AIR FORCE ENLISTED DORMITORY DESIGN GUIDE

Vandenberg Air Force Base

PDF

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CHAPTER I INTRODUCTION

A. Purpose

This design guide provides the basic criteria to plan, program, design, and construct Air Force Pipeline Student Housing and Permanent Party Enlisted Dormitories. It presents guidance for development of Permanent Party Enlisted Dormitories taking into account local program operations and requirements.

While this guide focuses on Permanent Party Enlisted Dormitory requirements, it also describes basic requirements for Basic Military Training (BMT) and Pipeline Student Housing.

This design guide provides guidance developed from the Office of the Secretary of Defense (OSD) dormitory design standard, called the "1+1" standard issued on 6 November 95, and recently modified by OSD letter dated 25 June 01. The recent OSD changes provide excellent opportunities for the Air Force to improve the quality of life for our airmen living in Permanent Party Enlisted Dormitories. Adoption of this guidance will allow the services additional flexibility in designing and constructing unaccompanied housing by making better use of industry standards. More importantly, eliminating the module gross area restriction allows the services to better use limited space to increase the individual room spaces in each module. The previous 11 m^2 limitation on room size has been eliminated, allowing greater flexibility and livability, however, the new criteria changes do not permit increased costs over the previous criteria. The gross building area limitation remains unchanged, but flexibility within the building is enhanced.

B. Measuring Quality

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, the enlisted dormitory must 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.

C. Design Guide Scope and Use

1. Application

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

- Programming requirements
- Site evaluation and 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 documents that give related 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 their dormitories. Adherence to base, Major Command facility design standards and facility excellence guides is critical. Required spaces and space requirements are mandatory as provided. All other programming, 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 personnel. It also promotes cradle-to-grave teamwork in the project development and execution process from requirements identification through beneficial occupancy.

Air Force dormitory projects will exhibit leadership in sustainable and environmentally responsible design and construction. These projects will also comply with the latest edition of the DoD and USAF Force Protection Guide.

CHAPTER 2 PLANNING AND PROGRAMMING

Buckley Air Force Base

A. Overall Considerations

1. Project Team

A number of people have an interest in the delivery of quality enlisted dormitory 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
- 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 Definition

Air Force Dormitory Master Plan

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 personnel housing (UEPH) facility requirements, assess existing facility conditions, and provide future-year program renovation and new construction recommendations.

Project Siting

Locate dormitories within a reasonable distance of all community facilities and services, such as dining facilities, postal service centers, base exchanges, commissaries, pedestrian circulation systems, bike paths, and mass transit routes. Programmers must address the capacity of existing community facilities and existing infrastructure, and accommodate any additional requirements incurred by the proposed dormitory increase. The proximity of dormitories to community services must be balanced with the need for quiet and privacy. To achieve the optimum site plan, each design discipline must work in concert with one another. All design disciplines involved in the site planning process must 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 potential
- Force protection considerations
- Environmental considerations
- Proximity to existing recreation facilities
- Relationship to community facilities
- Existing topography
- Existing landscape
- Available base infrastructure
- Adjoining land uses
- Off-base communities and adjoining neighborhoods
- Vehicle circulation system, including public transportation access
- Future expansion
- Existing Permanent Party Enlisted Dormitories
- 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.

Site Requirements—Air Force Dormitories

Functional Requirement	Minimum/Recommended
Siting	
Community Planning	Close proximity to dining hall, shopette, cleaners, club, etc.
Circulation	
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 force protection requirements
Parking	
Resident Parking	1 per resident/may be reduced based on local requirements
Accessible Parking	2% total parking/minimum 1 space (per UFAS)
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
Site Amenities	
Pavilions/Outdoor Areas	Include as appropriate in dormitory master planning/projects
Site Furniture	Per base standards
Site Lighting	Per IES recommended lighting levels/base standards
Dumpsters/enclosures	Location/design per force protection requirements/base standards
Signage	Per AFP 32-1097 Sign Standards/base standards
Landscape	Per USAF Landscape Design Guide/local materials

