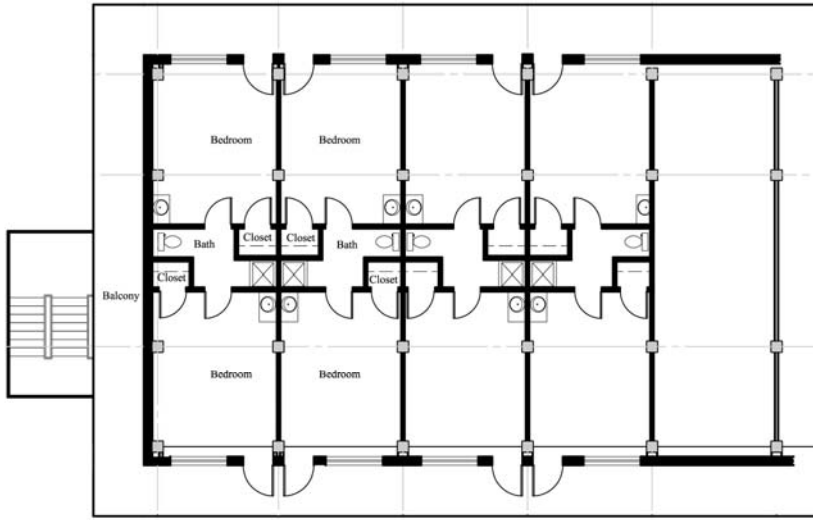
Renovation Balcony Access Module Plan



Renovation Balcony Access Building Plan – Second/Third Floors



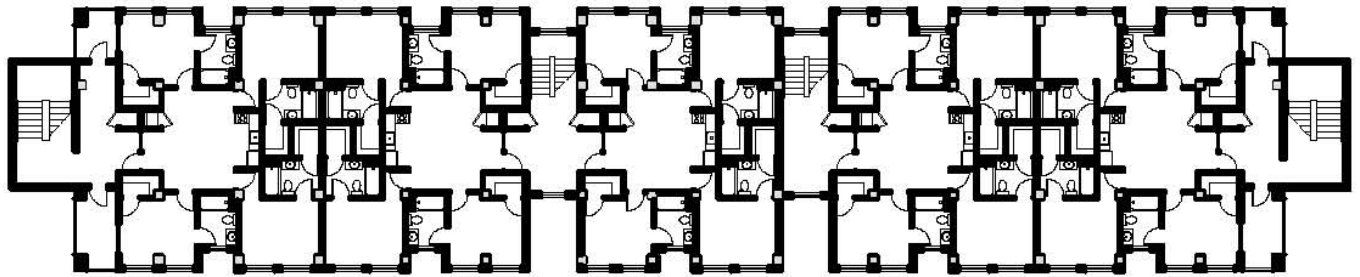
Renovation Balcony Access Building Plan – Ground Floor



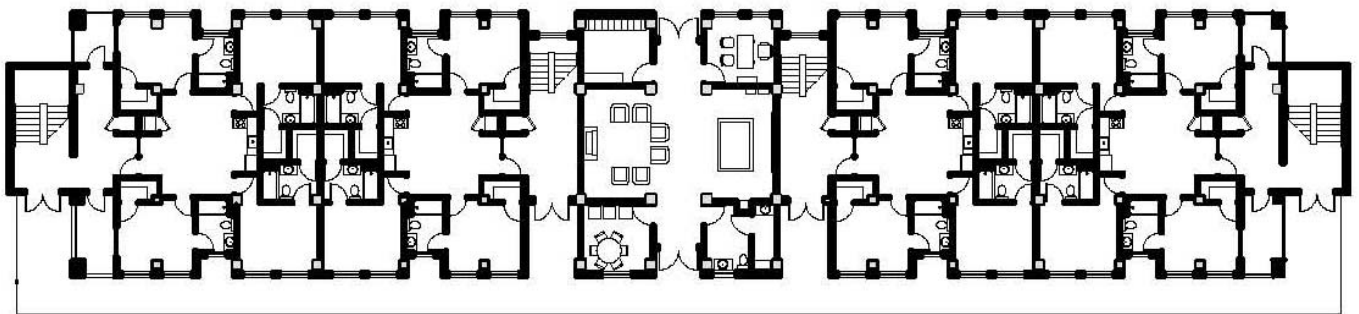
Existing Balcony Access Dormitory Plan



Renovation Corridor Access Module Plan



Renovation Corridor Access Building Plan – Second/Third Floors



Renovation Corridor Access Building Plan – Ground Floor

**Construction Standards – New Construction and Renovated Permanent Party Unaccompanied Housing E1-E4**

Grade	E1-E4
Minimum Net Living Area per Person	12 M <sup>2</sup> (129 SF)
Recommended Net Living Area per Person	12 -14 M <sup>2</sup> (129 -150 SF)
Maximum Net Living Area per Person	17 M <sup>2</sup> (183 SF)
Number of persons per module	4
Kitchen configuration	Semi-private (shared by 4)
Dormitory Configuration	Central Corridor, Breezeway, Balcony

New Permanent Party Unaccompanied Housing E1-E4 and major dormitory renovation projects shall meet the construction standards cited in the table above. Additionally, newly constructed Permanent Party Unaccompanied Housing E1-E4 shall include the required spaces with their associated prescribed sizes as listed in the table below. Some flexibility is allowed for renovated Permanent Party Unaccompanied Housing E1-E4, but they shall include the required spaces to the greatest practical degree.

**Required Spaces and Sizes—New Construction and Renovation Permanent Party Unaccompanied Housing E1-E4 Module Requirements**

Required Functional Space	Required Minimum Net Living Area	Maximum Net Living Area	Recommended Net Living Area
Private Living/Bedroom Area (1 per person)	12 M <sup>2</sup> (129 SF)	17 M <sup>2</sup> (183 SF)	12-14 M <sup>2</sup> (129-150 SF)
Private Bathrooms ( per person) (1 toilet, 1 combination tub/shower or 1 separate shower, and 1 lavatory/vanity—min 914 mm (36 inches) wide	3.25 M <sup>2</sup> (35 SF)	Based on available area	3.25 M <sup>2</sup> (35 SF)
Private Walk-in Closet (1 per living/bedroom area)	1.86 M <sup>2</sup> (20 SF)	Based on available area	1.86 M <sup>2</sup> (20 SF)
Shared Common Area (1 kitchen per module, 1 shared social space per module, 1 laundry area per module, and utility space as required, shared 4 persons)	11.5 M <sup>2</sup> (123 SF)	Based on available area	11.5 M <sup>2</sup> – 28 M <sup>2</sup> (123 – 300 SF) including shared kitchen, shared social space and/or seating/dining area, laundry, utility
<ul style="list-style-type: none"> <li>• Kitchen (1 per module, shared by 4 persons) In some OCONUS locations, local building codes may require a separate kitchen area</li> </ul>	Included in Shared Common Area	Included in Shared Common Area	Minimum includes: double-bowl sink; 2-burner cook top combination microwave/convection oven, full-size refrigerator, range hood with exhaust fan, storage cabinets, and disposal where permitted
<ul style="list-style-type: none"> <li>• Laundry Area (1 washer/1 dryer per module - shared by 4 persons (stacked) Laundry per module recommended – centralized laundry as option with minimum ratio 1 washer/8 persons and 1 dryer/6 persons</li> </ul>	Included in Shared Common Area	Included in Shared Common Area	0.93 M <sup>2</sup> (10 SF) per appliance actual footprint/ 1.95 M <sup>2</sup> (21 SF) per Appliance - circulation and access inclusive. Laundry per module recommended – centralized laundry as option with minimum ratio 1 washer/8 persons and 1 dryer/6 persons

**Required Spaces and Sizes—New Construction and Renovation Permanent Party Unaccompanied Housing Common Support Areas**

<b>Required Functional Space</b>	<b>Required Minimum Net Living Area</b>	<b>Maximum Net Living Area</b>	<b>Recommended Net Living Area</b>
Multi-Purpose Area (at least one such space per dormitory (includes game room, television room, fitness room, administration area, etc.)	25 M <sup>2</sup> (270 SF)	Based on available area	0.19 M <sup>2</sup> (2 SF) per person for each multi-person area plus 7.4 M <sup>2</sup> (78 SF) administration area—total area to be used based on local requirements
Vending Area (1 area per dorm recommended)	2.32 M <sup>2</sup> (25 SF) per vending area	Based on available area	7.43 M <sup>2</sup> (80 SF) per vending area based on local requirements
Mail Service—1 box per person, centrally located within the dormitory campus—location per force protection requirements	As required	As required	Requirements dependent on local conditions— may not be applicable at OCONUS locations unless local mail delivery is required for delivery of invoices for local telephone and internet service providers.
Accessible Public Toilets	9.3 M <sup>2</sup> (100 SF) per dormitory	Based on available area	9.3 M <sup>2</sup> (100 SF) per dormitory
Supply Storage Room	9.3 M <sup>2</sup> (100 SF) per dormitory	Based on available area	9.3 M <sup>2</sup> (100 SF) per dormitory
Bulk Storage (may be in-room, in-module or centralized area)	2 M <sup>3</sup> (70.6 CF) per storage cubicle	Based on available area	2 M <sup>3</sup> (70.6 CF) per storage cubicle. Recommended 1 cubic/area per 4 person to vary based on local requirements
Utility	As required	As required	8% of Gross Building Area dependent on building system requirements
Circulation	Dependent on layout	Dependent on layout	Dependent on layout



#### **4. Permanent Party Unaccompanied Housing – NCO/SNCO/Officer**

The area and occupancy requirements listed in the following table are construction standards for permanent party enlisted Unaccompanied Housing E5-E9 and officer grades, and not assignment standards.

##### **New Construction**

###### **Background**

Detailed analyses were conducted in the preparation of this revision to the original Permanent Party Enlisted Dormitory Design Guide to determine the optimal configuration and basic requirements for all permanent party Unaccompanied Housing including NCO, SNCO and officer grades. While previous design guidance focused primarily on E1-E4 requirements, new studies focused on space requirements, programming limitations, building proportions, and many other factors for all Unaccompanied Housing personnel.

This revision provides conceptual guidance for Unaccompanied Housing occupied by E5-E9 and officer personnel, allowing projects to be scored and programmed similar to E1-E4 Unaccompanied Housing requirements, with results rolled into the Air Force dormitory program. These types of dormitory facility requirements and projects were historically excluded from the Air Force dormitory program. The guidance presented in this document will provide the tools necessary to program all Unaccompanied Housing categories, emphasizing flexibility and conceptual planning guidance to enhance quality of life for the residents. The conceptual plans developed and included are provided for guidance only and are to ensure a consistent level of quality during design and construction. Variations within the criteria, scope and program dollars are permissible, but will require approval from appropriate Major Commands.

###### **New Criteria and Constraints**

The Air Force conducted several workshops to develop specific guidance for the inclusion of E5-E9 and officer Unaccompanied Housing requirements in this design guide. Dormitory Management, Major Command, Air Staff, and Command Chief representatives provided excellent input. A recommended Net Living Area (NLA) for NCO, SNCO, and officer grades was established based on existing MILCON construction and increased Air Force criteria while referencing existing space allocation allowances from Air Force and OSD sources including *AFI 32-6005*, *DoD 4165.63-M*, and *AFI 32-1084*. This recommended NLA takes precedence over other Air Force guidance and encourages maximum module living area more comparable to Military Family Housing area allowances. Gross Building Area (GBA) per resident remains constrained, but flexibility in module configuration to support installation specific requirements provide an opportunity to increase module Net Living Area (NLA). Specific installation requirements such as Collective Protection Systems (CPS) in OCONUS locations, high-rise and/or sub-artic construction, and host nation specific requirements are not counted as part of the overall GBA maximum limit. These requirements, though, shall stay within acceptable square footage allowances and shall include associated costs incurred. *Chapter 2 Planning and Programming* of this guide provides further detail on NLA and GBA measurements.

### Prototype Development

Similar to the development of the Dorms-4-Airmen module plans, a detailed analysis of square footage requirements and constraints led to the development of conceptual module plans for E5-E9 and officer Unaccompanied Housing. Existing officer MILCON designs and Dorms-4-Airmen configurations were considered to ensure flexibility based on installation requirements.

Numerous prototypes were developed to explore the ramifications of meeting these goals within each module type while staying within the maximum GBA. Module types were explored for E5-E6 (NCO), E7-E9 (SNCO) and O1-O3 (CGO) and O-4 and above officer grades. These modules were then used to create conceptual 72-person corridor dormitory building prototypes. A 72-person corridor dormitory facility was purposely chosen acknowledging that smaller dormitories have a tighter ratio between the area taken up by the modules and the maximum gross building area. A corridor access dormitory was chosen in lieu of breezeway and balcony access dormitory facilities based on full scope calculations of circulation required, again providing a conservative approach during conceptual development and analysis. The assumption was made that the successful application of the programming criteria for a smaller dormitory could certainly be repeated for larger dormitories as the building's efficiency increases.

### Air Force Unaccompanied Housing Net Living Area Space Allocation Comparison

		Current Guidance		Recommendation		
Grade	GBA	AFI	OSD	Min	Max	#
O-4 thru 1O	66 M <sup>2</sup>	460SF	n/a	500SF	*	2
O-1 thru O-3	66 M <sup>2</sup>	330SF	n/a	460SF	*	2
E-7 thru E-9	66 M <sup>2</sup>	236SF	capped	460SF	*	2
E-5 thru E-6	33 M <sup>2</sup>	118SF	capped	330SF	*	1

\* Note - NLA is limited by the overall GBA maximum limitations

### Analysis

Conceptual plans included show variation in NLA of different module configurations while maintaining the maximum GBA. As a module configuration evolves from linear to elongated, additional NLA can be realized within the modules based on reduced building circulation requirements. Based on the recommended NLA and to provide a private apartment for NCO grades, a dormitory facility constructed solely for this grade will greatly exceed the maximum GBA allowed. Thus, recommend mixing higher grades with an increased GBA allowance with the construction of NCO modules to maintain the overall GBA for the facility. When considering the use of the Dorms-4-Airmen footprint and a mix of NCO modules within this footprint, the maximum GBA allowance of a NCO module

must be balanced with a reduction in space elsewhere in the facility. A conceptual building plan using a mix of NCO modules within the recommended NLA on the third floor of a Dorms-4-Airmen dormitory will continue to exceed overall GBA.

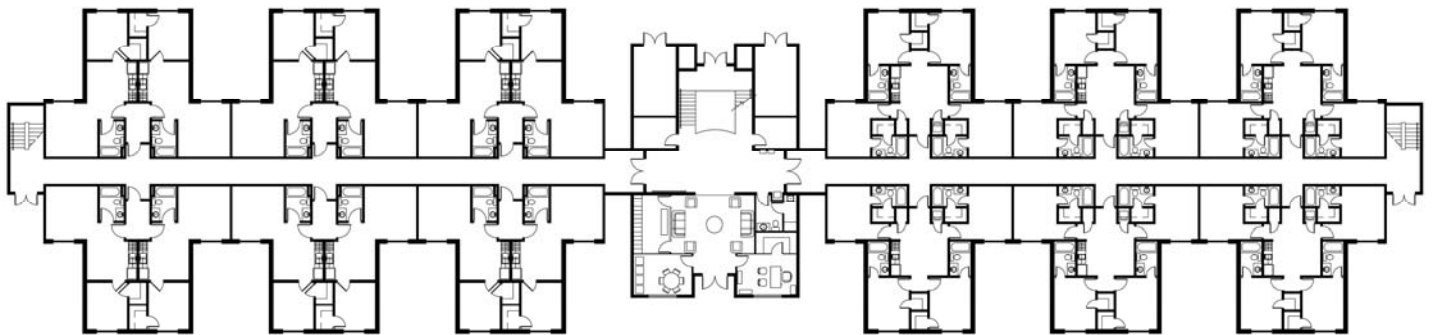
When an installation has Unaccompanied Housing requirements which include various grades of enlisted and officer personnel, especially in OCONUS or remote locations, new dormitory facility design and construction may require greater flexibility to support a mix of residents. Mixing of modules for CGO (01-03) with SNCO (E7-E9) grades within the same dormitory facility is permissible if officer and enlisted separation within this facility can be maintained by building wing or floor configuration and if this mix is required for efficiency of construction, unit integrity, or other justifiable installation specific requirements.

Officer grades 04 and above were also considered with similar results assuming that a combined dormitory facility would be constructed with a small number of 04 and above modules and a high percentage of CGO modules. To increase NLA in the 04 and above modules, allowing for additional amenities and space, the overall NLA of the CGO modules would need to be considered to balance the overall GBA for the building.



Corridor Access Dorms-4-Airmen Module Plan

Corridor Access SNCO/CGO Module Plan



Corridor Access SNCO/Dorms-4-Airmen Combination Building Plan

### **Dorms-4-Airmen**

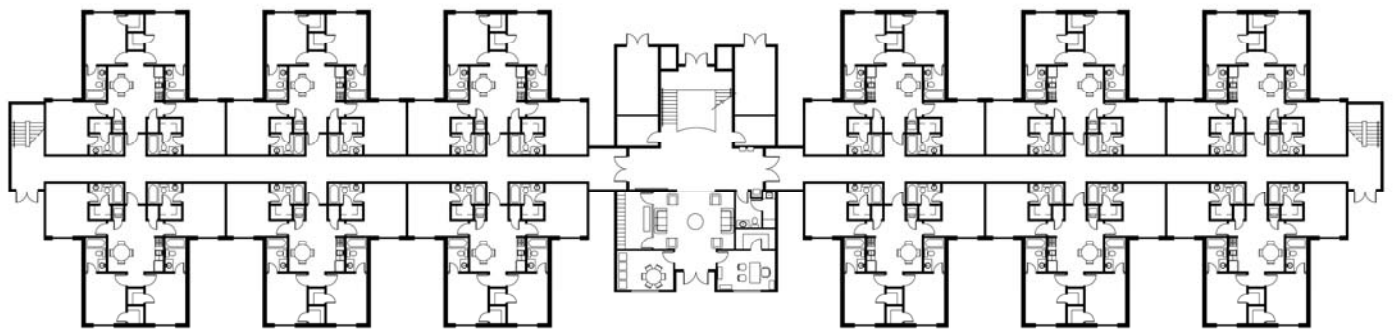
Another critical element of the analysis included consideration of the Dorms-4-Airmen module and building footprint. As stated, a significant goal of this design guide is to provide guidance and flexibility. The use of the Dorms-4-Airmen module when considering module designs for these senior grades provides flexibility in new construction and possibly renovation, understanding that occupant requirements will continue to change. The overall GBA limitation of 33 M<sup>2</sup> per person for NCO occupants does not lend itself to this concept based on module configuration and overall square footage of the Dorms-4-Airmen module. The NLA became excessive, confirming that the use of this type of module for NCO occupants may be an assignment standard and not a construction standard. To combine NCO grades with E1-E4 personnel within a Dorms-4-Airmen configuration is exemplified in the conceptual combination building plans provided above, but also exceed GBA limitations.

Although many of the conceptual plans developed will require significant renovation if constructed as one grade and later reconfigured to another grade, the overall footprint of the module and structural integrity of the module remained constant. Possible considerations in this type of mixed use may be future plumbing stub-ins provided in the original design to alleviate extensive renovation costs. Force protection and progressive collapse mitigation construction is another significant factor, as well as Collective Protection Systems (CPS) requirements in some OCONUS locations. A successful mix of Dorms-4-Airmen modules and senior grade modules in a dormitory design has already been developed and will be implemented in the Air Force MILCON program. Thus, this ability to provide flexibility while considering future requirements is a valid approach.

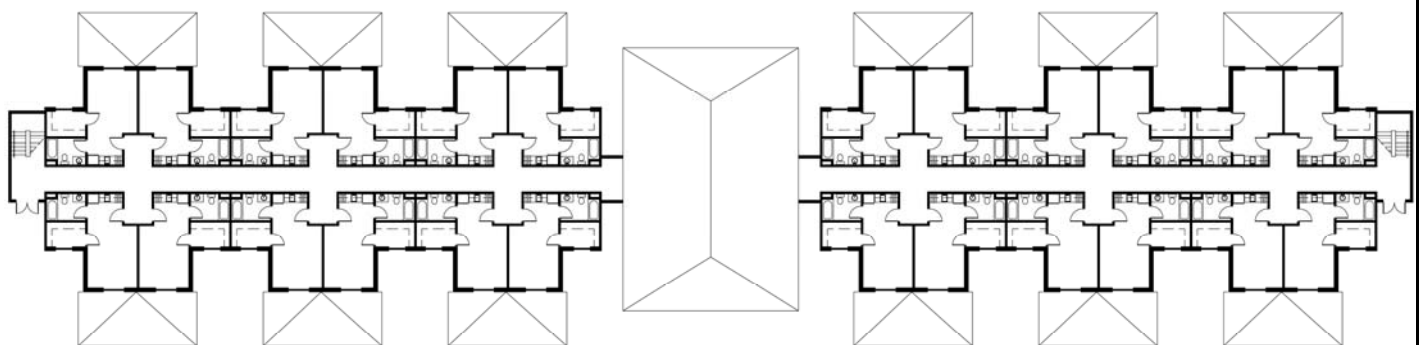


Corridor Access Dorms-4-Airmen Module Plan

Corridor Access NCO Module Plan



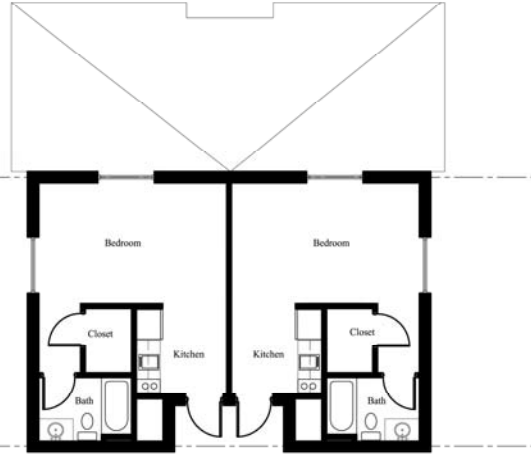
Corridor Access Dorms-4-Airmen Ground/Second Floor Building Plan



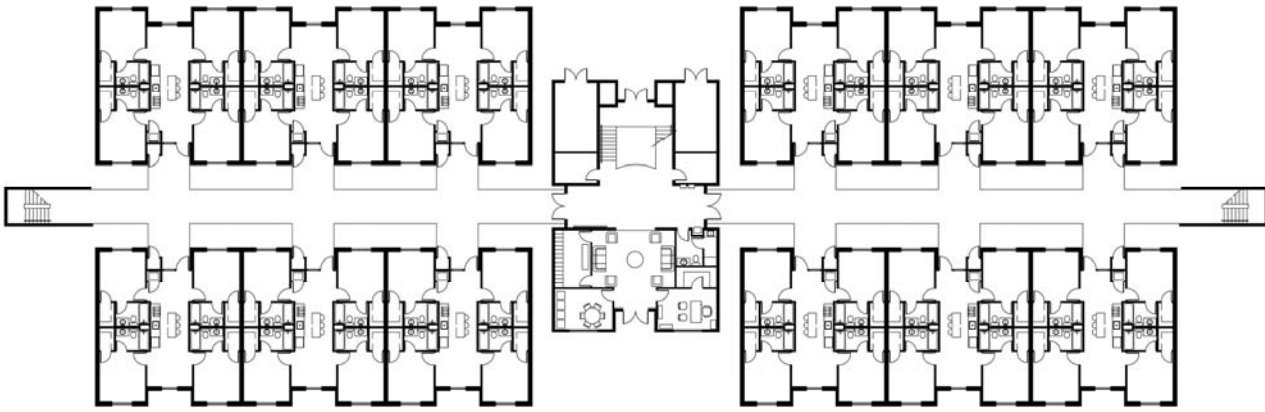
Corridor Access NCO Third Floor Building Plan



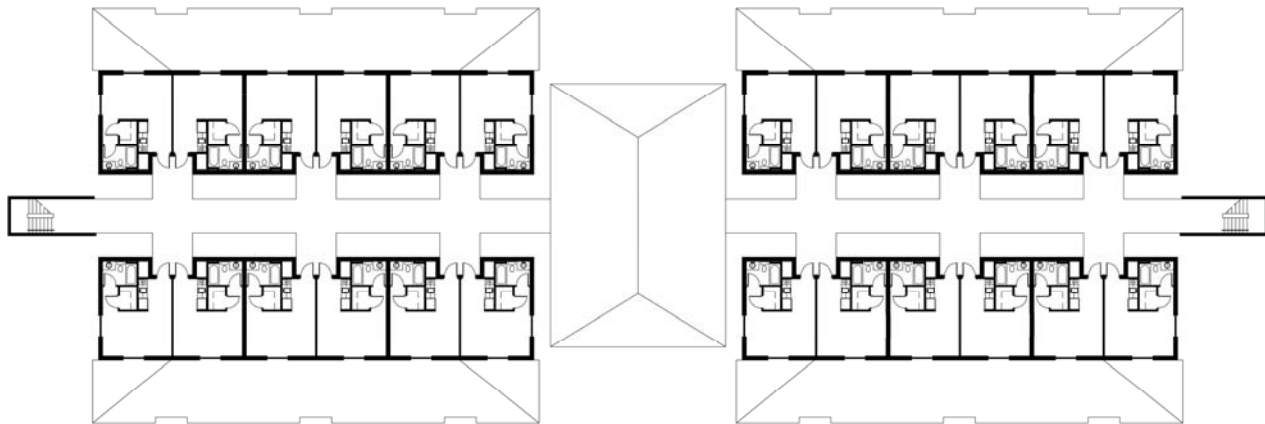
Balcony Access Dorms-4-Airmen Module Plan



Balcony Access NCO Module Plan



Balcony Access Dorms-4-Airmen Ground/Second Floor Building Plan



Balcony Access NCO Third Floor Building Plan

### **New Modules – NCO/SNCO/Officer**

Conceptual module and building configurations are included in this guide which successfully incorporates Air Force goals while meeting the GBA requirement. Additional plans are included for clarity and to respond to installation specific requirements.

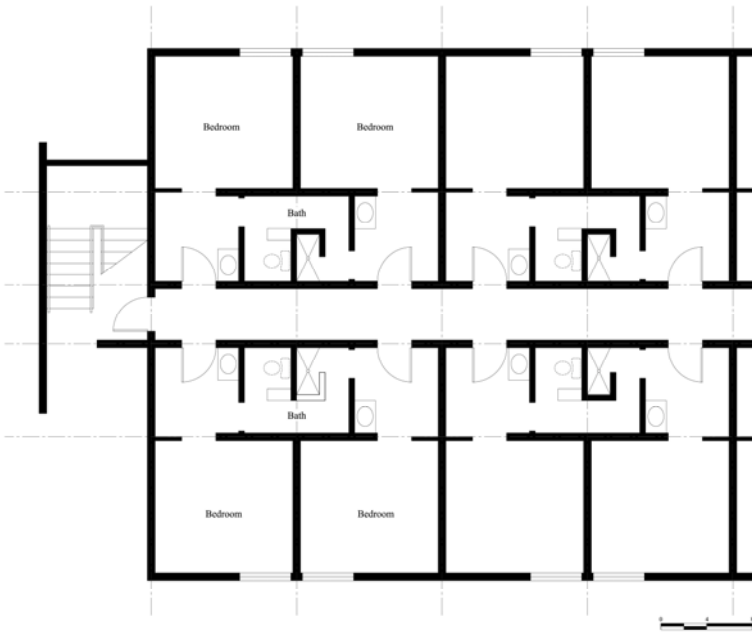
A critical aspect of mixing module types within a single dormitory facility is the ability to provide a structural rhythm or pattern, repeated regardless of module type or overall size, to ensure efficiencies and maintain reasonable costs within design and construction. During the development of the conceptual modules, the various configurations analyzed included complementary module configurations for each grade for consideration, i.e. a square NCO module configuration to be used with a square SNCO module configuration. This consideration, as well as many other specific installation requirements determining building access methods, i.e., corridor, balcony, breezeway, progressive collapse construction, Collective Protection System (CPS) requirements, are all critical factors when determining what type of module configuration to use in a specific dormitory facility design. The goals of the Air Force to provide flexibility is emphasized with the introduction of these modules as new guidance for Air Force Unaccompanied Housing construction.

### **Renovation – NCO/SNCO/Officer**

The conceptual NCO, SNCO, and Officer module plans included in this guide are based on structural rhythm or pattern to ensure the greatest efficiencies when mixing module types within a facility. This concept also ensures greater flexibility during renovation by allowing the existing dormitory building configuration to be best matched to conceptual module plans with the same general building configuration. Existing dormitory buildings were analyzed to explore the possibility of incorporating the same standards and benefits of the new module designs during renovation. Using typical Corridor and Balcony Access 1+1 dormitory buildings for background building plans, a mix of grades were studied using the recommended NLA and GBA limitations, while considering existing structural systems and load bearing wall constraints. Included below are conceptual renovation plans developed for a mix of NCO and SNCO grades.

#### **Analysis**

The existing building plans adapted well to both the NCO and SNCO module configuration, although existing structural constraints lessened the efficiency of each plan. To remain within recommended NLA for each module and yet remain within the constraints of existing bearing walls, the module configurations will vary slightly. In most configurations, the original occupancy of the building will be decreased with the new NCO or SNCO module design. These numbers will vary, though, based on building systems requirements and other local considerations. The cost of renovating existing dormitory facilities to meet these new standards is comparable to renovation costs using the 1+1 standards, as the building would be significantly gutted, retaining only building shell and/or existing stairwells, and replacing all building systems regardless. Additionally, the goals of the Air Force to provide increased living areas and quality of life for the residents is emphasized with these new standards for new and renovated Air Force dormitory construction.



Existing Corridor Access Dormitory Plan



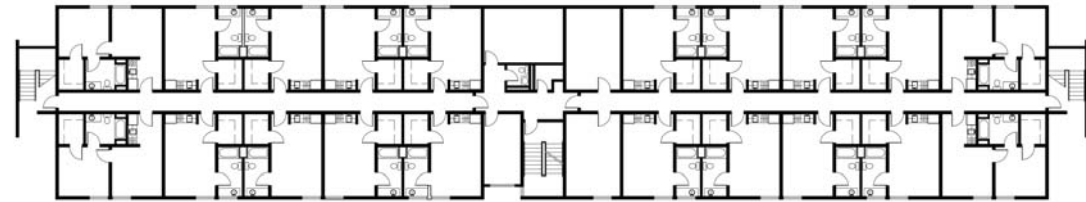
Renovation Corridor Access SNCO Module Plan



Renovation Corridor Access NCO Module Plans

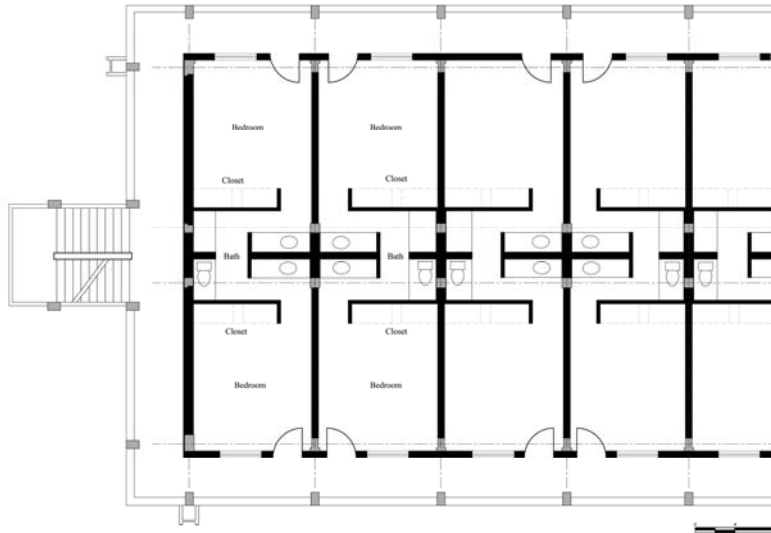


Renovation Corridor Access Combination NCO/SNCO Building Plan – Ground Floor



Renovation Corridor Access Combination NCO/SNCO Building Plan – Second/Third Floors

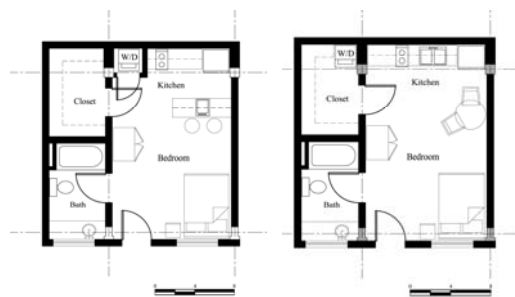




Existing Balcony Access Dormitory Plan



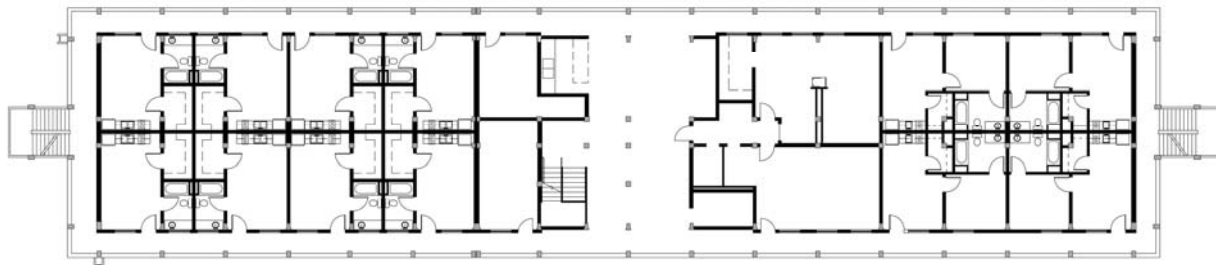
Renovation Balcony Access SNCO Module Plan



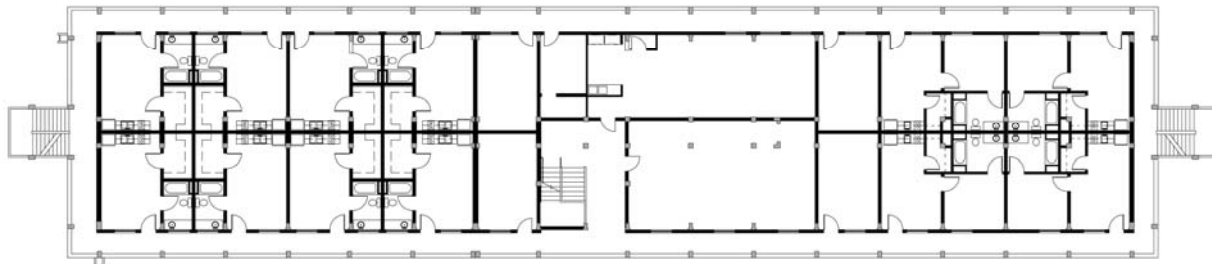
Renovation Balcony Access NCO Module Plans



Renovation Balcony Access SNCO Module Plan



Renovation Balcony Access Combination NCO/SNCO Building Plan – Ground Floor



Renovation Balcony Access Combination NCO/SNCO Building Plan – Second/Third Floors

**Construction Standards – New Construction and Renovated Permanent Party Unaccompanied Housing – NCO/SNCO/Officer**

Grade	E5-E6 (NCO)
Minimum Net Living Area per person	11M <sup>2</sup> (118 SF)
Recommended Net Living Area per person	30.7 M <sup>2</sup> (330 SF)
Maximum Gross Building Area per person	33 M <sup>2</sup>
Number of persons per module	1
Kitchen Configuration	Private (shared kitchen optional)
Dormitory Configuration	Central Corridor, Breezeway, Balcony

Grade	E7-E9 (SNCO) and O1-O3 (CGO)
Minimum Net Living Area per person	22 M <sup>2</sup> (236 SF) SNCO/30.7 M <sup>2</sup> (330 SF) CGO
Recommended Net Living Area per person	42.8 M <sup>2</sup> (460 SF)
Maximum Gross Building Area per person	66 M <sup>2</sup>
Number of persons per module	1
Kitchen Configuration	Private
Dormitory Configuration	Central Corridor, Breezeway, Balcony

Grade	O4-10 (FGO and above Officer)
Minimum Net Living Area per person	42.8 M <sup>2</sup> (460 SF)
Recommended Net Living Area per person	46.5 M <sup>2</sup> (500 SF)
Maximum Gross Building Area per person	66 M <sup>2</sup>
Number of persons per module	1
Kitchen Configuration	Private
Dormitory Configuration	Central Corridor, Breezeway, Balcony

New Permanent Party Unaccompanied Housing – NCO/SNCO/Officer and major dormitory renovation projects shall meet the construction standards cited in the table above. Additionally, newly constructed Permanent Party Unaccompanied Housing NCO/SNCO/Officer shall include the required spaces with their associated prescribed sizes as listed in the table below. Some flexibility is allowed for renovated Permanent Party Unaccompanied Housing NCO/SNCO/Officer, but they shall include the required spaces to the greatest practical degree. Common dormitory support area requirements for all Unaccompanied Housing regardless of grade should meet the same minimum requirements as noted in the Dorms-4-Airmen Required Spaces and Sizes – New Construction and Renovation discussed earlier in this Chapter.

**Required Spaces and Sizes—New Construction and Renovation Permanent Party  
Unaccompanied Housing NCO/SNCO/Officer Module Requirements**

<b>Required Functional Space</b>	<b>E5-E6 (NCO) Recommended Net Living Area</b>	<b>E7-E9 and O1-O3 Recommended Net Living Area</b>	<b>O4 –10 Recommended Net Living Area</b>
Private Living/Bedroom Area (1 shared area per person for NCO – Separate Living and Bedroom Areas for SNCO/Officers)	30.7 M <sup>2</sup> (330 SF) total NLA - 12 M <sup>2</sup> (129 SF) min combined living/ bedroom area	42.8 M <sup>2</sup> (460 SF) total NLA - 12 M <sup>2</sup> (129 SF) min each living and bedroom area	46.5 M <sup>2</sup> (500 SF) total NLA - 12 M <sup>2</sup> (129 SF) min each living and bedroom area
Private Bathrooms ( per person) (1 toilet, 1 combination tub/shower or 1 separate shower, and 1 lavatory/ vanity )	3.25 M <sup>2</sup> (35 SF) vanity min 914 mm (36 inches) wide	3.25M <sup>2</sup> (35 SF) vanity min 914 mm (36 inches) wide	3.25 M <sup>2</sup> (35 SF) vanity min 914 mm (36 inches) wide – 1220 mm (48 inches) preferred
Private Walk-in Closet (1 per person)	1.86 M <sup>2</sup> (20 SF)	1.86 M <sup>2</sup> (20 SF)	1.86 M <sup>2</sup> (20 SF)
Kitchen/Kitchenette Area (private kitchen per person recommended) Sink, cook top, combination microwave/ convection oven, refrigerator, range hood with exhaust fan, storage cabinets, and disposal where permitted – in some OCONUS locations, local codes may require a separate kitchen area	Private kitchen (shared kitchen optional) 2-burner cook top minimum	Private kitchen 2-burner cook top minimum (4-burner cook top with or without oven optional)	Private kitchen 2-burner cook top minimum (4-burner cook top with or without oven optional) seating/dining area
Laundry Area (1 washer/1 dryer per module - stacked) Laundry per module recommended - centralized laundry as option with minimum ratio 1 washer/8 persons and 1 dryer/6 persons	0.93 M <sup>2</sup> (10 SF) per appliance actual footprint/ 1.95 M <sup>2</sup> (21 SF) per appliance - circulation inclusive.	0.93 M <sup>2</sup> (10 SF) per appliance actual footprint/ 1.95 M <sup>2</sup> (21 SF) per appliance - circulation inclusive	0.93 M <sup>2</sup> (10 SF) per appliance actual footprint/ 1.95 M <sup>2</sup> (21 SF) per appliance - circulation inclusive

## **5. Project Cost Considerations**

The following special factors should be considered when establishing initial estimates of project costs in the Air Force Dormitory Master Plan:

### **Special Design Features**

Expenses associated with special design features in a dormitory room can account for a large portion of the total project cost because the features are repeated in every module.

Programmers and designers shall be aware of current unit cost factors. Programmers will only use unit costs; therefore, designers shall be concerned about the cost impact of special design features. A good example is kitchen equipment, where the cost can vary greatly, depending upon the quality of each item.

### **Utility Systems**

Utility requirements for dormitory facilities often exceed those of other facilities of similar size because of the higher energy demands and occupancy densities. Programmers shall determine these requirements and include them in the construction budget if they are associated with the cost of supporting facilities. Otherwise, accomplish the program requirements within the unit cost. The cost of pipe tunnels and trench systems associated with dormitories can have a significant impact on construction costs.

### **Mechanical Systems**

The type of mechanical system selected for a dormitory has a major impact on the cost of the project. An existing steam and chilled water distribution system from a central energy plant may have the capacity to supply the new dormitory. In other cases, the new dormitory campus may justify its own central energy plant, be more cost effective to provide each dormitory with a separate mechanical system, or provide individual systems for each module. Make these decisions as early in the programming or design process as possible. Life cycle cost analysis is especially important for mechanical systems in dormitories due to unique user requirements.

### **Fire Protection Systems**

Fire protection systems for dormitory facilities are a requirement, but may impact construction costs and should be considered when determining project budgets. These systems may impact costs due to the repetitive nature of dormitory designs, their occupancy classification, and dependent on selection of system, may increase the water demand for the project.

### **Sustainability**

Reference USAF/ILE policy letter "Sustainable Development Policy", dated 19 December 2001, for direction on all dormitory projects.

### **Force Protection**

Follow the *DoD Minimum Antiterrorism Standards for Buildings* for dormitory facilities, and consider the impact these standards have on the overall construction cost of the project and the appropriate siting of the new dormitory. Coordinate with the base security forces personnel for additional local guidance or requirements.

**Collective Protection Systems**

Follow *DoD Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings* for guidance on construction standards in OCONUS locations where Collective Protection Systems (CPS) are required. Consider the impact of these standards on the overall construction cost of the project and the required GBA to support these requirements.

**Other Factors**

Preliminary soils analysis is essential to determine whether extensive site work and foundation costs are required. Local environmental and climatic conditions can also impact costs. Dormitories located in areas prone to seismic activity generally cost more. Climatic influences such as heavy snow loads, wind loads, high humidity, and extreme temperatures result in additional costs due to structural and insulation requirements. Dormitories that occur in designated historic districts may incur additional cost in order to ensure compatibility with historic structures.

**Module Proportions**

The dimensional proportions of modules are critical to the overall construction cost of a dormitory. Designers shall consider not only efficiency in design of the individual modules, they shall also focus on how the modules string together to create a building. While module proportions, interior wall quantity, and the number of doors can be optimized to produce the lowest cost, designers shall also consider the impact these factors may have on privacy, functionality, and aesthetics.