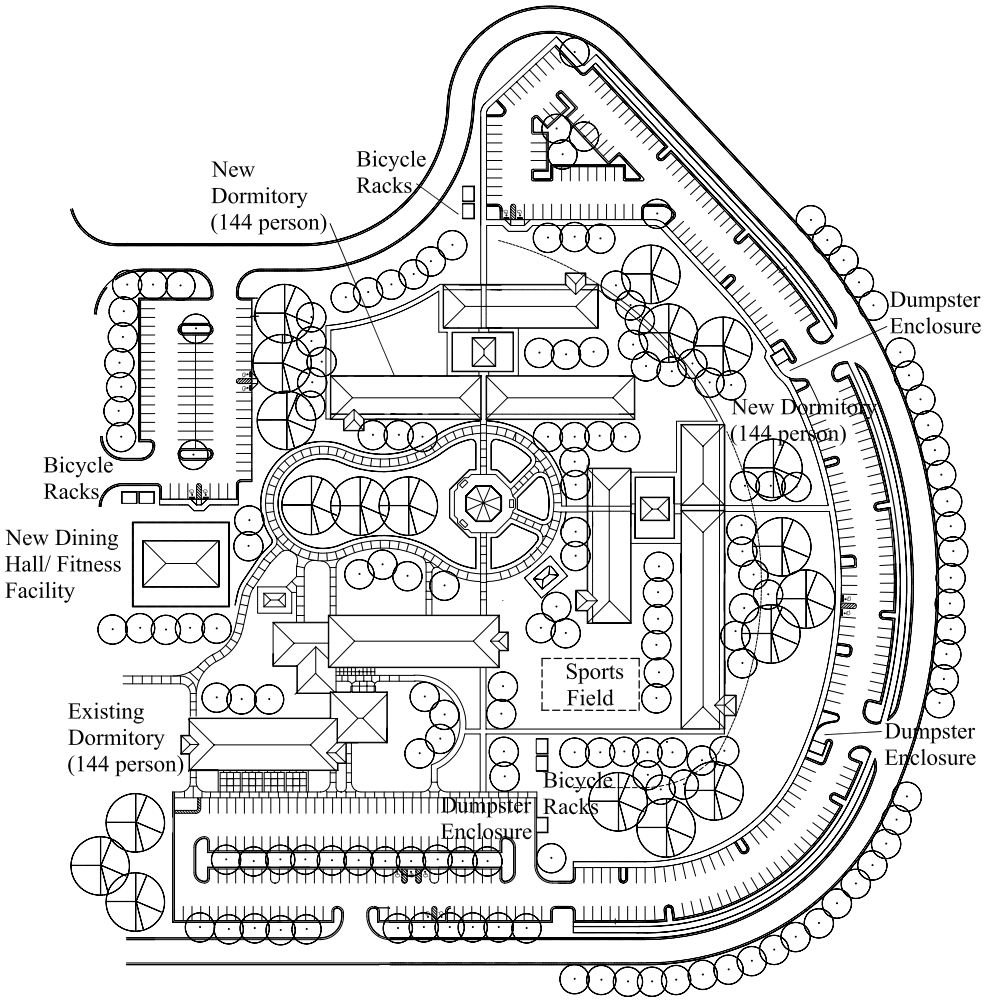
Organization and Circulation

Pay special attention to building orientation, mass and scale in developing the site plan. Develop a sense of order, arrival, orientation and community in planning the site. Insofar as possible, dormitory structures must not be overwhelming in apparent size. Site dormitories in relationship to one another to create outdoor spaces for use as passive or active recreation areas.

Most Air Force Permanent Party Enlisted Dormitories are three stories in height. This configuration, the maximum standard for force protection, ensures an efficient use of available real estate while avoiding the additional fire protection, inconvenience to occupants, and structural and life safety cost associated with buildings over three stories in height.

Achieve spatial balance and scale through thoughtful placement and arrangement of structures, landscaping and landforms. See Figure 1 for an illustration utilizing professional site development concepts for a typical Permanent Party Enlisted Dormitory project.

Expansion potential for dormitories usually involves 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.



Typical Enlisted Dormitory Site Development Plan Figure 1

Climatic Considerations

Dormitory design and building orientation must take advantage of local climate conditions. Balcony Access dormitories 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 dormitories 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 must 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 dormitories to take advantage of the 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. Building placement and design should also take advantage of views that are scenic, pleasant, or interesting. Designers must 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 dormitories. Achieve mutual shading by sensitively arranging adjacent structures. Avoid excessive east or west-facing glass and design for maximum cross-ventilation where feasible.

3. Codes and Standards

Anti-terrorism/Force Protection

Follow the *Interim DoD Antiterrorism/Force Protection Minimum Construction Standards* for guidance on dormitory 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. Architectural design can integrate required building and site components into the building and campus design as to enhance the success of the overall project.

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, 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.

Incorporating sustainable design concepts into dormitories requires the following actions:

- Expanding our focus to include life cycle costs along with first costs
- Extending the life of facilities
- Changing the facility delivery process to minimize waste
- Breaking down the traditional individual discipline stovepipes and working as a team from the beginning

This subject is addressed in detail in the *USAF Environmentally Responsible Facilities Guide.*

Additionally, the Air Force has developed a *LEED Application Guide* for Lodging which gives specific guidance for lodging facilities, but is directly applicable to dormitories as well. Use of this guide is required on all dormitory projects.