## CHAPTER 3 FACILITY DESIGN



Malmstrom Air Force Base



McGuire Air Force Base

### A. SITE DESIGN

Community planning is an integral part of dormitory campus planning. Although the emphasis in dormitory campus planning is to create a residential neighborhood atmosphere, somewhat separated from surrounding the installation administrative and mission related functions, proximity and access to common public use facilities is desired. Internal separation within a dormitory campus area may include separation of enlisted personnel from officer personnel. Other considerations may include centralized dormitory management and consolidated support functions, including interior and exterior support spaces. Adjacency and circulation to and from support and recreational areas are critical components that enhance quality of life and the campus environment.

The design of vehicular paths, pedestrian paths and landscape can help define layers of boundary around the dormitory campus to provide this separation, but can also enhance the flow into and out of the adjacent community areas, such as the dry cleaner, shopette, post office, food court, theatre, dining hall, and club. Adjacent recreational spaces additionally enhance this layer of boundary and can buffer other non-desired areas or functions. Site planning and community planning should define an edge to the dormitory campus, while considering the importance of adjacent community and common public areas.

#### 1. Siting Requirements

Site planning is an important element of project design and can significantly impact the overall success of an Unaccompanied Housing project. Site planning requires the interdisciplinary involvement of the community planner, architect, landscape architect, force protection/security forces specialist, interior designer, and civil, mechanical, electrical, and communication engineers, as well as Housing and Dormitory Managers. The quality of design will suffer if one of these team members is not included. The community planner or landscape architect should lead and take responsibility for the development of the site plan and ensure coordination with the most current version of *DoD Minimum Antiterrorism Standards for Buildings*, *Uniform Federal Accessibility Standards* (UFAS), and *Americans with Disabilities Act Accessibility Guidelines* (ADA/ADAAG).

### Site Requirements—Air Force Unaccompanied Housing

Functional Requirement	Minimum/Recommended
<b>Siting</b>	
Community Planning	Close proximity to dining hall, shopette, fitness center, club, etc
<b>Circulation</b>	
Entrance Roads	7.32m (24'-0") width minimum
Service Roads	2.4m (8'-0") width minimum
Entrance Sidewalks	2.4m (8'-0") width minimum
Sidewalks	1.8m (6'-0") width minimum
Siting Setbacks	Per <i>DoD Minimum Antiterrorism Standards for Buildings</i>
<b>Parking</b>	
Resident Parking	1 per resident/may be reduced based on local requirements
Accessible Parking	2% total parking/minimum 1 space (per <i>UFAS</i> )
Motorcycle Parking	5% residents/varies based on local requirements
Bicycle Parking	20% residents/varies based on local requirements
Visitor Parking	Optional based on local requirements
<b>Site Amenities</b>	
Pavilions/Outdoor Areas	Include as appropriate in master planning/projects
Site Furniture	Per installation standards and <i>AFI 32-6004</i>
Site Lighting	Per IES recommended lighting levels/installation standards
Dumpsters/enclosures	Location/design per <i>DoD Minimum Antiterrorism Standards for Buildings</i> / installation standards
Signage	Per <i>Air Force Sign Standards</i> /installation standards
<b>Landscape</b>	Per USAF Landscape Design Guide/local materials/ <i>DoD Minimum Antiterrorism Standards for Buildings</i>

## 2. Circulation

### Vehicular Access

Provide access to the dormitory from secondary (collector) streets to minimize the congestion associated with main arterial streets. Where possible, divide main entrances with landscaped traffic medians between entry and exit lanes. Because of the high volume of traffic using the entrances, the recommended minimum width of non-divided entry roads should be 7.32 m (24'-0"). Reference the most current version of *DoD Minimum Antiterrorism Standards for Buildings* for all vehicle access design, critical in determining allowable set backs from the dormitory to adjacent roads and parking, and eliminating lines of approach perpendicular to the building.



Incirlik Air Force Base – Force Protection

Consider passenger loading and/or drop off areas near the dormitory entrances, providing convenience to residents and their guests. Provide taxi drop-off areas when required, especially in OCONUS locations where personal vehicles are not allowed and residents rely on bikes, base shuttles, taxis and walking on and off base. Consider moving vans, delivery trucks and required easement areas. Design of vehicular access in sub-arctic climates should consider snow storage and snow dumping. Proper lighting of roads and parking should consider areas with extreme daylight and darkness conditions during part of the year.

### Fire Department/Emergency Service

Reference the *International Building Code (IBC)* and *DoD Minimum Antiterrorism Standards for Buildings* for a minimum separation required between dormitory facilities and the closest adjacent building. This separation is for fire protection purposes and to meet force protection requirements, and may also require consideration of local fire protection policies. Provide access to the structure from three sides for fire protection vehicles. Obtain width, weight, and turning radii of fire fighting vehicles from the base fire department to include operational dimensions including firefighting apparatus with appendages such as fully extended outrigger support legs.

### Service Vehicles

Access streets and parking areas should be designed to accommodate service vehicles. Where interior court areas are proposed between adjoining dormitory facilities, design the main pedestrian walks to accommodate such vehicles. As an example, these walkways shall be a



minimum of 2.4 meters (8 feet) wide and constructed using reinforced concrete to accommodate medium weight vehicles. Consider treating the walkways with a patterned concrete system to minimize the negative visual impact of the wider access route. Consider materials such as concrete grass road type pavers to provide access to infrequent service vehicles. Consider installing removable bollards as needed to restrict unauthorized vehicle access.

### **Bus Route Access**

Where possible and appropriate, access to public transportation systems should be considered in project design. If the installation provides bus service, designers should consider developing shelters and walks to serve enlisted personnel needs. Bus shelters shall be compatible with the architectural style of existing buildings and other bus shelters on base.

### **Pedestrian Circulation Systems**

Walkways to building entrances should be 2.4 meters (8'-0") wide. All other sidewalks should be 1.8 meters (6'-0") wide. Design and grade sidewalks to provide barrier-free access to the first floor of all dormitory facilities and to any outdoor use areas associated with the dormitories.

Provide connections to other functional areas of the installation with pedestrian circulation systems. Consider including links to jogging/biking trails as part of the site development process. In sub-arctic climates, consider the use of sidewalks above steam heat tunnels to keep walkways free of ice in the winter, or consider heated or covered walks in lieu of open corridors.

### **Outdoor Areas**

Consider including outdoor passive and/or active use areas in all dormitory facility area development plans and carefully coordinate these areas with indoor social activity areas. Where appropriate, design recreational pavilions as an integral part of the dormitory campus. The pavilions shall complement the architectural style and materials of the dormitory facilities. Plan for and provide additional amenities such as barbecue grills, tables, benches, lighting, and landscape plant materials. In sub-arctic climates, outdoor equipment will need to withstand extreme conditions or be stored during the winter seasons. Additionally, consider the placement of equipment in these climates to avoid snow or ice falling from adjacent roofs.

### **Service Entrances**

Where possible, separate service entrances associated with mechanical rooms or mechanical enclosures from resident parking areas. Reference *DoD Minimum Antiterrorism Standards for Buildings* for all vehicle access design.

### 3. Parking

#### Resident Parking

Generally provide one parking space per dormitory resident. Siting should consider availability of resident parking early in the design phase. Parking areas should be sized to local conditions and the number of required parking stalls may be reduced. Consider head bolt heaters in sub-arctic climates. Reference the most current version of *DoD Minimum Antiterrorism Standards for Buildings* for all vehicle parking designs including set back requirement from the dormitory building to adjacent roads and parking.

Additional visitor parking, with the exception of accessible parking, is not required but may be an option based on local requirements. This can result in significant paving areas which, if not planned properly, will have a negative impact. Paving increases storm water runoff, results in increased reflected and absorbed radiation, and raises the ambient air temperature of the surrounding area. Parking areas also result in reflected sun glare off vehicles, increased air pollution, and concentrated contamination of runoff from leaking oil and antifreeze.

Many of the negative impacts of parking areas can be mitigated or lessened by improved design techniques. Trees planted in parking lot islands will intercept reflected radiation, visually break up the mass of paved surface, and provide shade for vehicles. Properly located, the traffic islands can also provide safer pedestrian circulation. Where topography allows, design parking areas in multiple levels with transition zones. This may reduce grading requirements and allow the designer to balance the volume of cut and fill. Design these transitions as landscape buffers much like traffic islands to soften the visual impacts. Consider sustainable alternatives to solid pavement.

#### Parking for the Persons with Disabilities

The parking requirement for dormitory facilities assumes all occupants are able-bodied personnel. Although military dormitory facilities are exempt from accessible requirements per UFAS, real world requirements necessitate provisions for persons with disabilities in a small percentage of living units on the ground floor of each dormitory facility to assist personnel with specific requirements. Provide accessible parking spaces for visitors and residents with disabilities in accordance with the *Uniform Federal Accessibility Standards* (UFAS) and the *Americans with Disabilities Act (ADA/ADAAG) Accessibility Guidelines*. Locate these parking spaces to provide the most convenient access to the building entry.

#### Motorcycle Parking

Designated motorcycle parking areas should be included in the site plan. These areas should be constructed of reinforced concrete to prevent motorcycle stands from sinking into the asphaltic concrete parking areas. Recommend the installation of concrete embedded lockdown eyebolts for securing motorcycles from theft.

### **Bicycle Parking**

Dormitory residents frequently use bicycles, particularly in milder climates. Provide bicycle parking facilities within the dormitory campus area. Provide required bicycle parking on concrete surfaces adjacent to sidewalks or first floor building corridors. Parking areas shall be covered and screened from view of the general public. Consider covered bicycle parking enclosed on a minimum of 3 sides, enclosed parking areas on the exterior of dormitory buildings, or lockable bicycle lockers in northern tier or highly corrosive environments, which maximize security and minimize visual clutter. Such lockers can be purchased with equipment funds.

## **4. Site Considerations**

### **Establishing the Finished Floor Elevation (FFE)**

Establishing the finished floor elevation of a new dormitory facility is an important aspect of site planning that occurs after all site utility issues are resolved. The FFE affects grading, cut and fill, visual impact of the facility and interior-exterior transitions. In addition, the FFE has a significant impact on the landscape architect's ability to effectively introduce plant materials into the new environment. When the approach is to level the site without sensitivity to other demands, the results often are catastrophic, resulting in barren sites lacking visual interest. The landscape architect, architect, and civil engineer should work closely together to achieve optimal design results.

### **Airfield Constraints**

Reference *Airfield and Heliport Planning and Design* to determine if the dormitory building height may be limited by the airfield imaginary surfaces and set backs. Review the installation's Air Installation Compatible Use Zone (AICUZ) mapping to determine noise levels at the project site and design to mitigate for excessive noise.

### **Grading**

Grade the site to achieve an orderly transition from the point where residents enter the site by automobile or on foot to the point where they are at the first floor entrance. Site grading shall consider the impacts of the parking area, the dormitory, bus-stop shelters, sidewalks, outdoor passive use areas, mechanical equipment, and trash dumpsters. Where appropriate, use grading to control the negative visual impacts these man-made facilities have on the visual environment. See the discussion of landforms below.

Dormitory facilities tend to be linear and relatively narrow in configuration and therefore lend themselves to an orientation paralleling existing contours. Determine if local building codes require storm water retention. Where on-site storm water retention is required, the location of retention areas shall be carefully thought out in terms of function as well as visual impact. Use large retention sites for outdoor recreation areas.

### **Landforms**

The landscape architect and the civil engineer shall work together to use landforms to soften the impact of parking on the landscape and to positively enhance force protection

of the dormitory campus. Reference *DoD Minimum Antiterrorism Standards for Buildings* for criteria limitations. Use landforms such as mounds and swales in conjunction with landscape plant materials to soften or obscure the parking areas, provide spatial articulation, or enhance drainage structures or surface water retention areas. Use landforms to add interest and diversity to the project. In particular, landforms can perform an important function around outdoor activity areas by screening undesirable views.

### **Storm Drainage**

The successes and failures of site planning rely heavily on the designer's ability to facilitate drainage. Depending on the geographic location and the availability of nearby subsurface storm drains, provide underground storm drainage for each Unaccompanied Housing campus. All site water shall either be intercepted in drop inlet structures or be designed to drop directly into a subsurface system. If subsurface storm drains are not available at the proposed site, then program them as part of the dormitory project. As a minimum, divert surface water to an underground system to a point where it is discharged into aboveground storm drains. The project should provide for appropriate surface water retention and erosion prevention, and should provide for drop inlets as necessary to intercept surface runoff and prevent walkways from being flooded. Refer to the *USAF Landscape Design Guide* for further guidance.

### **Utility Corridors**

The site planner should develop underground utility corridors (easements) in coordination with the base community planner, electrical, mechanical, communication and civil engineers. Size corridors to accommodate future expansion. Place utility corridors no closer than one and one-half times the crown width of nearby mature trees or 10.7 meters (35'-0"), whichever is greater. Locate utility corridors to allow for future street-tree plantings. Consider using pipe tunnels and trenches.

## **5. Site Amenities**

### **Site Furniture**

The selection of site furniture along with appropriate landscape development and signage provides the project with a finished appearance. Site furniture that is in harmony with the architectural style of the dormitory campus complements the building while ensuring a more usable and organized outdoor space. Poorly selected and/or placed site furniture can result in major disharmony, drawing attention away from otherwise superbly designed site and building features. The landscape architect shall coordinate selections with the architect and interior designer to ensure smooth transitions are made from within the building to the outdoors and vice versa. Effective transitions are achieved when building materials, colors, and design details from the building are incorporated into and reinforced by the paving materials, signage and site furnishings. In extreme climates, consider exposure to elements, snow loads, corrosion, and maintenance requirements during furniture selection. Reference *Furnishings Management, Furnishings Standards* for further guidance.

### **Site Lighting**

Site lighting is an integral part of a dormitory project. Provide lighting to ensure occupants have a safe means of travel between outdoor spaces while ensuring that lighting is sensitive to the environment surrounding the dormitory campus. Follow the installation's design standards, if available, in the selection of luminaries and poles. All signage and lighting shall be in compliance with the installation's standards. The selection of materials and locations shall be a joint decision between the landscape architect and the electrical engineer. Energy-efficient lamps such as high-pressure sodium with color correction ensuring optimum visual acuity are recommended for energy-conscious site lighting. Consider life-cycle costs of lamp replacement, though, when specifying fixture and lamp types. Consider motion detection and photo sensitive sensors to achieve energy efficient lighting design.

Provide adequate site lighting at any point where there is a change in grade requiring steps, near accessible and motorcycle parking areas, under stairwells, and near main entrances to buildings. A lighted sign may be appropriate for night visitors. Consider sub-arctic climates where extreme darkness during part of the year may require additional lighting for the safety of residents. Design exterior lighting such that zero direct-beam illumination leaves the building site. Use the recommendations of the *Illuminating Engineering Society (IES) Lighting Handbook* to establish illumination levels. In particular, do not exceed IES of North America (IESNA) foot-candle level requirements as stated in the Recommended Practice Manual: *Lighting for Exterior Environments*.

### **Sustainability**

Incorporate sustainable design concepts into dormitory campus design. Consider recycling centers and containers and other reuse issues when developing site design and landscaping. Coordinate locations of recycling and refuse containers with site furnishings and landscape to complement the campus and building design, while providing ease of use and serviceability.

### **Signage**

Follow guidance in *Air Force Sign Standards*, and as supplemented in the installation's design standards, if applicable.

### **Visual Screening**

Trash dumpsters must balance convenience to the residents with access by large trash handling trucks, but must be located away from main entrances and comply with antiterrorism/force protection requirements. Screen trash dumpster locations with any combination of hard wall materials, earth forms and landscaping to reduce adverse visual impact. Where hard wall materials are used, the materials must complement the materials used in the dormitories and other outdoor facilities. Screen mechanical equipment such as chillers, evaporating condensers, switchgear, and electrical transformers, while maintaining sufficient access to equipment for maintenance and repair. Architectural screening materials must complement the dormitory's architectural style and materials. Use landforms to screen objects in the landscape that do not require enclosures.

## 6. Landscape Architecture

Landscape plans developed for the Air Force require the services of a professional landscape architect working in conjunction with the other disciplines to achieve the total design intent for the project. The landscape architect must have an intimate knowledge of the plant materials for the region. Refer to the *USAF Landscape Design Guide* for further guidance. In addition, the landscape architect must conform with *DoD Minimum Antiterrorism Standards for Buildings* referencing maximum height and location of plant materials adjacent to a dormitory building.

The design intent should include creating an aesthetically pleasing landscape minimizing resource and maintenance requirements. The fundamentals of good landscape design include: proper planning and design, plant selection, plant installation, use of turf alternatives, use of mulch materials, zoning of plants as per water requirements, soil improvements, efficient irrigation, and appropriate maintenance considerations.



Peterson Air Force Base – Landscape

Structure the landscape design program to satisfy the architectural, engineering, aesthetic, and environmental requirements of each project while minimizing maintenance needs.

The following factors must be evaluated when performing a site analysis:

- Visual elements
- Hydrology
- Security Requirements
- Climatic Data
- Topography and Soil Quality
- Maintenance Requirements
- Existing Vegetation
- Spatial and Program Analysis
- Circulation Patterns

### Enframement

Identify appropriate external views of the dormitory during the site analysis process. Using landscape design elements, focus attention to important features of the building by manipulating and placing tree masses and screening undesirable features.

### Visual Enhancement

Landscape plant materials used for utilitarian purposes, such as screening service areas or providing shade, will also enhance the attractiveness and livability of an area. The oppressive feeling of monumental scale can be relieved by the careful selection of proper plant materials. Visually separate multiple buildings into several pleasantly framed units, and enhance individual buildings within a group. Shrubs and small trees arranged in strategic groups around a building improve the appearance by softening structural lines. This also helps to integrate the building with its site and diverts attention from unattractive structural features.

### **Spatial Articulation**

Use plant materials to create outdoor enclosed spaces and to separate such spaces one from another. Also use plant material to direct people through outdoor spaces by visually defining and reinforcing patterns of movement. The degree of enclosure, separation, or movement depends upon the density, form, and type of plant material used. Keep in mind that the effects of deciduous plants vary with the season, whereas evergreens remain constant year-round.

### **Visual Screening**

Unattractive views or objects identified by the site analysis should be screened with appropriate plant materials to minimize negative visual impacts. Trash dumpster areas, pad mounted electrical transformers, parking areas, and mechanical yards are examples of such views or objects. Sufficient access to mechanical and electrical equipment must be maintained, though, to allow for maintenance and repair. While plant materials can be used solely for screening purposes, a combination of plant and architectural materials offers an ideal solution to screening needs. Landforms coupled with plant materials will provide an immediate effect while waiting for the plant materials to mature.

### **Wind Control**

Wind is either a pleasant or unpleasant climatic factor depending on ambient air temperature, relative humidity, and velocity. Use plants as wind control devices to slow, guide, deflect or filter the wind. Knowledge of the direction and speed of prevailing winds at different seasons of the year is necessary. When plants are used as a wind barrier, wind is generally affected for a distance of 2 to 5 times the height of the barrier to the windward side and 10 to 15 times the height of the barrier to the leeward side. Plants are better screens than fences or walls for windbreaks because they permit some degree of wind penetration. Irregular forms provide a more effective windbreak than evenly spaced plants. A variety of plant species and sizes also provide a better windbreak than one consisting of a single species. For climates where occasional to frequent snows occur, consideration must be given to the effects of snowdrifts.

### **Sun Control**

The skillful use of plant materials around buildings, along walkways, and around parking areas significantly increases the energy efficiency of buildings and reduces the ambient air temperature around the dormitory project. By intercepting the direct and reflected radiation, plant materials control the absorption of heat energy by the building and parking areas, thus reducing energy costs.

### **Landscape Maintenance**

Include landscape establishment and maintenance within the initial contract for installation of plant materials. The duration of the establishment period should be for a period of one year and should not be included as a contract option. The establishment period requirements should include:

- Irrigation
- Mowing and edging
- Replacing mulch
- Inspection/control of pests and weed control
- Tightening staking/guying materials
- Pruning
- Fertilization
- Maintaining watering saucers

### **Landscape Irrigation**

Landscape with indigenous materials and plants to minimize irrigation needs. Include irrigation systems in dormitory projects sited in arid and semi-arid climatic regions. Use bubbler or drip irrigation systems adjacent to building facades to minimize impact of overspray. Provide all irrigation systems with solid-state automatic multi-station controllers, state-of-the-art control valves, and backflow prevention devices in accordance with building codes. Locate backflow preventers in the mechanical room in cold climates and within screened mechanical enclosures where freezing is not a problem. Include adjusting turf spray coverage, duration of watering cycles, repairing leaks, and general maintenance to ensure proper functioning during the maintenance period for all irrigation systems. Water conservation is a high-priority factor in development of the irrigation design. Take advantage of non-potable water if possible.



## **B. BUILDING DESIGN**

### **1. General Considerations**

The following three basic functional activities must be addressed in Unaccompanied Housing facilities. Designers must fully understand the relationships between these categories and must take an overall approach to creating a fully integrated facility.

#### **Residential Activities**

- Sleeping
- Personal hygiene
- Personal study
- Personal storage
- Indoor relaxation
- Personal cooking and dining
- Laundry

#### **Recreation and Community Activities**

- Television viewing
- Fitness/workout rooms
- Game rooms
- Outdoor sports
- Outdoor relaxation areas

#### **Service Activities**

- Mail delivery
- Vending
- Bulk storage
- Administrative support

Successful dormitory designs require well-designed outdoor spaces integrated with the dormitory building. There are two basic categories for outdoor spaces.

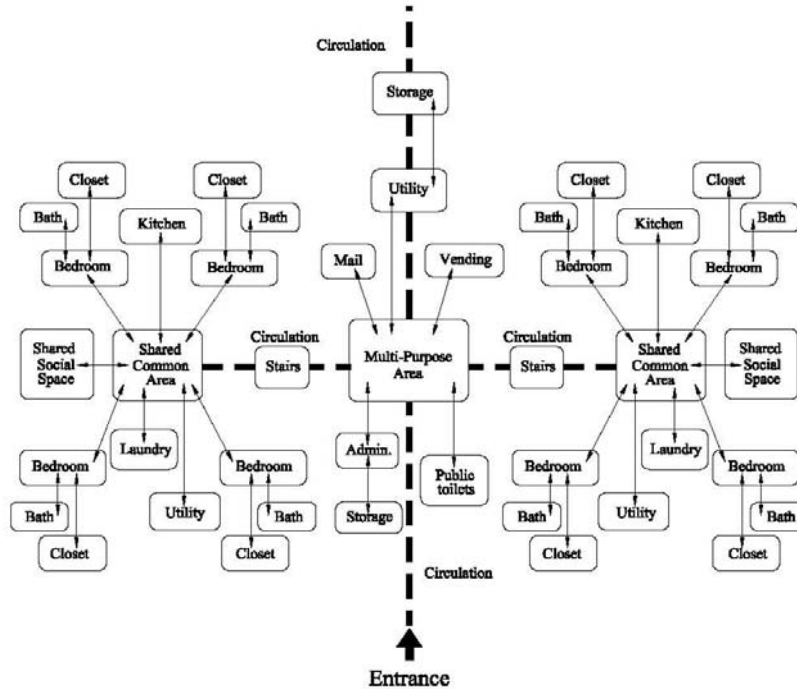
#### **Sports Areas**

- Football and soccer fields
- Ball diamonds
- Basketball courts and Tennis courts
- Open space for informal sports activities

#### **Other Recreational Areas**

- Outdoor seating areas
- Barbecue grills
- Gazebos
- Picnic tables
- Patios and decks

A typical functional relationship diagram is included below to further define relationships between functional areas within a Dorms-4-Airmen dormitory. Unaccompanied Housing for enlisted personnel E5-E9 and officer grades do not require the same level of social interaction as the E1-E4 Dorms-4-Airmen grades.



Dorms-4-Airmen Functional Relationship Diagram

## 2. Building Configuration

The three basic functions are linked together by circulation spaces, and the functions are typically arranged in one of three configurations:

- Undistinguishable within a major architectural form
- Configured as connected components
- Contained in separate structures

Three typical types of building circulation are applied to the varying building functional configurations noted above that apply to Unaccompanied Housing facilities:

- Corridor Access: access from interior double-loaded corridors
- Balcony Access: access from exterior balconies or sidewalks
- Breezeway Access: access from breezeways in a garden apartment arrangement

Balcony Access dormitories with private access to individual living units from exterior balconies or sidewalks may give the perception of increased privacy. They convey a feeling of an individual apartment rather than the hotel-like feeling presented by a Corridor Access dormitory

with interior double-loaded corridors. Balcony Access dormitories can benefit aesthetically from the articulated facades created by balconies. Corridor Access dormitories usually present a greater challenge to the architect due to their typically flat facades. It is important to note, however, that residents in Balcony Access dormitories tend to close their window coverings to gain privacy from outside walkways. This results in less use of natural light. Balcony Access dormitories have the advantage of more centrally located plumbing systems where toilets are grouped back-to-back down the center of the building without being interrupted by a corridor. In Corridor Access dormitories, the view from living unit windows can be directly to the exterior without having to look across a balcony. Corridor Access configurations generally support interior socialization, while Balcony Access configurations support outside social interaction and interior separation. Breezeway Access style dormitories offer the greatest degree of privacy, since stairways access a limited number of modules. In most configurations, Breezeway Access dormitories have only two modules per floor accessed by each stairway.



Aviano Air Force Base

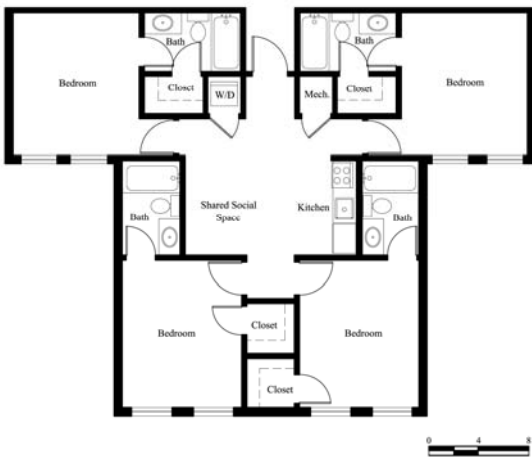
Most Air Force dormitory facilities are three stories in height. Although this configuration requires force protection progressive collapse construction, this density ensures an efficient use of available land while avoiding additional fire protection requirements, inconvenience to occupants, and structural and life safety cost associated with buildings over three stories in height. In locations where land

is very restricted and force protection set back criteria severely limits configuration opportunities, multi-story high rise construction may be considered to meet requirements while ensuring that other site considerations are achieved. The inclusion of elevators is required in dormitory construction four stories and above. Reference the *NAVFAC Elevator Design Manual* for additional guidance on elevator requirements.

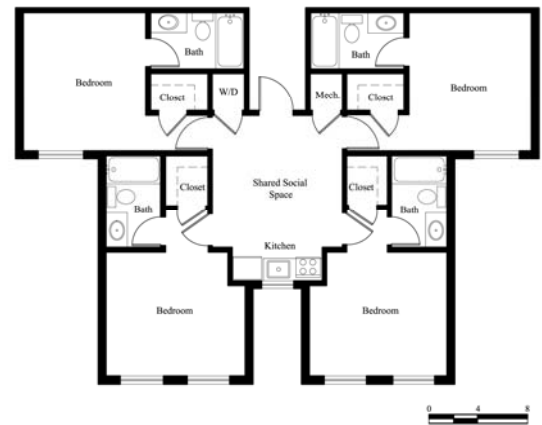
Designers should recognize the importance of minimizing the exterior wall area of the dormitory. This practice not only reduces construction costs, but also reduces life-cycle energy costs. The proportions of dormitory buildings are a direct product of the proportions of the dormitory's modules, therefore deeper modules have less exterior wall surface and result in more efficient building footprints that can be constructed on smaller sites.

### 3. Permanent Party Unaccompanied Housing - Dorms-4-Airmen

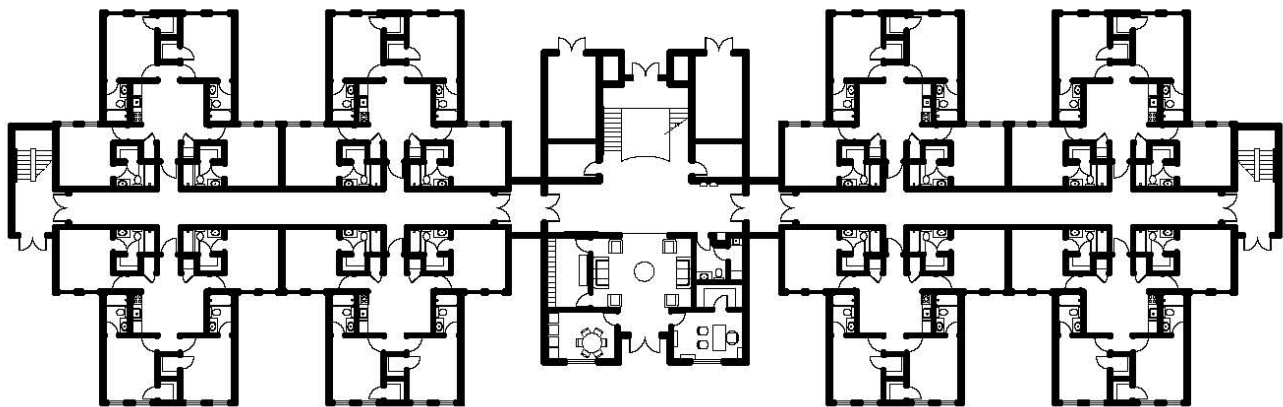
Figures A-D below show conceptual module plans with corresponding conceptual building configurations for each type of Dorms-4-Airmen facilities. These are the basic building blocks from which permanent party E1-E4 Unaccompanied Housing programs are developed. The following concepts are provided for guidance only. Variations within the criteria, scope, and program dollars are permissible. The module layout may vary provided that the required Net Living Area, minimum dimensional clearances, and maximum gross building area conform to established criteria.



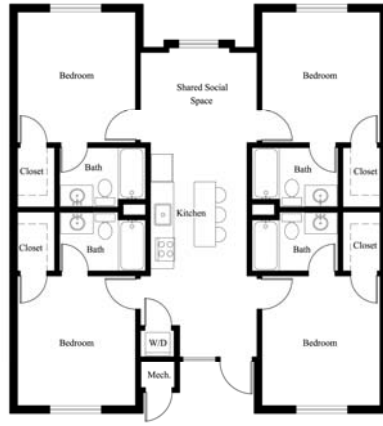
Corridor Access Dorms-4-Airmen Module Plan A



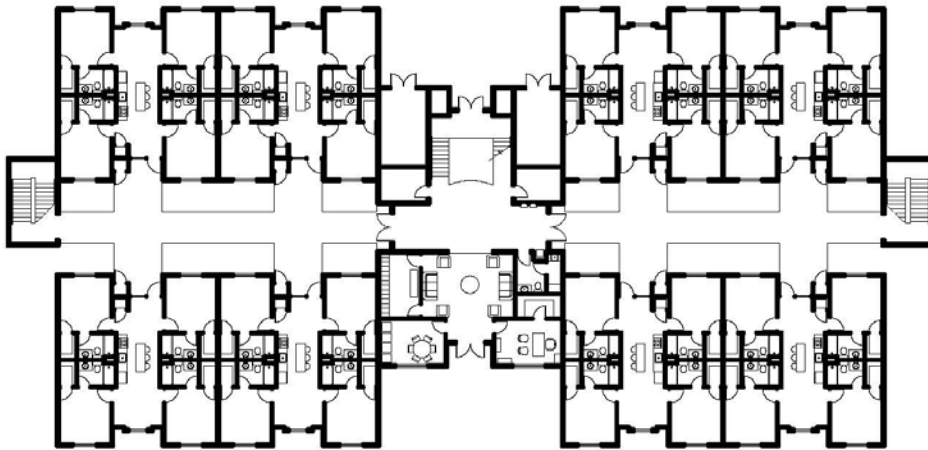
Corridor Access Dorms-4-Airmen Module Plan B



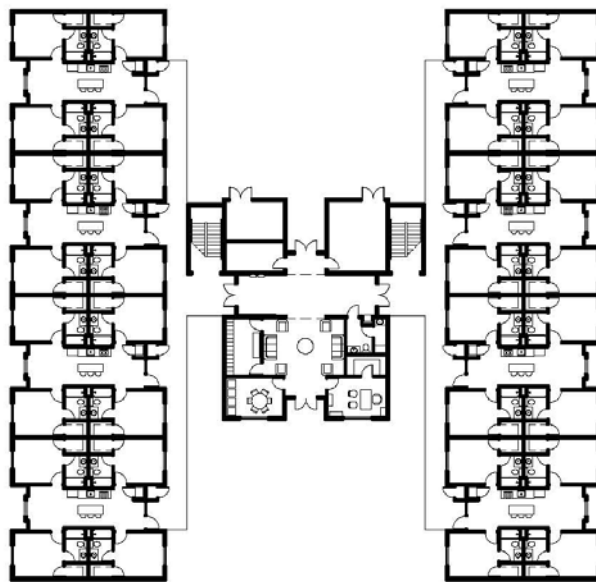
Corridor Access Dorms-4-Airmen Building Plan



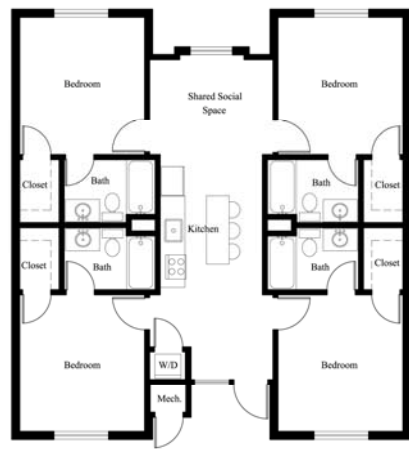
Balcony Access Dorms-4-Airmen Module Plan C



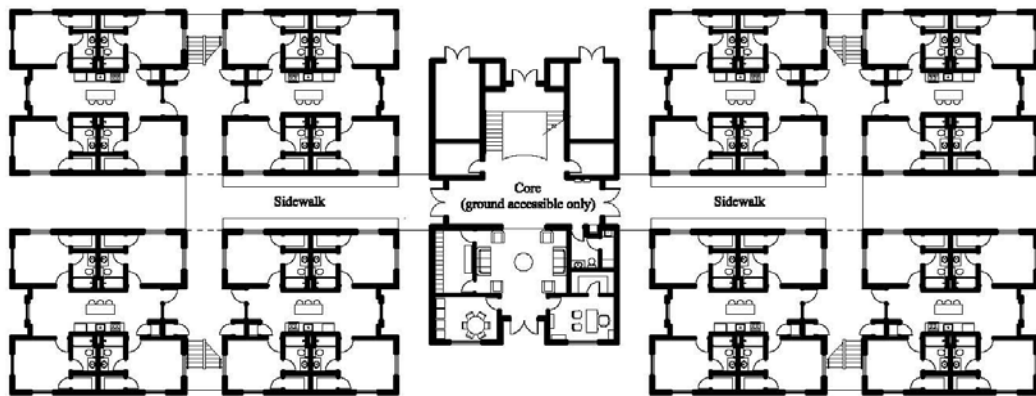
Balcony Access Dorms-4-Airmen Building Plan



Balcony Access Dorms-4-Airmen Building Plan



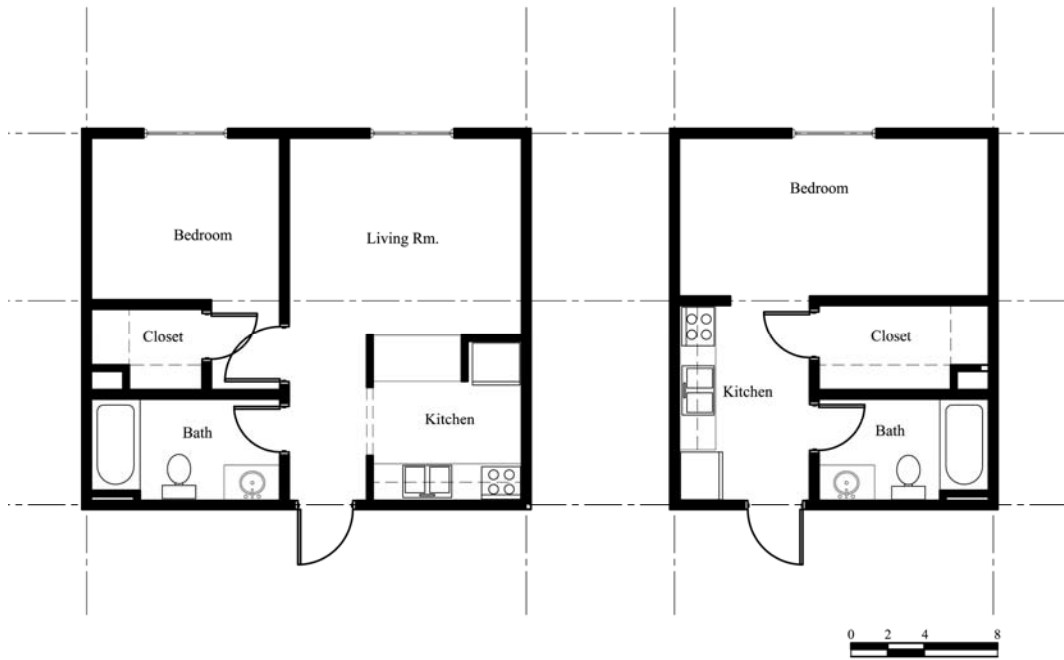
Breezeway Access Dorms-4-Airmen Floor Plan D



Breezeway Access Dorms-4-Airmen Building Plan

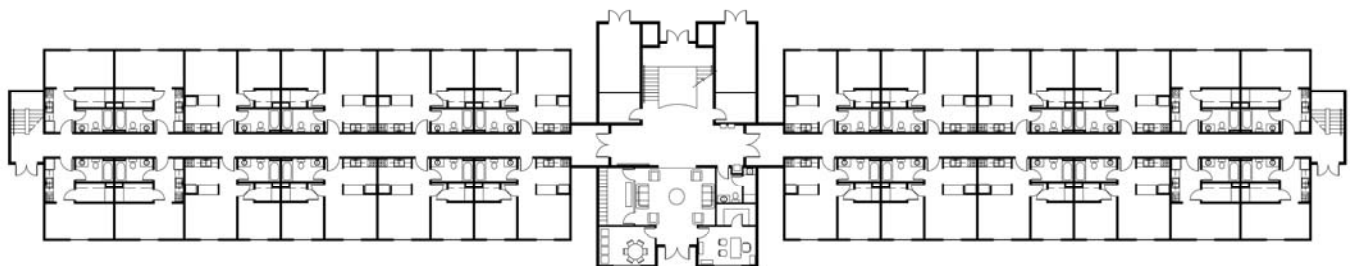
#### 4. Permanent Party Unaccompanied Housing - NCO/SNCO/Officer

Figures 4A-4G show conceptual module plans with coordinating conceptual building configurations for permanent party NCO (E5-E6), SNCO (E7-E9, CGO (O1-O3) and O4 and above Unaccompanied Housing dormitory buildings. These are the basic building blocks from which permanent party Unaccompanied Housing programs are developed for these grades. The following concepts are provided for guidance only. Variations within the criteria, scope, and program dollars are permissible. The module layout may vary provided that the required Net Living Area, minimum dimensional clearances, and maximum GBA conform to established criteria.

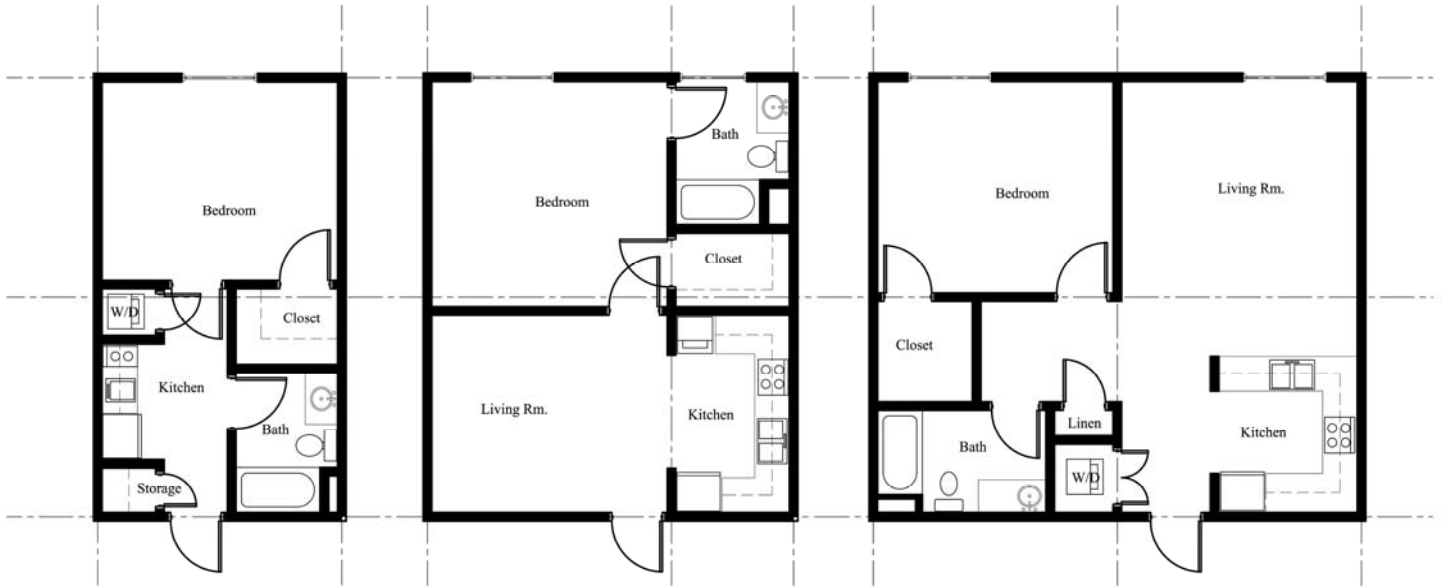


Linear SNCO/CGO Module Plan A

Linear NCO Module Building Plan B



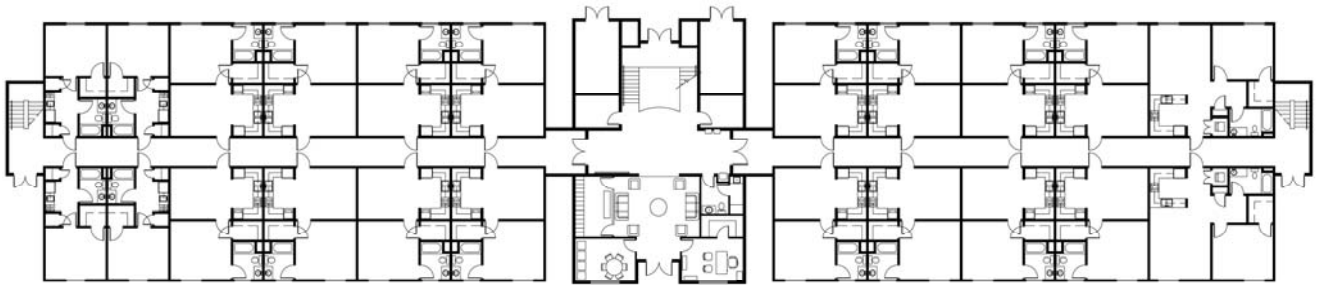
Corridor Access Linear Module Combination Building Plan



NCO Module Plan C

Square SNCO/CGO Module Plan D

Square O4-10 Module Plan E



Corridor Access Square Module Combination Building Plan

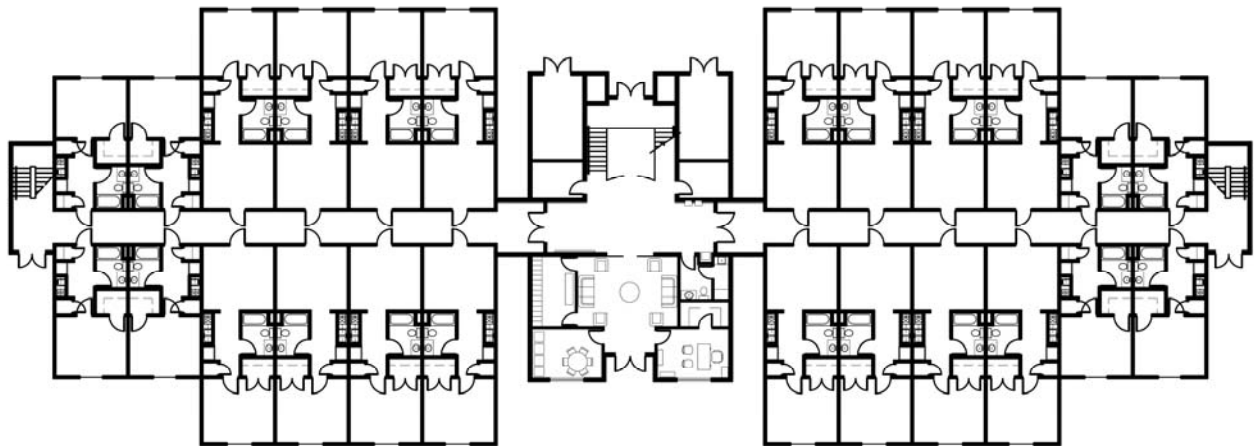




NCO Module Plan C

Elongated SNCO/CGO Module Plan F

Elongated O4-10 Module Plan G



Corridor Access Elongated Module Combination Building Plan

## 5. Interior/Exterior Relationships

A holistic approach to dormitory facilities is vital to ensure that the site and the building relate properly to each other. Site circulation must directly interface with the building circulation, exterior social spaces should be designed where possible to be extensions of interior social spaces, and main building entrances should be carefully coordinated with sidewalk, parking, and roadway configurations.