Access for Persons with Disabilities

Design Permanent Party Enlisted Dormitories to accommodate the needs of able-bodied military residents. Military dormitories are exempt from accessible requirements per UFAS, thus, provisions for persons with disabilities are not required in any of the living units. As an exception, bases in Japan, Korea, and other OCONUS locations provide quarters for civilians (DoDDS teachers, AAFES, Red Cross, etc.) and may require special provisions for persons with disabilities. Temporarily disabled airmen should be assigned to accessible lodging units. 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
- Designated parking spaces with convenient access to the main entry of the building.

The 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 (ADA) Accessibility Guidelines*. In case of conflicting guidance regarding public areas, the stricter guidance should be followed.

4. Design Process

Successful dormitories 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. The following project development stages apply to traditional design-bid-build projects as well as to design-build projects.

Project Initiation

The Air Force Dormitory Master Plan is the principle planning document which defines basic Air Force dormitory requirements and must be followed. The Air Force Dormitory Master Plan uses guidelines in this design guide to score the condition of existing dormitories and prioritize dormitory renovation and replacement projects. It is critical that site selection and any base or MAJCOM facility standards be identified prior to project initiation.

Site Selection

Specific guidance for selecting appropriate sites for Permanent Party Enlisted Dormitories is given in Section 2 of this chapter.

Program Definition

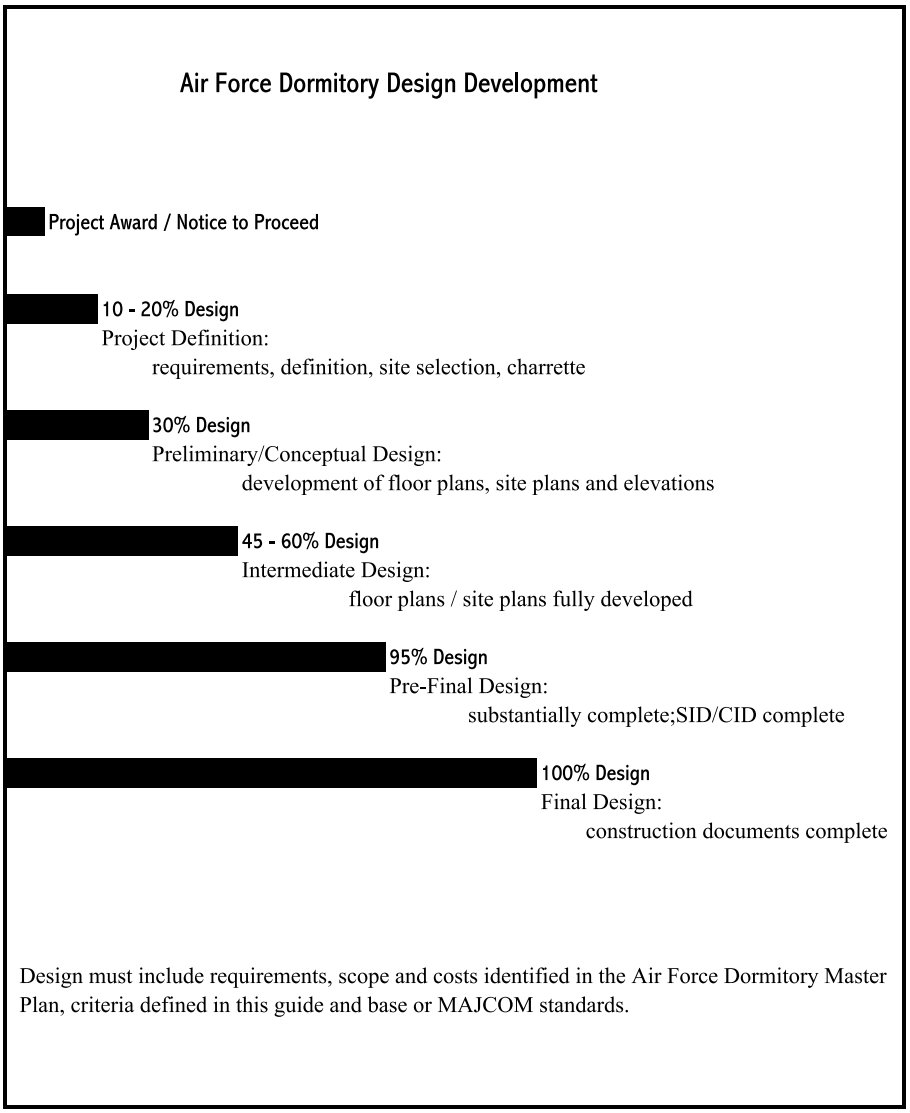
Requirement documents provide the design agent and the designer with information used in negotiating the design contract and completing the project definition phase of the project. The information in this design guide provides the basis for developing the requirements. Site selection has enormous affect on project costs, functionality, and customer satisfaction, and is generally part of the comprehensive planning process conducted at base 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.