Minimum construction standards referencing force protection building set back distances from parking and roadways must be incorporated during this coordination process. Follow *DoD Minimum Antiterrorism Standards for Buildings* for guidance on dormitory construction.

## 6. Privacy/Social Interaction

Privacy for residents is an important design factor, but must be tempered with the concept of “buddy care” when designing for young enlisted residents E1-E4. Dormitory facilities serve as homes for the airmen, and should be designed in as much as practical to avoid an “institutional” appearance or feeling. Shared social space within the Dorms-4-Airmen module is a functional requirement for Air Force Permanent Party Enlisted Unaccompanied Housing, but designers should strive to achieve a balance between the social space and the privacy of each bedroom. Separation between male and female ranks is critical and must be maintained.

Less desired in NCO, SNCO and Officer dormitory designs, shared social space is not a requirement based on grade and seniority, and privacy becomes the priority and should be addressed accordingly. Conceptual module designs included earlier in this Chapter are included to exemplify privacy.

Corridor Access dormitory facilities offer a moderate degree of privacy with the living/bedroom areas typically buffered from the central hallway by kitchen, bath, and closet locations. Balcony Access dormitories with direct exterior access for each resident have the perception of offering a greater sense of privacy, but circulation on the balcony that is directed past the resident’s only window must be considered. Breezeway Access garden apartment style dormitory facilities offer a greater degree of privacy by limiting the number of modules accessed by a single stair, reducing noise and pedestrian traffic.

## 7. Noise Considerations

Provide adequate separation of noisy areas (shared common areas, game rooms, television rooms, outdoor recreation areas, and laundry rooms) from quieter spaces (residential rooms and study rooms). Include acoustical construction measures such as vibration and impact resistance materials to resolve sound transmission between spaces. Consider exterior sources such as adjacent airfield runways, firing ranges, or military working dog kennels during site selection. Design non-public support areas (utility spaces, trash collection and mail service access) to avoid conflict with public residential functions.

## 8. Architecture

### Mass and Scale

Architectural scale is defined as the comparative relationship of a structure or space to the human form. People perceive a sense of personal comfort based on influences from the physical environment. Environments that enable a person to feel comfortable and accepted as a part of the environment are considered to possess a human scale. The relative proportions, height, form and volume of a building or space, as well as its formal relationship to other buildings or spaces, contribute to achieving this sense of scale. Dormitory facilities should provide a residential environment with an architectural scale that imparts a clear sense of relative comfort, ease, and satisfaction. This can be achieved by using standard residential ceiling and windowsill heights, avoiding oversized entrance canopies, structural elements, and other artificially oversized building elements.



Andrews Air Force Base

Building mass is defined as the overall bulk or total volume of space a building occupies. Large buildings such as dormitories, aircraft hangars, and maintenance facilities often have a greater mass than other buildings on a base. Modulating the form and facade of these buildings with setbacks, repetitive details, and less

dominant colors softens their physical appearance and enables a blending of facilities in terms of form, proportion, and perceived size. The size, shape, proportion, repetition, and placement of design features such as fenestrations, roofs, and columns, combine to project the architectural character and mass of a building.

### Architectural Compatibility

The architectural character of the facility must be in context with its surroundings. The facility must relate not only to the immediate site and adjacent buildings, but also to the base itself. The desired architectural character is usually defined in the base architectural compatibility standards available at most installations. These standards provide a basis for compatibility and order within the built environment. The intent of these standards is not to create uniformity, but to promote a sense of harmony and a respect for local and regional design and architectural characteristics. Well-designed dormitory facilities respect the characteristics of the built environment in the local region through compatible architectural style, choice of construction techniques and materials, and form. Some of the local influences that affect regional character fall in these categories:

- Historic
- Cultural/Traditional
- Topographic
- Climatic

Architectural compatibility and appropriate proportions can be achieved by integrating a vocabulary of scales, forms, color palettes, and materials that blend with and respect the built and natural environments. The result is a combination of facilities that complement each other and create balance and harmony. Architectural compatibility guidelines are not intended to compromise design expression, but rather to provide a framework for the development of quality design.

### **Windows**

All living areas and places of assembly must have operable windows to provide natural ventilation. Windows and glazing shall meet force protection construction standards minimum requirements. In the case of dormitory facilities requiring Collective Protection Systems (CPS), ensure that windows and glazing additionally meet minimum CPS requirements. Reference *DoD Minimum Antiterrorism Standards for Buildings and DoD Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings* for guidance on construction standards.

Windows serving residential units must be operable and sized for emergency egress. Dormitories may be provided for disabled airmen, thus special provisions may be required for persons with disabilities, including access to windows as a secondary means of egress.

Use tight-fitting, insulated, commercial-grade windows for dormitory facilities. Light-duty residential grade windows are not acceptable. Low emissivity (Low E) double pane glazing is recommended for increased thermal performance, ultraviolet retardation, and maximum light transmission, especially critical in extreme climates. Install heavy-duty insect screens on all operable windows. Size windows at between 10 and 15% of the floor area they serve. All windows must be compatible with the type of window coverings to be used, and shall allow ease of maintenance, such as tilt-out features.

### **Doors**

All exterior doors shall meet force protection construction standards minimum requirements. In the case of dormitory facilities requiring Collective Protection Systems (CPS), ensure that door assemblies additionally meet minimum CPS requirements. Reference *DoD Minimum Antiterrorism Standards for Buildings and DoD Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings* for guidance on construction standards. Dormitories may be provided for disabled airmen, thus special provisions may be required for persons with disabilities, including door specifications and construction.

For privacy, security, and force protection, dormitory entrance doors should be locked with access by residents only, keyed to match module locks also, and security alarms shall be provided on all primary entrance doors as applicable. Consider keyless locksets. Provide dead bolts on all private room entrance doors. Entry doors for dormitory modules and bedroom doors in Dorms-4-Airmen configurations should be sound-insulated and must have a peephole for viewing visitors. Consider a doorbell and/or intercom/buzzer access at module entrances.

Entry doors should be 900 mm (3'-0") wide, closet and bath doors should be a minimum of 600 mm (2'-0") wide, and doors between living/sleeping areas and common areas should be a minimum of 750 mm (2'-10") wide. Doors must be fully weather-stripped, include a heavy-duty

metal threshold and minimum 12.3 mm (.5") grade change to prevent drafts, dirt, water, and insect entry, and must be thermally insulated. Do not use hollow core wood doors, bi-fold doors, or pocket doors in dormitory construction. Provide doorstops throughout and provide blocking in walls as required.

### **Moisture Control**

Special construction considerations, not limited to HVAC systems, are required for dormitories in humid areas. Reference *Design Criteria for Prevention of Mold and Mildew in Air Force Facilities in Humid Climates* for specific guidance. For dormitory construction in sub-arctic climates or area with nominal humidity, include provisions to add moisture into rooms as required.

### **Exterior Finish Materials and Systems**

Select reliable, conventional building systems for dormitory facilities, and use building materials and finishes that are durable and easy to maintain. Architectural systems must be selected based on their aesthetics, simplicity, economic characteristics, and compliance with installation architectural guidelines and force protection requirements.



Buckley Air Force Base

Designers must consider durability, functionality, economy, low maintenance requirements, and architectural compatibility when selecting exterior finish materials.

Design the structural support system in dormitory buildings three story and greater to mitigate progressive collapse.

Many dormitory facilities are constructed of load-bearing CMU exterior walls with a brick veneer finish. Other dormitory facilities are built with single-wythe split faced or ribbed CMU. Steel frame with CMU infill is another standard method of construction. In all cases, the CMU wall is furred with gypsum board on the interior of the modules.

Some dormitory facilities have successfully utilized exterior insulation finish systems (EIFS) as the primary exterior wall finish. While this is a good system for thermal performance, integral color, and moisture penetration, designers must specify heavy-duty reinforcing mesh at all areas subject to impact damage. Exterior insulation finish systems require tightly written specifications to ensure proper installation, materials, and details, including provisions to limit exposure to finished grade.

**Roofing**

Unless the installation's architectural compatibility standards state otherwise, all dormitory facilities shall have sloped roofs. Sloped roofs not only ensure positive drainage, but also impart a more residential image than do flat roofs. Standing seam metal roof systems have excellent performance characteristics, but must be in context with the installation's architectural compatibility standards. Restrict the use of concealed gutters on standing seam metal roofs because of problems with water shedding. Consider ice and snow hazards when locating sloped roofs over building entrances. Composition shingles and clay tile roofing may also be appropriate. Avoid using tapered roof insulation to achieve slope.

## 9. Functional Area Requirements

This section presents criteria applicable to the design of each functional area of Enlisted and Officer Unaccompanied Housing facilities. Primary design considerations are presented for each functional area indicating the anticipated use, performance, organization, character, and relationships of specific areas. Criteria are included herein for size and critical dimensions, storage requirements, furnishings and equipment, and other technical requirements.

### Unaccompanied Housing Modules

#### **Dorms-4-Airmen Module (E1-E4)**

- Private Living/Bedroom Area (4 per module)
- Private Bathroom (4 per module)
- Private Vanity & Sink (usually located in bathroom)
- Private Closet (4 per module)
- Shared Common Area (one per module, shared by 4 persons)
  - Shared Kitchen (one per module, shared by 4 persons)
  - Laundry Facilities (usually located in module)
  - Shared Social Space (one per module, shared by 4 persons)

#### **NCO Module (E5-E6)**

- Private Living/Bedroom Area (1 per module)
- Private Bathroom
- Private Vanity & Sink (usually located in bathroom)
- Private Closet
- Private Kitchen
- Laundry Facilities (usually located in module - centralized area optional)

#### **SNCO Modules (E7-E9)/Officer Modules (01-03)**

- Private Living Room
- Private Bedroom
- Private Bathroom
- Private Vanity & Sink (usually located in bathroom)
- Private Closet
- Private Kitchen
- Laundry Facilities (usually located in module - centralized area optional)

#### **Officer Modules (04-10)**

- Private Living Room
- Private Bedroom
- Private Bathroom
- Private Vanity & Sink (usually located in bathroom)
- Private Closet
- Private Kitchen
- Laundry Facilities (usually located in module - centralized area optional)

### **Common Support Areas**

- Utility Space (mechanical, electrical, data, communications, plumbing)
- Bulk Storage (can be incorporated into module or located separately)
- Mail Service (can be located outside if appropriate/as coordinated with force protection Requirements/required where USPS delivers to base housing/may not be applicable at OCONUS locations unless local mail delivery is required)
- Vending (optional)
- Circulation Space (amount depends on building design)
- Janitor's Closet with Housekeeping Storage
- Public Restrooms
- Administration Area/Space (not required where Dorm Managers are located elsewhere)
- Multi-Purpose Space(s)

### **Functional Area Requirements – Unaccompanied Housing Modules**

#### **Living Room/Bedroom Areas**

A combined Living Room/Bedroom Area shall be provided in Dorms-4-Airmen configuration and is defined as the total NLA per resident. A combined Living Room/Bedroom Area shall be provided in NCO modules (E5-E6), and separate living and bedroom areas shall be provided for SNCO and officer grades. NLA for these grades is defined as the floor area of the living area, bedroom (if separate), bath, and kitchen area measured to the inside face of the room walls. *Chapter 2 Planning and Programming* of this guide provides further detail on NLA and GBA measurements.

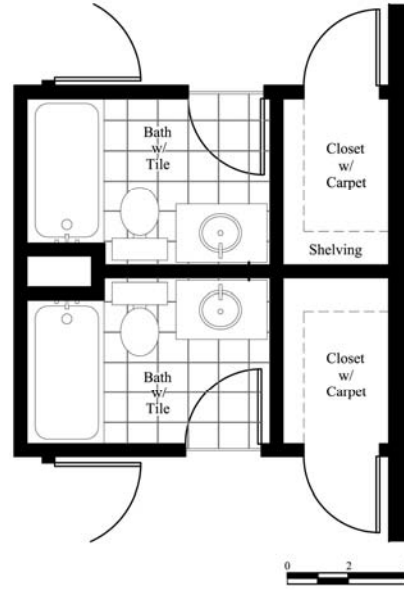
Consider the following in the design of all modules

- Ceiling height must be at least 2440 mm (8'-0"). Do not use lay-in acoustical tile ceiling systems.
- If CMU construction is used for exterior walls or interior partitions, use 13mm (.5") or thicker gypsum wallboard, or plaster/lath veneer.
- Provide wide-angle peepholes on all module entrance doors and bedroom doors in Dorms-4-Airmen configurations.
- Provide automatic door closers on all dormitory and module entrance doors.
- Provide an entry door lockset with an integral deadbolt and master entry capability (either by key or card, at local option) on all module entrance doors and bedroom doors in Dorms-4-Airmen configurations. Corridor Access dormitory entrance doors require sound insulation. Exterior doors require thermal insulation.
- The minimum dimension of living/bedroom areas should not be less than 3048 mm (10'-0"). Minimize doorways or openings in perimeter walls of living/bedroom areas in order to enhance flexibility in furniture arrangement. See the following plans for typical living/bedroom layouts.
- Ceiling fans with integral light kits may be provided in each living/bedroom area.
- Walls between living units, between living/bedroom areas and shared common areas, between living units and corridors, and exterior walls of living units must have a sound transmission class (STC) of at least 50. Reference *Chapter 3 Section C Building Systems Design* of this guide for additional acoustical design requirements.
- Reference *Furnishings Management, Furnishings Standards* for furnishing requirements.

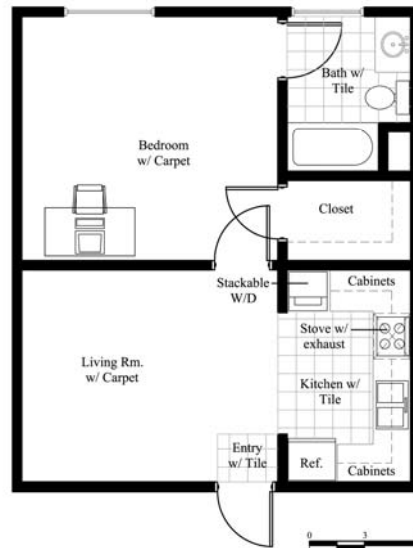




Typical Dorms-4-Airmen Living/Bedroom Area



Typical Dorms-4-Airmen Bathroom Plan



Typical SNCO Module Plan

### Vanity Area and Bathroom

Each resident shall have a private vanity, located within the bathroom (preferable), in the living/bedroom area for E1-E6 modules, or in its own dedicated alcove. Plan this area to make the most efficient use of very limited space. Include the following:

- Provide a full-length mirror on the vanity side of the door leading to the closet if within the bathroom, on the inside of the bathroom door if the vanity occurs within the bathroom, or on the inside of the closet door if within the bedroom.
- Provide a minimum 914 mm (36") wide vanity with integral bowl, countertop, and integral

backsplash. Provide a 1200 mm (48") wide vanity with integral bowl, countertop, and integral backsplash in the O4-10 modules as possible. The vanity counter top should be 787 mm to 914 mm (31" to 36") above the floor.

- Where space permits, provide vanity base cabinets with a minimum of two 200 mm wide by 75 mm high (8" x 3") drawers with the remaining area under the vanity given to storage accessed by cabinet doors. Where the lavatory bowl prevents providing drawers, provide access under the sink by cabinet doors.
- Provide a full width mirror above the vanity, with top of mirror a minimum of 1829 mm (72") above the floor finish. The bottom of the mirror should extend to the top of the backsplash. Provide a residential incandescent light fixture providing at least 75 foot-candles illumination above the mirror. This fixture may have single or multiple lamps.
- Install one medicine cabinet with at least 10,618 cm<sup>3</sup> (648 cubic inches; nominally 12"W x 18"H x 3"D) of interior area adjacent to the vanity, hinged next to mirror. At least three adjustable interior shelves are required. The medicine cabinet doors should be finished to match the vanity base.
- Provide a duplex GFI convenience outlet near the mirror. Size circuits to accommodate 1600-watt hair dryers, etc.
- Provide a single-lever ceramic cartridge washerless faucet at each lavatory.
- A shower/tub combination is preferred in all private bathrooms. Major Commands may select to specify showers only, but must consider the height of the curb to avoid leakage problems. Use enameled cast iron or steel tubs. Glass fiber reinforced tubs are not allowed. Glass shower doors mounted on tubs are not encouraged due to increased maintenance and cleaning requirements. Provide a heavy-duty shower curtain rod.
- Provide a showerhead with mounting hardware that allows height adjustment over a wide range. Consider heavy-duty hand-held showerheads connected to a flexible hose that fits into an adjustable-height holder mounted on a vertical rod.
- Provide two towel bars, each at least 600 mm (24") long. One should be located convenient to the vanity, the other convenient to the shower/tub combination. Placement should avoid door swing area.
- Provide one robe hook on the bathroom side of the bathroom door.
- As a minimum, provide a wall mounted storage cabinet with doors and at least one adjustable shelf above the wainscot over the water closet in all modules. The finish of this cabinet must match the vanity.
- Provide a heavy-duty, recessed ceramic, wall mounted toilet tissue holder near the toilet.
- Allow space beside the toilet for a plastic trashcan, 7-liter (7.4 quart) minimum capacity.

### **In-Room Storage**

Each private living/bedroom area (E1-E6) or bedroom area (E7-E9 and officer) must have a minimum of 2.3 M<sup>2</sup> (20 SF) of net closet space. This requirement is met with a single walk-in closet measuring approximately 1500 mm by 1500 mm (4' 0" x 5' 0"). Access from the closet should typically be from the bedroom. In renovations where pre-existing conditions limit closet configurations and/or new construction has limited design constraints, access may be provided from within the bathroom. Allow for adequate ventilation of both rooms and properly seal around the closet door. Where ceiling height allows, consider raising closet ceilings to maximize storage volume.

Closets must have minimum interior dimensions of 600 mm deep (24”), 1050 mm wide (42”), and 2250 mm tall (90”). Provide solid core wood doors with heavy-duty builder’s hardware, lockset keyed to match bedroom entrance door lockset. Provide at least one clothes rod with a shelf above in each closet. The total length of hanging space must not be less than 2400 mm (8' 0”). Provide heavy duty closet organizers, braced into wall studs. Closet organizer systems that have double clothes rods and shelves are highly recommended to maximize the efficiency of closets. Space may be provided in the lower part of the closet for movable drawer units that are moved out of the closet into the living area at the resident’s option. Designers may consider increasing the in-room storage closet size to accommodate the dormitory’s bulk storage requirements, therefore eliminating dedicated bulk storage areas.

Provide a utility storage closet adjacent to the kitchen area and/or laundry area for supplies and cleaning products in all modules. Provide a linen storage closet in E5-E9 and officer modules integral to the private bathroom as practical, and consider additional closet areas based on installation specific gear and climate requirements. Consider the use of vertical storage areas and/or storage beneath full size beds. Additionally, a nominally sized coat closet is required in 04-10 modules adjacent to the entrance or living room area.

## **Shared Common Areas and Kitchen Areas**

### **Kitchen**

The kitchen provides residents with a quality of life amenity similar to personnel occupying military family housing or living off base. In Dorms-4-Airmen modules, four E1-E4 personnel will share a kitchen area, shared social space and laundry area. In E5-E6 modules, a private kitchen or kitchenette shall be provided, although a shared kitchen and/or laundry area is permissible. In E7-E9 and officer Modules, a private kitchen or kitchenette is required and may include a dining or eat-in counter configuration. In some OCONUS locations, local building codes may require a separate kitchen area.



Elmendorf Air Force Base - Kitchen

All built-in equipment must be purchased with MILCON funds. Freestanding equipment is purchased from other appropriations. As a rule of thumb, appliances that are set in place and plugged in are purchased with equipment funds, whereas “built-in” appliances are purchased as part of the construction with MILCON funds. Appliances may be gas or electric based on local requirements.

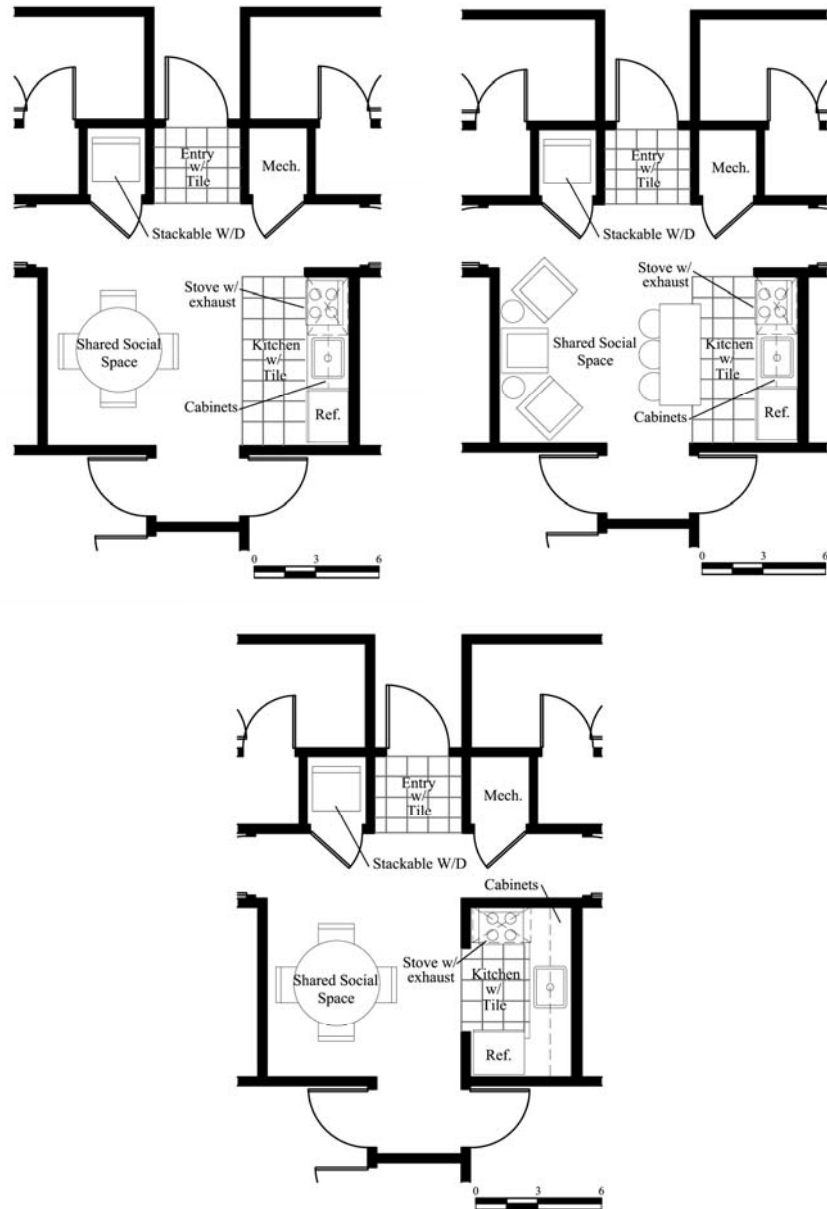
The following requirements must be met in the design of the kitchen:

- Provide a frost-free energy saver refrigerator with a separate freezer compartment and ice maker. Recommended size ranges from 11-25 cubic foot depending on grade and module configuration. 25 cubic foot refrigerators are recommended for Dorms-4-Airmen configurations to reduce maintenance within bedroom areas. Individual refrigerators within living/bedroom areas can be funded separately as determined by each installation.
- Provide a double-bowl stainless steel sink. In NCO modules, a single bowl sink may be required based on area constraints. Consider using a “sink-and-a-half” design having one large bowl with a smaller bowl connected to a disposer. A disposer is required except in locations where they are illegal. Provide a gooseneck single lever faucet.
- Dishwashers are recommended if funding allows.
- Provide at least two duplex outlets above the backsplash. These outlets must be GFI if they occur within the specified distance from the sink as defined in the latest addition of the National Electric Code. These outlets are in addition to those required for the range, refrigerator, range hood, oven, microwave/convection oven, or disposer.
- Provide a built-in or shelf-mounted combination microwave/convection oven. Conventional ovens are not required due to the functionality of the microwave/convection oven, but are optional, based on local requirements.
- Provide an electric cook top, 2-burner minimum, based on local requirements.
- Provide a range hood with a light and fan. Positive ventilation to the exterior is required for all newly constructed dormitory facilities. Ducted exhaust hoods are recommended for renovation projects as well, but ductless fans with re-circulating fans and proper filters are acceptable when warranted by existing building conditions, and when allowed by local building or fire protection codes.
- An operable window is desirable but not mandatory in kitchens.
- The following cabinet and countertop dimensions are recommended, but may be reduced where space is at a premium:
  - Provide at least 900 mm (3' 0") of wall cabinets in the kitchen and provide 900 mm (3' 0") of base cabinets.
  - Provide at least 600 mm (2' 0") of counter space adjacent to the sink. The countertop should have an integral backsplash.
- Provide fluorescent task lighting of at least 75 foot-candles under wall cabinets, and provide either an incandescent or fluorescent ceiling light fixture(s) on the ceiling of the kitchen area, providing between 50 and 100 foot-candles ambient illumination.
- Designers should consider the use of pre-manufactured “Compact Kitchens” to maximize kitchen efficiency and make best use of limited space. Each component should be independent, though, to allow for replacement or repair.
- Provide a fire extinguisher, mounted in an easily accessible location to the cooking area.

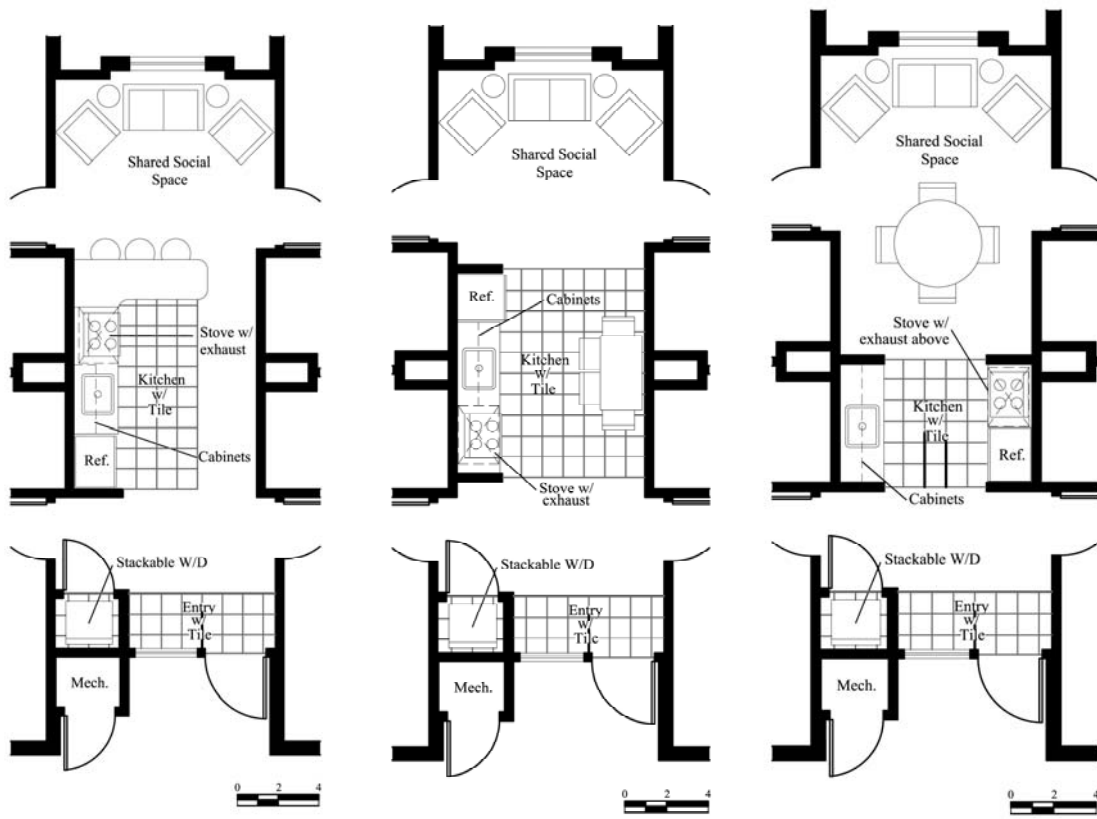
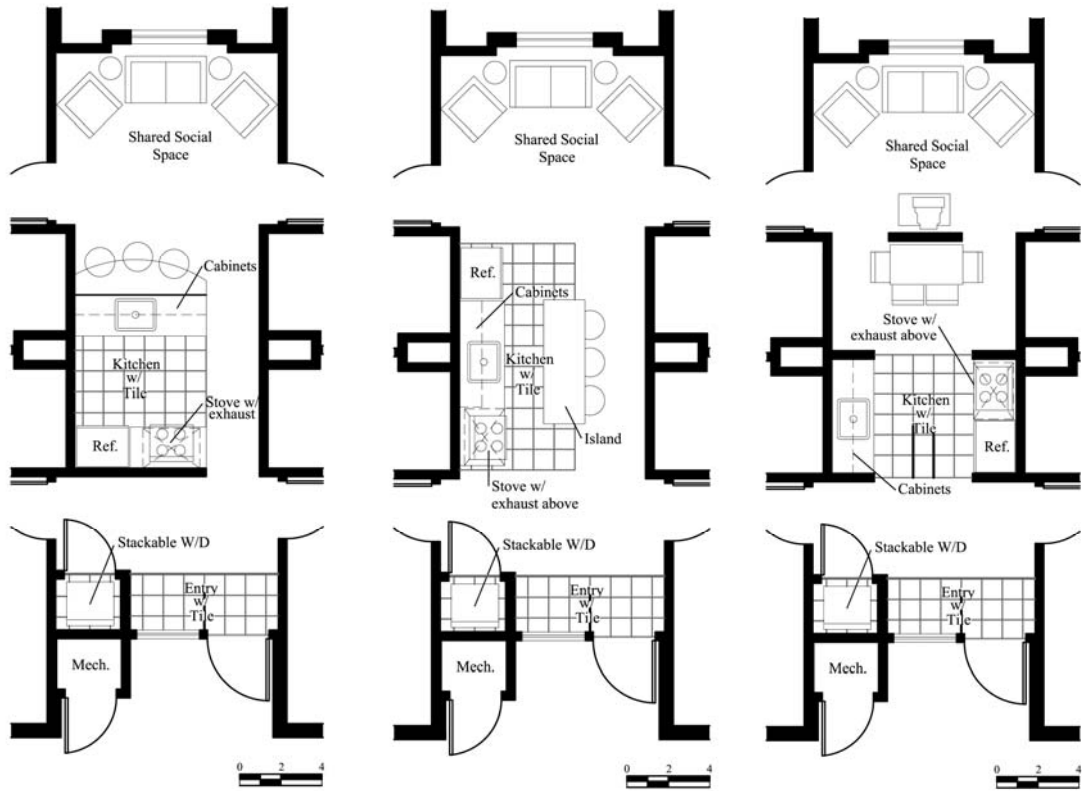
### Shared Social Space

In Dorms-4-Airmen module designs, a shared social space provides residents with a common living area to relax together and watch television, eat meals, study, and/or play games.

Provide a shared social space in Dorms-4-Airmen modules as part of the Shared Common Area and adjacent to the kitchen and laundry areas, enhancing quality of life for the residents, while providing an apartment type setting encouraging interaction and relaxation. See the following plans for optional kitchen/shared social space configurations.



Corridor Access Dorms-4-Airmen Optional Kitchen/Shared Social Space Configurations



Balcony/Breezeway Access Dorms-4-Airmen Optional Kitchen/Shared Social Space Configurations

## Laundry Areas

Provide 1 washer-dryer set in each dormitory module, heavy duty commercial grade, side-by-side or full sized stacked. Consider the use of a ventless dryer or ventless washer/dryer combination to eliminate the requirement for a location adjacent to an exterior wall or special exhaust systems. Provide adequate circulation around units and consider maintenance and potential heat build-up in the selection process.



Elmendorf Air Force Base – Centralized Laundry

While in-module laundry is preferred, centralized laundry facilities are optional and/or necessitated if the dormitory construction includes a Collective Protection System (CPS) which requires laundry facilities to be located outside of toxic free dormitory module areas. Washer/dryer ratios in centralized laundry rooms shall be a minimum of 1 washer/8 residents and 1 dryer/6 residents.

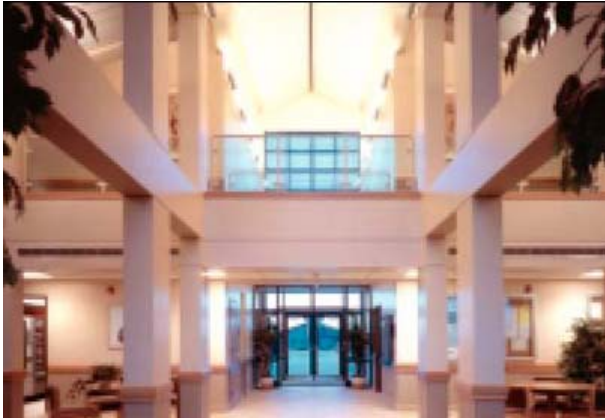
Designers must carefully address noise isolation, acoustics, vibration, humidity, ventilation, and temperature control. Other laundry area considerations:

- Conceal all utilities from view, yet provide easy access. Mount utility connections 900 mm (36 inches) above the floor. Design straight-run venting of dryers to avoid lint clogs.
- Provide floor drains for each washer, in addition to the drain in the wall-mounted box.
- Consider providing one recessed, cabinet-mounted fold-down ironing board in the common area of each module, convenient to the laundry area, reinforced to support wear.
- Consider providing a wall-mounted storage cabinet above side-by-side washers and dryers in modules, to match quality and finish of kitchen cabinets.

## Functional Area Requirements – Unaccompanied Housing Modules

### Common Support Facilities

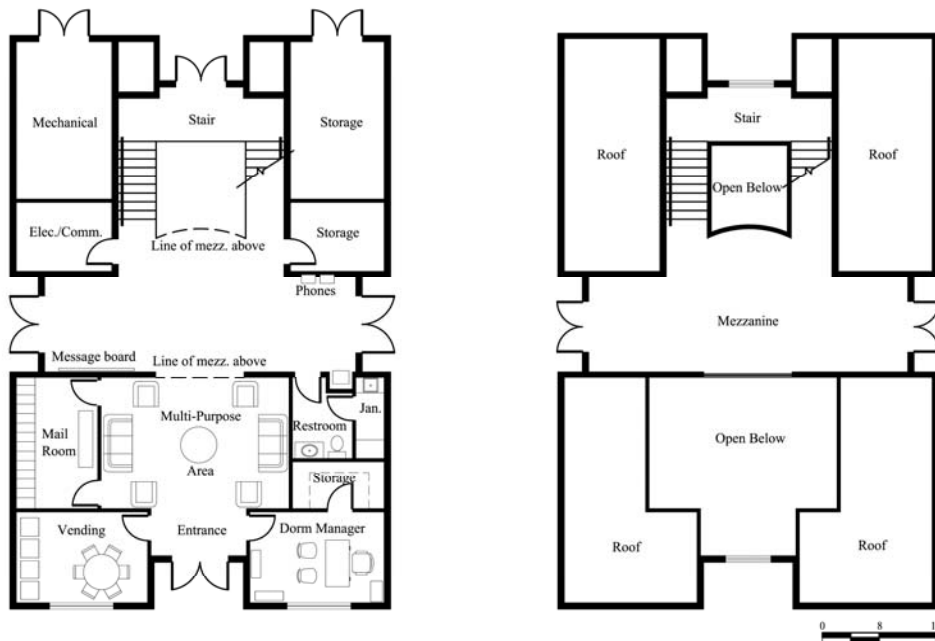
Reference the following plans for a conceptual support facility containing multi-purposes space, including vending area, administration office, game room, television room, and public toilets. It is important that these centralized spaces be designed as an integral part of the dormitory although they may be configured as a separate structure during design. Consolidate these areas into one larger area on the ground floor that allows for several uses as possible.



Buckley Air Force Base

Consider the use of common support areas in different geographical locations and ensure the appropriate design of these spaces to support the requirements of those residents. Provide access to persons with disabilities to all public spaces on the ground floor of all dormitory buildings. Designers should encourage social interaction by ensuring circulation

patterns pass through the consolidated support facility such that residents routinely are exposed to these common areas as they go to and from their rooms. Consider and coordinate the use and location of recycling centers throughout the common areas to compliment the interior design while supporting sustainability guidance.



Typical Common Support Area - Ground and Second Floor Plans



### Multi-Purpose Space

Multi-purpose space includes study/meeting rooms, game rooms, television rooms, fitness rooms, public toilets, administration area, mail rooms, vending, and utility areas. Consolidate multi-purpose spaces into a single common area on the ground floor allowing for several uses or distribute throughout the dormitory if specific installation requirements necessitate areas per floor. Consider the location of these areas to avoid undesirable noise and traffic, while providing the ability to secure the area and/or electronics and equipment as necessary. Encourage social interaction between residents in Dorms-4-Airmen configurations. Plan acoustics, lighting, and furnishings to create an environment conducive to the use.



Hill Air Force Base

Anticipate the type of activities provided in the design of the multi-purpose spaces. The need for a television room should be evaluated based on individual requirements but if provided, window treatments and dimmable lighting should be included to control glare. Most game rooms are designed to accommodate pool tables or Ping-Pong tables.

Acoustically isolate game rooms from television rooms, as well as residential and study areas because of the typically high noise level. Locate the game room and television room near the vending area to encourage use and social interaction. Provide public phones and base DSN phones in alcoves adjacent to main entrances and multi-purpose space, either located together or in separate locations based on local requirements. DSN phones are required adjacent to main entrances per force protection requirements. Provide drinking fountains adjacent to multi-purpose spaces as required.



Spangdahlem Air Force Base

Television, workout and game rooms are often subject to hard use. Select finish materials accordingly. Provide durable wall finishes such as sisal wall covering, natural stone, brick or integrally colored split face block, or wood on the walls of these rooms. Avoid the use of suspended acoustical ceiling systems in game rooms as they have a tendency to be damaged by pool cues.

## **Mail Service**

Where mail is delivered to the dormitory, provide one United States Postal Service approved tamper-resistant mailbox per resident. Requirements may be dependent on local conditions and may not be applicable at OCONUS locations unless local mail delivery is required for delivery of invoices for local telephone and internet service providers. Each mailbox must have minimum dimensions of 150 mm wide by 125 mm tall by 390 mm deep (6"x5"x15 1/2") and must be key lockable or combination lock as coordinated with the postal service.

Consider the likelihood of vandalism in proposed mailbox locations and design accordingly. Do not provide mail slots in individual dormitory rooms. Where space and dormitory size permits, group the mailboxes together into one consolidated unit. The mail service may be located indoors on the ground floor of a dormitory building or in an outdoor covered area, gazebo, or where quantity warrants, even a separate enclosed building. The location and configuration of mail service areas must be closely coordinated with *DoD Minimum Antiterrorism Standards for Buildings*, which may preclude location within the dormitory or will require the mail room to be located on exterior walls well sealed between the mail room and other portions of the dormitory and with a separate, dedicated air ventilation system.

While mail service must be relatively convenient to the residents, emphasis must be placed on providing convenient and efficient delivery and pick up. Avoid locating boxes where residents retrieving their mail becomes difficult for other residents. In large dormitory campus areas, consider locating several groupings of mailboxes in a number of locations. Provide overhead protection for boxes located outdoors, and consider the impact of adverse weather on mail delivery and pick up. Provide a mail drop box for out-going mail adjacent to the mailbox areas. Parcel lockers are not required and residents will pick up large packages at the base Post Office.

Coordinate the proposed location for mailboxes with base information managers, who, in turn, should coordinate with the local United States Postal Service and/or mail delivery contractors. The location of mailboxes may be driven by traffic flow, building configuration, security requirements, and agreements with the USPS and/or contracted delivery services. Landscaping considerations are required for mailboxes located outside of a building. Mailboxes added to an existing dormitory should be well integrated into the design to appear as an original feature rather than an afterthought. Programmers and designers should refer to HQ USAF letter, 13 October 1995, *Mail Delivery Service for Unaccompanied Personnel Housing*, for more information.

## **Vending Area**

Provide a vending area near the multi-purpose spaces on the ground floor of each dormitory as required. This space or vending on each floor is optional based on local requirements. Provide space and utility connections for ice and vending machines, number to be determined by individual base requirements. Where provided, icemakers should be sized based on 136 kg (300 pounds) for each 200 residents. For larger dormitory facilities, vending areas may be distributed throughout the facility.

### **Administration Area**

For most Unaccompanied Housing facilities, the administration area consists of a single office for the facility manager. Locate this office on the ground floor for the convenience of residents and visitors. They are typically located near the main entrance to the building. Provide a recessed, wall mounted, lockable key storage box in this office (if required) for storage of spare room keys for each room. Some bases collocate their dormitory managers with their housing managers in a location separate from the dormitories. To account for this situation, the space for the administration area has been included in the total area programmed as “Multi-Purpose” space.