Project definition also includes the space planning guidance found in Section 10 of this Chapter plus the site design, building design and building systems concepts in Chapter 3—Facility Design. Unique local requirements concerning building program, design criteria, and code compliance should also be identified at this stage. Oversea projects must consider requirements of host nations to ensure requirements for certification of compliance are met.

Information required for the preparation of DD Forms 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.

Design

Designs are developed using the pre-established project requirements and data are normally prepared in the following sequence: project definition (10 – 20% design), preliminary/conceptual (30% design), intermediate (45 – 60% design), pre-final (95% design), and final working drawings (100% design). Designs must conform to the requirements, scope, and costs identified in Air Force Dormitory Master Plan, plus the criteria defined in this guide, and in any supplemental base or MAJCOM standards. Designs may also 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*. (http://www.afcee.brooks.af.mil/dc/products/pmguide/pmguide.asp)



Design Process Diagram Figure 2

5. Air Force Dormitory Categories

Unaccompanied Air Force Enlisted personnel typically transition through 3 distinctly different types of dormitories during their career, starting with Basic Military Training dormitories, followed by Pipeline Student Housing, and ending with traditional Permanent Party Enlisted Dormitories.

6. Equity between Construction and Renovation Projects

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

7. Special Considerations for Renovations

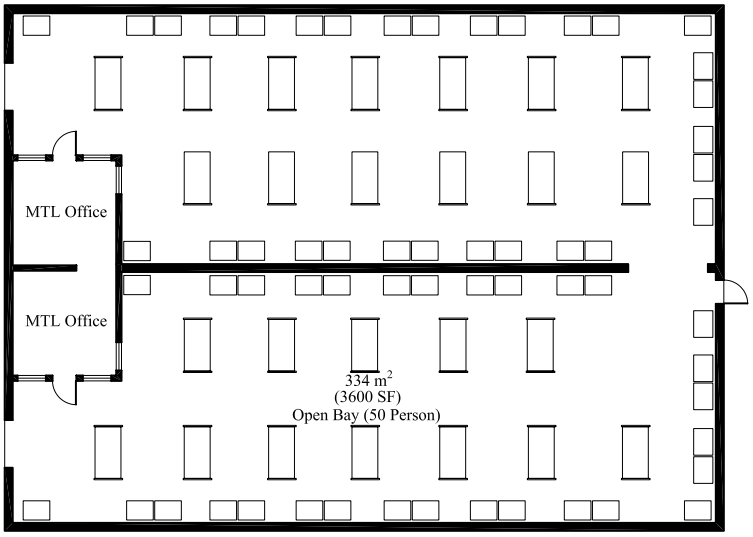
Renovations of dormitories range from building and system upgrades to complete gutting and reconfiguration. The requirements and recommendations set forth in this design guide apply to new construction and to renovations, and every attempt to meet these standards should be made. Flexibility in these construction standards such as two/three-bedroom module designs 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, renovation projects must meet the same Net Living Area and functional space criteria applicable to new dormitories. 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.

Basic Programming Requirements for Air Force Dormitories

Grade Rank	Minimum Net Living Area per person	Maximum Gross Building Area per person
Grade E1 Basic Trainee	6.7 m^2 (72 SF)	12.3 m^2 (132 SF)
Grade E1 – E3 Tech Trainee	9.17 m^2 (98 SF)	25.2 m^2 (269 SF)
Grade E1 through E6	12 m^2 (129 SF)	33 m^2 (355 SF)
Grade E7 through E9	24 m^2 (258 SF)	66 m^2 (710 SF)

8. Basic Military Training Dormitories

Basic Military Trainees are housed in an open-bay configuration with 50 trainees per bay. BMT dormitory furnishings are limited to bunk beds and lockers for personal gear. Net Living Area is shared, but is based on 6.7 m^2 (72 SF) per person. The Gross Building Area for BMT dormitories is 12.3 m^2 (132 SF) per person.