### **Utility Space**

Utility spaces include mechanical rooms, electrical and telephone closets, sprinkler control rooms, janitor closets, storage closets, outside storage, and supply storage rooms. Address the following:

- Locate mechanical rooms to control noise and vibration and allow for efficient utility distribution. Mechanical rooms are generally best located adjacent to laundry facilities. Give special attention to the reduction of noise and vibration transfer.
- Electrical and communications rooms, as well as sprinkler control rooms, introduce little conflict with living units and should be located as required throughout the dormitory for efficient utility distribution.
- Plan access to mechanical, electrical, and communications rooms so that minimal disruption of residents occurs when these spaces require service and access is restricted by residents. Provide access from the exterior of the dormitory whenever possible.
- Locate a janitor closet on the ground floor of all dormitory buildings and on each floor of Corridor Access dormitories. Balcony Access and Breezeway Access dormitories require janitor closets on each floor only if public areas such as laundry rooms or television/game rooms are provided on that floor. Provide each janitor closet with a deep service sink, a mop strip, a floor drain, and wall-mounted shelves for storage of cleaning supplies.
- Provide storage closets where needed. These are most often required near public spaces such as television and game rooms for storage of game equipment, etc.
- An outside storage room is recommended for each dormitory building for storage of grounds and building maintenance equipment and supplies, such as lawn mowers, snow removal equipment and garden tools. Determine the types of materials to be stored and design accordingly for the associated fire hazard classification and ventilation requirements.
- A supply storage room is recommended for storage of vacuum cleaners, supplies, etc. Ideally, locate this room on ground floor and adjacent to the administration area. The recommended size for this room is about 23.22 M<sup>2</sup> (250 SF).

### **Bulk Storage**

Provide bulk storage per dormitory based on specific installation requirements such as gear or artic needs. Storage may also include bicycles, computer boxes, and other resident requirements. Designers may consider increasing the in-room storage closet size to accommodate the dormitory's bulk storage requirements, or provide a separate storage room per module, thus eliminating dedicated and centralized bulk storage areas.

Recommend 1 storage cubicle/area for each Dorms-4-Airmen person module, quantity to vary based on local requirements. Recommend 1 storage cubicle/area for each E5-E9 and officer module. Each storage cubicle or area should be a minimum of 2 M<sup>3</sup> (70.6 CF), and should be lockable, keyed to match module entrance lockset.

### **Public Toilets**

Where public spaces occur on the ground floor of a dormitory, provide accessible toilet facilities for use by visitors and residents. Provide convenient access to these toilets from multi-purpose areas. Design these toilets to accommodate the needs of persons with disabilities. Provide one lavatory and one toilet in each visitor toilet. In smaller dormitories, this requirement is met by one room with a privacy lock on the door to allow use by both males and females. Use separate men's and women's toilets in larger facilities where higher use is anticipated. Provide commercial quality toilet accessories in the visitor toilets. These include a recessed paper towel dispenser/trash receptacle, toilet tissue holder, soap dispenser, grab bars, and soap dish.

### **Circulation Space and Entryways**

Introduce natural light into interior circulation spaces where possible. Avoid an institutional appearance for interior corridors in Corridor Access dormitory facilities. This is accomplished by using wall-mounted light fixtures and wall and ceiling articulation to help alleviate the "tunnel effect" of a long corridor. Recess all wall-mounted accessories other than the light fixtures, such as fire extinguisher cabinets. Except for emergency pull boxes, ensure that all fire extinguisher cabinets, hose boxes, electrical boxes, plumbing chase covers, etc. are finished to match, or at least coordinate with the surrounding surface. Exposed ductwork, conduit, etc., is not allowed. Provide utility access doors as required. Provide convenience outlets each 7.6 M (25'-0") on center in interior corridors.

### **Elevators**

Freight elevators may be provided if the construction budget allows, and are encouraged to facilitate moving of furniture and appliances. Provide a stainless steel interior finish to provide durability and ease of maintenance. Combination freight/passenger elevators are required for dormitory facilities four stories or more in height.

## **10. Interior Design**

### **Comprehensive Interior Design**

The interior design and architectural design of the facility must be integral and related, and in context with characteristics of the built environment of the local region. Architectural compatibility, historical background, and vernacular design are critical in providing a cohesive dormitory campus. The interior design also has a direct impact on the quality of life for the residents. Increased attention to the high-tech personal environment should be emphasized.

All Air Force dormitory design projects shall include Comprehensive Interior Design (CID) services. CID services may be provided as part of the original dormitory design package, developed by a professional commercial interior design service, or accomplished by in-house Air Force interior designers. CIDs should reference Major Command and installation standards for base-specific information on furniture styles, color schemes, and project-specific guidance.

### **Quality-of-Life**

The interior design of a dormitory facility has a direct impact on the quality of life for the occupants. Interview typical dormitory residents for invaluable feedback and consider including the residents in design reviews. Allow flexibility in module configuration for the facility occupants to personalize their units, including freedom in furniture arrangement and display of artwork.

### **Interior Finish Materials and Colors**

Select neutral colors for surfaces that will have a long life, such as ceramic tile, laminates, window blinds, solid surface counters, etc., to facilitate future finish material upgrades. Provide a pleasing color scheme in durable finish materials. Use color in non-permanent finishes to add interest and vitality, but do not allow color to dominate the interior environment. Coordinate materials, finishes, color, and texture selection to complement the overall building design and image. Based on the grade of the occupant, consider upgrading materials and furnishing selections as appropriate. Officer grades O4 and above may have specific requirements based on mission and geographical location. Additionally, upgraded finishes are appropriate for senior ranking officer similar to Military Family Housing allowances. For further guidance on interior design standards and criteria, see the *Air Force Interior Design Guidelines*.

When selecting interior finishes, consider the recycled content requirements for alternative procurement of products included in the Environmental Protection Agency (EPA) list of guideline items. Federal agencies must purchase products made with recycled materials unless these products do not meet technical requirements, are more expensive than comparable virgin material products, are not available competitively from two or more sources, or are not available in a timely manner. The complete list of guideline items and their recycled content requirements is found on the *Environmental Protection Agency* website. Additionally, designers are encouraged to work with product manufacturers for other available products.

### Recommended Finish Schedule

Area	Floors	Walls	Ceiling
<b>Living Units</b>			
Living/Bedroom	CPT	PT, WC	PT
Bathroom	CT, PPT	CT, PT	PT
Entrance	PPT	PT, WC	PT
Common Social Space	CPT, PPT	PT, WC	PT
Kitchen	PPT	PT	PT
Laundry	PPT, CT	PT	PT
<b>Common Areas</b>			
Entrance	PPT, T	PT, WC	PT
Corridors, Stairs	PPT, T	PT, WC	PT
Multi-Purpose Area	CPT, PPT, T	PT, WC	ACT, PT
Vending	PPT, T	PT	ACT, PT
Storage Rooms	SC, PPT	PT	PT
Toilets	CT, PPT	CT, PT, WC	PT

<b>LEGEND</b>	
<b>Floors</b>	
CPT	Carpet or Carpet Tile
CT	Ceramic Tile
T	Terrazzo
SC	Sealed Concrete
PPT	Porcelain Paver Tile
<b>Walls</b>	
CT	Ceramic Tile
PT	Painted Drywall or Plaster
WC	Wall Covering
<b>Ceiling</b>	
ACT	Suspended Acoustical Tile
PT	Painted

#### **Carpet**

For the latest guidance on carpet, reference *Air Force Carpet Standards* and the *USAF Interior Design Guide*. Carpet with a small pattern, a tweed or random design is required for its appearance retention and durability. A commercial grade level loop carpet or carpet tile with rubber slab carpet is recommended for the living units and public areas. Consider new products with additional wearability and maintenance abilities, and consider recyclable goods. Carpet over cushion should be applied with the double-stick method. If available, factory attached cushion is preferred. Living/bedroom areas have a heavy wear classification for carpet, and public areas

have a severe wear classification. Carpet may be used on stairs if a hard surface flooring is not appropriate, but shall be severe wear and a texture to prevent slipping when wet or subjected to the elements.

### **Hard Surface Flooring**

Use tile with sealed or epoxy grout in walk-off entrance areas, module bathroom/vanity areas, kitchens and laundry, and other heavier traffic areas of dormitory common areas including corridors, stairs and multi-purpose areas. Stone or terrazzo flooring are good alternatives based on location and use. Non-slip flooring is required in sub-arctic climates especially in entrances and corridors such as rubber floor tile. The option to use commercial grade sheet vinyl is allowable in Pipeline Student Housing only, primarily for main corridors and laundry areas.

Grout should be sealed immediately following installation and use of epoxy grout should be considered in heavy traffic areas. Grout color should be neutral and medium tone to match color of tile. Avoid white as a predominant color.

### **Walls**

Exposed concrete masonry units (CMU) are unacceptable as an interior wall finish. The use of natural materials such as stone, brick and wood on the interior can provide a durable finish and provide warmth and texture to the space. Additionally, sisal and other heavier duty materials can be considered in the appropriate areas, such as the Multi-Purpose Area. The use of vinyl wall covering over smooth walls in areas as recommended above is optional. If vinyl wall covering is provided on exterior walls, ensure that the wall is properly designed to avoid moisture problems such as mold and mildew. Accent colors can be used in textiles such as draperies and upholstery fabrics. When walls are painted, a washable, non-glossy product such as an eggshell enamel must be used. Bathrooms, kitchens, laundry area, vending areas, doors and trim work, and service areas should receive a semi-gloss enamel finish. Consider an orange-peel or medium sand finish as appropriate to provide texture. Provide blocking in walls throughout for all wall mounted accessories, including doorstops, bathroom accessories, accessibility requirements, bulletin boards, cue racks, etc.

### **Ceilings**

Paint ceilings white. Avoid heavily textured acoustical treatments, including a sprayed popcorn ceiling application which is difficult to patch. Do not use suspended acoustical tile ceilings in the living units, as this treatment conveys a non-residential quality and tiles are easily damaged. Coordinate ceiling treatment with lighting selections - consider recessed lighting and soffits. In longer corridors or large areas, consider introducing soffits, coves, headers, and varying ceiling heights to provide interest. Emphasize natural light as possible.

### **Cabinets and Millwork**

Built-in cabinets must be well constructed with sturdy hardware and shall meet the requirements of the *Kitchen Cabinet Manufacturer's Association* (KCMA) standards. Particleboard may not be used in kitchens, bathrooms or vanities. Cabinet faces shall be solid wood and use a raised panel surface. Recessed pulls are preferred, but may not comply with accessibility requirements applicable to some overseas locations where civilians occupy dormitories. Finishes must be able

to withstand frequent cleaning and must coordinate with the other finish materials. Neutral colors are required for cabinets and millwork to facilitate future color scheme changes.

Recommend the use of a non-porous solid surfacing material for countertops and back splashes as possible based on durability and ease of maintenance. Provide full height back splash in kitchen to run from countertop to underside of cabinets above.

### **Bathrooms**

Use 154.2 mm<sup>2</sup> (8 inch square) or 304.8 mm<sup>2</sup> (12 inch square) slip resistant ceramic floor tiles or porcelain paver tiles in bathrooms/vanity areas with matching base. Specify a mottled or shaded tile to hide discoloration from detergents, etc. Use ceramic wall tile or non-porous solid surfacing material from floor to ceiling around bathtubs and showers. Grout should be sealed immediately following installation and use of epoxy grout should be considered in heavy traffic areas. Grout color should be neutral and medium tone to match color of tile for ease of maintenance and good appearance retention. Other areas may be covered to wainscot height as possible.

Recommend the use of a non-porous solid surfacing material for countertops and back splashes as possible based on durability and ease of maintenance. Provide blocking throughout for wall mounted accessories, including doorstops, bathroom accessories and accessibility requirements.

### **Lighting**

Dormitory facilities have historically suffered from poor lighting levels, thus designers shall provide a much higher quality light source, light level and fixture selection to enhance new dormitory spaces and their use. Provide a combination of task and ambient lighting in living units. Recommend incandescent or halogen lamps as the primary source of illumination, and as used in recessed, table and floor lamps, and wall sconces. Halogen lamps blend well with traditional incandescent lamps. Limit fluorescent lighting to utility areas and use color-corrected lamps to provide a warm residential appearance. Compact fluorescent lamps are a good alternative over traditional lighting systems, can retrofit standard fixtures, and provide a long lamp life. based on long-term energy efficiencies and long lamp life span. Remain cognizant of lighting for both day and night situations and emphasize natural light as possible. Consider dimmable lighting in living/sleeping rooms. Coordinate lighting selections with ceiling treatments and consider recessed lighting, light coves, indirect lighting and soffit lighting as alternatives. Provide adequate support and blocking in walls and ceilings for all wall or ceiling mounted lighting fixtures, wall sconces, and ceiling fans.

### **Window Treatment**

Mini blinds, vertical blinds, draperies or a combination are authorized. Consider solar conditions when selecting a window treatment. All window treatments must pass *NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*. Fabrics for draperies and bedspreads will be inherently flame-retardant. For ease of cleaning, drapery pleats that are either stack pleated, roll pleated, or accordion-type pleated are preferred instead of pinch pleated. The drapery lining must hang independently from the finished drapery treatment. Installation of blackout linings is recommended but optional. Traverse rods and blinds must be of commercial quality. Refrain from specifying blinds sandwiched between panes of glazing that cannot be



serviced. Provide blocking in walls throughout for all wall mounted accessories. Bedspreads must complement the window treatments and carpet color, but need not match exactly since bedspreads are laundered more frequently. Consider installing European style rolladens (roll-up shutters) to provide additional privacy, security, and noise and light reduction.

### **Furniture Considerations**

Reference the *USAF Interior Design Guides* for guidance on appropriate Air Force requirements, specifications and recommended manufacturers. All furniture shall match in style and finish per dormitory project, and shall be constructed of solid hardwoods and veneers, with steel frames where necessary. Storage shall be maximized, as well as flexibility in furniture arrangement. Bed sizes shall be a minimum 2030 mm (80 inches) long and 990 mm (39 inches) wide. Provide full size beds 1372mm (54 inches) wide where space permits in all enlisted and officer modules. Provide queen size beds, minimum 2030 (80 inches) wide for all SNCO and officer grades when possible. Consider providing under-bed storage. Furniture in the shared common area of each module shall be sturdy, but shall include a combination of dining and/or seating for relaxation, reading, watching television, eating and/or studying. Use individual lounge chairs and love seats instead of sofas to maximize placement flexibility. Furniture in the building public areas shall also be well planned and specified, to allow maximum flexibility and comfort, while encouraging social interaction and use.

Scale and proportion of dormitory furniture is critical based on the gross building and module area constraints. Although durability is critical, traditional large scale dormitory furnishings are not appropriate. The interior designer must coordinate the Comprehensive Interior Design (CID) package during the design process, and should make recommendations on appropriate scale and type of required furnishings based on individual project requirements. Furniture considerations and layout are integral to the success of the room and module designs, and must be included. Reference *Furnishings Management, Furnishings Standards*.

Based on the grade of the occupant, consider upgrading materials and furnishing selections as appropriate. Officer grades O4 and above may have specific furnishing requirements such as formal dining or hospitality needs based on assignment, mission requirements, and geographical location.

### **Signage, Artwork and Accessories**

Provide artwork for all public areas. Graphics and signage must be well designed and coordinated with the architectural style and finish materials. Follow the guidance contained in *Air Force Sign Standards*. Fire-resistant silk plants are authorized for public areas. Install chair rails where needed. Provide wall protection for recreational games such as dartboards and billiards. Provide nameplate signage with removable inserts to identify the occupants of each dormitory room or module, and provide an insert to allow a sign that indicates “day sleeper”.

## C. BUILDING SYSTEMS

Considerable detailed analyses were conducted in the preparation of this design guide to consider alternative construction types, materials and methods, and cost impacts. Based on new technologies, alternative materials and methods are considerations as well as materials and methods more common in commercial construction, and may be a viable way to lower either initial or long term operational and maintenance costs and reduce construction time and cost. In all cases, the goal is to continue to provide quality construction and enhanced quality of life for the airmen.

Various structural systems and exterior finish systems were compared, roof systems and supporting structures were considered, mechanical systems were researched and lighting systems identified. These recommended alternatives are viable options for new and renovated dormitory construction and are included below.

### 1. Structural

The selection of an economical structural system is based on several critical factors including:

- Antiterrorism construction standards
- Collective Protection System requirements where applicable
- Facility size
- Projected load requirements
- Subsoil conditions
- Local availability of materials and labor
- Feasibility of prefabrication
- Local construction practices
- Resistance to fire, and wind, snow, seismic, geologic, and permafrost conditions

#### **Antiterrorism/Force Protection**

Force Protection standards applicable to the structural design of dormitory facilities include those found in *DoD Minimum Antiterrorism Standards for Buildings*. Reference this document for all requirements; several critical requirements are included below including the design of the structural support system to mitigate progressive collapse in dormitory buildings three stories and above, all interior ceiling, electrical, and mechanical components must be attached to the building structure, and annealed laminated glass must be used on all windows and doors.

#### **Collective Protection System**

Structural system selection for dormitory construction in OCONUS locations where Collective Protection Systems are required should comply with *DoD Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings* for guidance on construction standards.

### **Structural System Selection**

Recognize that dormitories are modular and repetitive in nature; therefore, decisions concerning the structural system have substantial impact on construction costs. Coordinate column spacing and layout with the building's floor plan so that columns occur within or in alignment with walls. Keep columns within living spaces to a minimum, and limit them to larger public spaces.

CMU with steel frame construction or systems using bearing wall construction are common systems selected for use in dormitory construction with economic advantages, durability and climate resistance validating their use. Analyze the proposed structural system to determine if it is the "best value" method to realize the architectural design intent. Larger projects (multi-dormitory campus) or fast track design-build projects should consider the use of precast module units or architectural concrete tilt-up wall systems. Based on new technology and required expertise needed to construct/maintain, these systems are not recommended for single dormitory building application.

Roof systems and supporting structure should consider life cycle costs as well as long term durability and ease of maintenance. Concrete tile roofing systems and metal roofing systems are recommended for typical dormitory construction. Reference the *International Building Code (IBC)* for design load criteria for dormitory facilities.

## **2. Acoustics**

Careful attention to acoustic design is required for dormitory facilities to ensure a high degree of privacy for residents within their living units and study areas. Designers must address isolation of noise from a variety of sources, including:

- Adjacent living units
- Living/bedroom areas and adjacent shared common areas
- Units on a floor level above or below
- Hallways and balconies
- Mechanical rooms and systems
- Exterior-generated sound, such as aircraft and automobile noise

Walls between living units, between living areas and shared common areas, between living units and corridors, and exterior walls of living units must have a Sound Transmission Class (STC) of at least 50. Floor and ceiling assemblies must have an STC of at least 55 and an Impact Insulation Class (IIC) of at least 60. In addition, consider the impact of vibration in all dormitory design and construction. Telephone, cable television, convenience outlets, and mechanical ducts must not compromise the acoustical integrity of wall, floor, or ceiling assemblies. Where fluorescent lamps are used, specify lamp ballasts with sound level rating 'A'.

### 3. Heating, Ventilation and Air Conditioning (HVAC)

#### **Antiterrorism/Force Protection**

All mechanical and utility systems should comply with *DoD Minimum Antiterrorism Standards for Buildings*; locate air intakes on roofs or above first story, and restrict access to intakes; control access to facility roofs; install emergency shutoff switches for HVAC systems; avoid positioning redundant utilities in the same location or chase; and provide secured access to all supporting facilities and infrastructure systems.

#### **Collective Protection System**

Mechanical and utility systems in dormitory construction in OCONUS locations where Collective Protection Systems are required should comply with *DoD Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings* for guidance on construction standards.

#### **HVAC System Selection and Design**

Installation of Air Conditioning is recommended in all dorms for the quality of life of the airmen. Only in areas of year round cold weather conditions should air conditioning not be installed. Major Commands should use sound judgment to make this determination.

The selection and design of the HVAC system must comply with the criteria set forth in *Design: Heating, Ventilating and Air Conditioning*, and as modified by *Design Criteria for the Prevention of Mold in Air Force Facilities*. Note that this ETL includes considerations in addition to those specific for HVAC systems. HVAC equipment selection is based upon the lowest total life cycle costs: include initial costs, operating costs, energy costs, system maintenance and repair costs, and component replacement costs. The HVAC system is to be designed to achieve the energy conservation requirements set forth in *ASHRAE 90.2, Energy-Efficient Design of Low Rise Residential Buildings*. Use of a central plant should be considered for dormitory campus areas. A central plant with heating and cooling equipment reduces maintenance and capitalizes on the higher efficiency of larger capacity commercial equipment. Consider the requirement and/or selection of DDC controls or other types of EMCS systems with base personnel.

#### **Maintenance**

Maintainability of the system is critical to the continued quality of life of the occupants. Access to the systems must minimize disruption to the occupants and maximize servicing efficiency. The mechanical systems must comply with *Reliability and Maintainability (R&M) Design Checklist*. HVAC units will be located within the mechanical closet/space to ensure that filters, controls, drain pans, and condensate piping, control valves and coils are easily accessible for servicing and cleaning. Condensate piping will be equipped with traps and threaded clean outs at the unit. Design drawings must detail these features including minimum clearances for maintenance. In the selection of chilled water systems, the design of HVAC enclosures must take into account the space needed for chillers to receive air to cool condenser coils and room for service.

Enclosure design should also consider screening that will prevent large amounts of pollen and vegetation from clogging condenser coils, enclosure placement on the site, and compatibility with surrounding architecture and exterior design elements.

### **Individual HVAC Units**

Individual HVAC units should be ducted vertical fan units placed within designated mechanical closets or mechanical rooms equipped with lockable doors. Through-the-wall units and units located in the ceiling space are discouraged for maintenance reasons.

- **Supply air:** Supply air shall be ducted to the sleeping rooms and common area. Branch ducts shall be equipped with balancing dampers.
- **Control:** Individual climate control shall be provided in each living/bedroom area, plus a separate control for common shared social space.
- **Return Air:** Provide ducted return or transfer grills; do not use ceiling space as return air plenums. Evaluate need for transfer/return air sound attenuation between the sleeping room and common area. Provide transfer grill to allow make up air into bathroom.

### **Piping System**

Where air conditioning is provided and centralized hot and chilled water utilized, recommend that individual HVAC units be connected to a centralized mechanical system by a 4-pipe hot water and chilled water distribution system to provide positive space control. Reference *Design: Heating, Ventilation, and Air Conditioning* for HVAC authorization and guidance.

### **Perimeter Fin Tube Heating**

Where perimeter fin tube heating is utilized, provide temperature control for each zone.

### **Ventilation Air**

Provide a central ventilation system to supply conditioned outside air to each room. Equip all branch ducts with accessible volume control dampers. Each module will be supplied continuously with conditioned outside air to meet the current *ASHRAE Standard 62* or as required for building pressurization, whichever is larger. Balance ventilation air to provide positive pressure of the space in relation to the outside.

### **Kitchen and Laundry Areas**

Provide kitchen areas with a minimum of 2.54 L/s per M<sup>2</sup> (0.5 cfm/SF) of supply or transfer air continuously. For all new or renovated kitchens, provide a range hood above cook tops or ranges that exhausts directly to the outdoors. Recirculating exhaust hoods are not allowed for new dormitories, but are allowed for major renovation projects where running ductwork from the kitchen to the outside of the building is difficult. Where practicable, use direct exhaust systems for renovation projects as well.

Dryer venting must be well-designed, especially with the inclusion of laundry units per module, to prevent lint clogs and significant maintenance issues. Design straight-run venting of dryers to avoid lint clogs. Use of a ventless dryer or ventless washer/dryer combination may be considered to eliminate the requirement for a location adjacent to an exterior wall or special exhaust systems, but must be coordinated during design to avoid potential heat and

humidity concerns. Provide adequate circulation around units and consider maintenance and potential heat build-up in the selection process. Both kitchen exhaust and dryer venting must be exhausted away from windows, exterior balcony areas, and air intakes.

#### **Bathroom Exhaust**

Bathrooms may be equipped with a central exhaust system or individual, directly vented, and switched exhaust fans. System selection shall be based upon a life cycle cost analysis. If a central ducted bath exhaust system is utilized, the exhaust system shall:

- Run continuously and be interlocked with the building supply air system.
- Have a manual volume damper accessible from the space for proper balancing.
- Be evaluated for utilizing heat recovery from the exhaust system to precondition ventilation air.

### **4. Plumbing**

Reference the *Uniform Plumbing Code (UPC)* for plumbing requirements. Reference *DoD Minimum Antiterrorism Standards for Buildings* for force protection requirements and the *DoD Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings* for guidance on construction standards in dormitory construction in OCONUS locations where Collective Protection Systems are required.

Provide the following as required:

- Domestic hot and cold water
- Sanitary and storm drainage
- Propane or natural gas
- Steam or hot water
- Chilled water

Provide hot and cold water to all public toilets, bathrooms, kitchens, sinks, janitor closets, drinking fountains and laundry rooms. Provide shut-off valves at all fixtures. Tank type, low water volume toilets are required in all bathrooms. Provide elongated bowl toilets with a closed-front seat and a lid. Toilets and bath fixtures must match and be neutral in color. Drinking fountains shall be located in the multi-purpose areas of each dormitory building, and shall meet accessibility requirements and UPC requirements for number, size and height. Provide filtration systems for all drinking fountains.

Plan plumbing systems for dormitory facilities to take advantage of stacking bathrooms and placing fixtures back-to-back. Mechanical engineers, architects, and structural engineers must work together to carefully plan the size and location of plumbing chases with minimal impact on usable living space. Consider collocating plumbing chases with vertical vents serving each room. Provide hose bibbs on all exterior walls of each building at 30.48 m (100'-0") intervals; freeze proof as dictated by climatic conditions. Provide floor drains in all toilets, bathrooms, janitor closets, and laundry rooms. Provide metering for water per building and as per Air Force requirements.

## 5. Energy Performance

Sustainable energy efficient performance in dormitory facilities cannot be achieved solely by individual building systems, but must be supplemented by other design factors as well. Reference *Energy Usage Criteria for Facilities in the Military Construction Program* for further guidance. Design factors to consider include:

- Mechanical system and management controls selection
- Thermal insulation characteristics
- Building orientation
- Solar shading
- Solar water heating
- Landscaping
- Electrical system design
- Appliance selection
- Dormitory type (Corridor Access, Balcony Access, or Breezeway Access)

There are many other factors designers must consider, but they should keep in mind the importance of life-cycle cost analysis for dormitories. The Air Force keeps its facilities for a longer period of time than most buildings in the private sector. Therefore, considerable attention should be given to energy-efficient design in the initial planning process. Metering of individual buildings is required to monitor energy performance and must be included in all projects.

## 6. Electrical/Communications

Reference the latest edition of the *National Electrical Code*, the *IES Lighting Handbook*, and *NFPA 101 Life Safety Code*, or host nation code, as applicable. The following components are key elements of electrical and communication requirements in dormitory construction and renovation. Required design components include:

- Distribution equipment
- Electric, telephone, and local area network wiring
- Receptacles and grounding
- Interior and exterior lighting
- Emergency lighting
- Fire detection and annunciation
- Cable television
- Personnel Alerting system

### **Antiterrorism/Force Protection**

All electrical system designs should comply with the *DoD Minimum Antiterrorism Standards for Buildings* requirements including the installation of a Mass Notification system. Coordinate with base security forces personnel for additional requirements. Reference *Design and O&M: Mass Notification Systems* for further guidance with attention to specific dormitory building requirements in paragraphs 2-2.2 and Table 3.1.

### **Collective Protection System**

Dormitory electrical systems in OCONUS locations where Collective Protection Systems are required shall comply with *DoD Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings* for guidance on construction standards.

### **System Design**

Electrical system design calculations should be based on multi-family occupancy rather than hotel occupancy since the dormitory is the full-time home for the residents, and therefore has a higher demand factor. Provide individual circuits per room. Provide metering for electric power per building and as per Air Force requirements. Electric or gas is acceptable for appliances based on local requirements. Allow 120v, 208v and gas dryer connections.

### **Security Requirements**

Incorporate appropriate security measures into dormitory construction. This can include surveillance cameras mounted throughout public areas of the dormitory facility, monitored in the Dormitory Manager's office, dormitory entrance door alarms, etc. Coordinate with base security forces personnel for guidance and additional requirements.

### **Power and Communications Requirements**

Provide one quadruplex outlet on each wall of the living/bedroom area, 5 per room, minimum, mounting height per code. Provide arc fault circuit interrupters (AFCI) in all sleeping rooms as applicable. Provide ground fault interrupters (GFI) at all wet locations including exterior locations as required.

Prewire and provide two F-Type cable television outlets on opposite walls in each living/bedroom area. Telephone outlets must consist of two 4-pin/4-position non-keyed CAT 5 or better if available modular USOC RJ-11 jacks, one labeled "TELEPHONE" and one labeled "DATA". Telephone outlets shall be located adjacent to a 120-VAC, 60Hz (or host country standard voltage and frequency as applicable) duplex electrical receptacle. Location of outlets should allow for maximum flexibility in furniture arrangement. Consider the installation of cable modem infrastructure. All designs should consider latest technology available, but actual requirements will vary per location. Due to wide variances, this guide will only suggest the installation of conduit for future communication systems. The use of cable trays is encouraged.

Provide a wall mounted public pay telephone per each 12 modules, to be located adjacent to the multi-purpose room in the common support areas. Provide 1 LAN phone line adjacent to these phones.

### **Lighting Requirements**

Provide overall ambient and task lighting throughout dormitory buildings. Design considerations for lighting systems must be made for cost of replacement bulbs and parts, ease of installation and maintenance, and impact of heat loading on HVAC requirements. Incandescent fixtures with dimmer switches are recommended for living/bedroom areas.



Fluorescent fixtures on the underside of kitchen wall cabinets are recommended to provide task lighting and supplement ambient lighting. Consider recessed downlights and indirect lighting. The use of fluorescent fixtures is allowed, but must be carefully selected to fit into the residential environment. Fixtures in dormitory rooms must not appear “institutional”. Do not rely solely on table lamps for room lighting. Ambient light level at desk height must average 50 foot-candles in each dormitory room. Conceal all wiring; exposed wire mold or conduit is not allowed. Provide appropriate lighting in Corridor Access dormitory facilities to support viewing from the peep holes, security at module entrances, and lighting of signage as applicable.

Halogen lamps and compact fluorescent lighting are good alternatives over traditional lighting systems based on long term energy efficiencies, improved illuminance, and long lamp life spans. Halogen lamps blend well with traditional incandescent lamps and produce residential warmth to a space. Compact fluorescent fixtures can retrofit standard fixtures and provide a long lamp life. These advantages balance higher initial costs, and should be considered for dormitory construction.



Elmendorf Air Force Base – Site Lighting

Provide exterior lighting for parking areas, building entrances, and walkways. Use the latest edition of the *National Electrical Code*, the *IES Lighting Handbook*, and *NFPA 101 Life Safety Code* for lighting calculations, or host nation code as applicable. Provide one exterior light fixture outside each room entrance door for Balcony Access and Breezeway Access dormitory buildings.

## 7. Fire Protection/Life Safety

### Fire Protection/Life Safety Design

Fire protection systems must conform to *Fire Protection for Facilities Engineering, Design and Construction* and to *National Fire Protection Association (NFPA)* fire codes. Based on the *International Building Code (IBC)*, a dormitory module is classified as an efficiency apartment with an R-2 occupancy. Based on the *Life Safety Code*, this occupancy is classified as an apartment building. Provisions for life safety must conform to the requirements found in the latest edition of *NFPA 101, Life Safety Code*.

Traditional dormitory designs are three stories in height. Based on strict set back requirements defined in the most current version of *DoD Minimum Antiterrorism Standards for Buildings*, critical airfield constraints, and land use, installations may need to consider construction of multi story dormitories greater than three stories. Ensure that all fire

protection and life safety codes are considered if this approach is determined feasible. Travel distance to exits is of particular concern in designing dormitory facilities. The placement of stair towers or stairwells must be part of the preliminary building planning process. Minimizing the number of stairs required can be achieved by maximizing allowable travel distance in the design. This requires determining the maximum number of living units that can be served by one stair while still conforming to the maximum allowable travel distance. The elimination of stairs must be tempered with the need for privacy. Fewer stairs can result in more traffic being funneled past module entrances in Balcony Access dormitories. In this case, balcony widths must be sized to allow required egress width plus clearance required with outswinging entrance doors.

Requirements for the fire resistance of wall, ceiling and floor assemblies shall be in accordance with the *International Building Code (IBC)*. In addition, the minimum fire separation between egress paths, hazard areas, and exits shall comply with *NFPA 101, Life Safety Code*. Construction of such assemblies must be closely coordinated with the sound attenuating techniques used. Exits such as stair enclosures shall be separated by not less than 1-hour fire resistive construction. All fire exits should be alarmed and sound when opened. Note there is no minimum fire separation requirement between modules or with modules in a fully sprinkled facility.

#### **Antiterrorism/Force Protection - Collective Protection Systems**

All fire protection system designs should comply with the most current version of *DoD Minimum Antiterrorism Standards for Buildings* requirements including seismic detailing. In the case of dormitory construction in OCONUS locations where Collective Protection Systems (CPS) are required, designs shall comply with *DoD Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings* for guidance on construction standards.

#### **Fire Suppression and Fire Detection Systems**

All new dormitories and major dormitory renovation projects must be protected throughout by an approved supervised automatic sprinkler system installed in accordance with the requirements specified in *NFPA 13, Installation of Sprinkler Systems*, or *13R, Sprinkler Systems in Residential Occupancies Up To and Including Four Stories in Height*, as appropriate and other fire codes referenced therein. Sprinkler water supplies for systems designed in accordance with NFPA 13 shall comply with *Fire Protection for Facilities Engineering, Design and Construction*. Ensure adequate space is included in the mechanical room for the sprinkler riser or, if no mechanical room is in the project, a sprinkler riser closet with adequate space to service the riser. Fire sprinkler heads shall be recessed as standard design, with an exposed head with protective cage acceptable in utility or service locations.

Fire detection/internal alarm and reporting system shall conform to the latest edition of *NFPA 72, National Fire Alarm Code*. Each dormitory living/bedroom area and shared social space must be provided with an approved single station smoke/heat detector powered from the building electrical system. All living areas and modules shall be clearly identified on an addressable panel, based on local requirements. Additionally, provide carbon monoxide

detection as required throughout.

Ensure that audible notification devices are easily heard within the living units, and allow all devices within each bedroom and common area of each module to sound concurrently. This may require additional, louder, or individual (in each room) notification devices because of the sound attenuating construction found in dormitories. Fire alarm notification devices used within modules will be the “private mode” type.

Provide a Class I standpipe system in stairwell enclosures of dormitories 4 stories or greater in height in accordance with *NFPA 14, Installation of Standpipe, Private Hydrants and Hose Systems*. Standpipes consist of a 63mm (2.5 inch) outlet at the ground floor and one 63mm (2.5 inch) outlet to be located at each intermediate landing between floors to prevent congestion at doorways. Where there are multiple intermediate landings between floors, hose connections should be located at the landing approximately midway between floors. These outlets must have American National Fire Hose Connection Screw Threads (NH), also sometimes known by the abbreviations NST and NS.

## CHAPTER 4 RESOURCES AND LINKS

This chapter provides a list of references, including other Air Force, Department of Defense and national standards documents that give related guidance, to be used in conjunction with this guide.

### A. GOVERNMENT PUBLICATIONS

#### 1. Department of the Air Force

**AFH 32-1084 Standard Facility Requirements**

(<http://www.e-publishing.af.mil/pubfiles/af/32/afh32-1084/afh32-1084.pdf>)

**AFI 32-1023 Design and Construction Standards and Execution of Facility Construction Projects**

(<http://www.e-publishing.af.mil/pubfiles/af/32/afi 32-1023/afi 32-1023.pdf>)

**AFI 32-6004 Furnishings Management, Furnishings Standards**

(<http://www.e-publishing.af.mil/pubfiles/af/32/afh32-6004/afh32-6004.pdf>)

**AFI 32-7062 Air Force Comprehensive Planning**

(<http://www.e-publishing.af.mil/pubfiles/af/32/afi 32-7062/afi 32-7062.pdf>)

**AFI 33-111 Telephone Systems Management**

(<http://www.e-publishing.af.mil/pubfiles/af/33/afi 33-111/afi 33-111.pdf>)

**AFI 33-133 Joint Technical Architecture—Air Force (JTA-AF)**

(<http://www.e-publishing.af.mil/pubfiles/af/33/afi 33-133/afi 33-133.pdf>)

**AFI 64-101 Cable Television Systems on Air Force Bases**

(<http://www.e-publishing.af.mil/pubfiles/af/64/afi 64-101/afi 64-101.pdf>)

**AFPAM 32-1010 Land Use Planning**

(<http://www.e-publishing.af.mil/pubfiles/af/32/afpam32-1010/afpam32-1010.pdf>)

**ETL 94-4 Energy Use Criteria for Facilities in the Military Construction Program**

(<http://www.afcesa.af.mil/userdocuments/publications/ETL/ETL%2094-4.pdf>)

**ETL 01-1 Reliability and Maintainability (R&M) Design Checklist**

(<http://www.afcesa.af.mil/userdocuments/publications/ETL/ETL%2001-1.pdf>)

**ETL 02-12 Communications and Information System Criteria for Air Force Facilities**

(<http://www.afcesa.af.mil/userdocuments/publications/ETL/ETL%2002-12.pdf>)

**ETL 03-3 Air Force Carpet Standards**

(<http://www.afcesa.af.mil/userdocuments/publications/ETL/ETL%2003-3.pdf>)

**ETL 04-3 Design Criteria for Prevention of Mold in Air Force Facilities**

((<http://www.afcesa.af.mil/userdocuments/publications/ETL/ETL%2004-3.pdf>)

**USAF Project Managers' Guide for Design and Construction**

(<http://www.afcee.brooks.af.mil/dc/products/pmguide/pmguide.asp>)

**USAF Landscape Design Guide**

(<http://www.afcee.brooks.af.mil/dc/dcd/land/ldg/index.html>)

**USAF Master Landscape Construction Specifications**

(<http://www.afcee.brooks.af.mil/dc/dcd/land/mstrland/mlcs.html>)

**USAF Sustainable Facilities Guide**

(<http://www.afcee.brooks.af.mil/dc/products/dcproducts.asp>)

**USAF Application Guide for Lodging using the LEED Green Building Rating System**

(<http://www.afcee.brooks.af.mil/dc/DCD/arch/leed/leedguide.pdf>)

**USAF Force Protection Design Guide**

(<http://www.afcee.brooks.af.mil/dc/dcd/arch/force.pdf>)

**USAF Interior Design Guides**

(<http://afcee.brooks.af.mil/dc/dcd/interior/intdespu.html>)

**HQ AFCEE Accessibility Page**

(<http://www.afcee.brooks.af.mil/dc/dcd/afada/afada.html>)

**HQ AFCESA Cost Engineering Program**

([http://www.afcesa.af.mil/ces/cesc/cost\\_engr/cesc\\_costengr.asp](http://www.afcesa.af.mil/ces/cesc/cost_engr/cesc_costengr.asp))

**JTA-AF Fixed Base Technical Architecture, Vol. 6, Building 1040 Wiring Architecture**

(contact HQ AFCESA) (<http://www.afcesa.af.mil/Directorate/CES/default.html>)

**TIA/EIA 570 Residential Communications Standard with CAT 5 cable**

(contact HQ AFCESA) (<http://www.afcesa.af.mil/Directorate/CES/default.html>)

**HQ USAF Letter, 13 Oct 95, Mail Delivery Service for Unaccompanied Personnel Housing**

**HQ USAF Letter, 19 Dec 01, Sustainable Development Policy**

[http://www.wbdg.org/media/pdf/af\\_sdpolicy.pdf](http://www.wbdg.org/media/pdf/af_sdpolicy.pdf))

**2. Department of Defense**

**UFC 1-200-01 Design: General Building Requirements**

(<http://www.hnd.usace.army.mil/techinfo/UFC/UFC1-200-01.pdf>)

**UFC 3-120-01 Air Force Sign Standard**

(<http://www.hnd.usace.army.mil/techinfo/UFC/UFC3-120-01.pdf>)

**UFC 3-260-01 Airfield and Heliport Planning and Design**

(<http://www.hnd.usace.army.mil/techinfo/UFC/UFC3-260-01.pdf>)

**UFC 3-410-01FA Design: Heating, Ventilation, and Air Conditioning**

(<http://www.hnd.usace.army.mil/techinfo/UFC/UFC3-410-01.pdf>)

**UFC 3-600-01 Fire Protection for Facilities Engineering, Design and Construction**

(<http://www.hnd.usace.army.mil/techinfo/UFC/UFC3-600-01.pdf>)

**UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings Standards for Buildings**  
(<http://www.hnd.usace.army.mil/techinfo/UFC/UFC4-010-01.pdf>)

**UFC 4-010-10 DoD Minimum Standoff Distances for Buildings (FOUO)**  
(<http://www.hnd.usace.army.mil/techinfo/UFC/UFC4-010-10.pdf>)

**UFC 4-012-11 Security Engineering: Procedure for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings**  
(<http://www.hnd.usace.army.mil/techinfo/UFC/UFC4-012-11.pdf>)

**UFC 4-021-01 Design and O&M: Mass Notification Systems**  
(<http://www.hnd.usace.army.mil/techinfo/UFC/UFC4-021-01.pdf>)

**DoD Military Handbook 1190 Facility Planning and Design Guide**  
(<http://www.ccb.org/html/home/html>)

**DoD Uniform Federal Accessibility Standards (UFAS)**  
(<http://www.access-board.gov>)

### **3. Department of the Navy**

**NAVFAC Elevator Design Manual DM3.09 and ANSI 17.1**

### **4. Federal Government**

**Americans with Disabilities Act Accessibility Guidelines (ADA/ADAAG)**  
(<http://www.access-board.gov/adaag/html/adaag.htm>)

**Energy Star website**  
(<http://www.energystar.gov/products>)

**Environmental Protection Agency (EPA) website**  
(<http://www.epa.gov/cpg/products>)

## **B. NON-GOVERNMENT PUBLICATIONS**

**American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Fundamentals Handbook**  
(<http://www.ashrae.org>)

**ASHRAE 90.2, Energy Efficient Design of Low Rise Residential Buildings**  
(<http://www.ashrae.org>)

**Illuminating Engineering Society North America (IESNA)**  
(<http://www.iesna.org>)

**International Building Code (IBC)**

**Kitchen Cabinet manufacturer's Association (KCMA) standards**  
(<http://www.kcma.org>)

**Master Painter's Institute (MPI)**

(<http://www.paintinfo.com/mpi/approved/sheen.html>)

**National Fire Protection Association (NFPA)**

(<http://www.nfpa.org>)

**Uniform Plumbing Code (UPC)**

**Whole Building Design Guide (WBDG)**

(<http://www.wbdg.org>)