Basic Training Bay Plan figure 3

9. Pipeline Student Housing

Pipeline Student Housing are designed and constructed to meet the needs of a specific category of personnel. These dormitories 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 must adhere to strict discipline and control. The pipeline dormitory design provides this atmosphere. Although many concepts in Pipeline Student Housing are similar to Permanent Party Enlisted Dormitories, there are differences in their physical layout and construction, including construction as individual structures to control entry. The general concepts applicable to Permanent Party Enlisted Dormitories 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.

Required Spaces—Pipeline Student Housing

Functional Space	Minimum Net Area	Maximum Net Area	Recommended Net Area
Living/Bedroom Area—2 per module	18.2m² (196 SF)	18.2m² (196 SF)	18.2m² (196 SF)
Shared Bathroom—1 per room (1 toilet,1 shower)	2.3m² (25 SF)	Based on available area	2.3m² (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	Approximately 900mm (3 LF) per lavatory/ vanity
Closets—2 per room	1.86m² (20 SF)	1.86m² (20 SF)	1.86m² (20 SF)
Laundry Facilities (a 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	1.95m² (21 SF) per appliance—circulation and access inclusive
Bulk Storage	Not required	Not required	Not required
Utility	As required	As required	Requirement dependent on local conditions
Mail Service—1 box per student (inside building)	As required	As required	Requirements dependent on local conditions/force protection requirements
Circulation space	Dependent on layout	Dependent on layout	7.4m² (80 SF) per room, varies with layout

Optional Spaces—Pipeline Student Housing

Functional Space	Minimum Net Area	Recommended Net Area
Multi-Purpose Area (May be programmed as meeting/study room,television rooms, exercise rooms, etc.)	13.9 m² (150 SF) for each multi-purpose area	0.19 m² (2 SF) for each room for each multi-purpose area
Game Room	28 m² (300 SF)	0.19 m² (2 SF) per room
Vending	18.6 m² (200 SF) per floor	18.6 m² (200 SF) per floor
Accessible Public Toilets (ground floor location)	46.5 m² (200 SF) per dormitory	46.5 m² (200 SF) per dormitory
Supply Storage Area	18.6 m² (200 SF) per dormitory	26.4 m² (500 SF) per dormitory
Administration Area	1.4 m² (15 SF) per room	1.4 m² (15 SF) per room
Public Telephone Area	18.6 m² (200 SF) per floor	18.6 m² (200 SF) per floor

Construction Standards—Pipeline Student Housing

Net Living Area per Person	9.1 m² (98 SF)
Maximum Number of Person per Room	2
Bathroom Configuration	1 per room shared by 2 students
Corridor	Central

Recommended Spaces and Sizes

Access to Pipeline Student Housing rooms will be from interior double-loaded corridors. Modules are based on a standard of 18.2 m^2 (196 NSF) living space. Net living area is generally defined as the floor area of the living/bedroom space, measured to the inside face of the room walls. The net living space is neither a minimum nor maximum but must be met exactly.

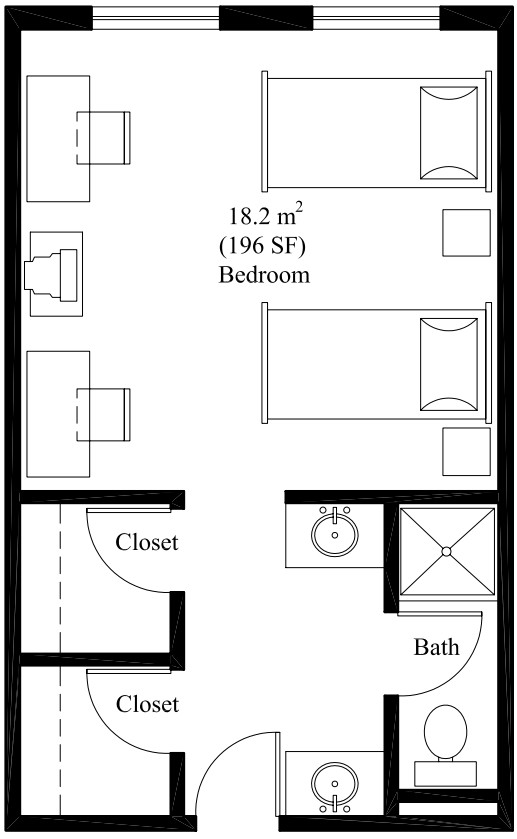
The following items are included when determining Net Living Area calculations:

- All door swings that encroach upon the living/bedroom area
- Mechanical equipment such as heat/air-conditioning units, radiators and baseboard heaters.

The following items are 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 and air ducts).
- Closets are not included as Net Living Area.

All Pipeline Student Housing will be of a standard design.



Typical Pipeline Student Housing Floor Plan figure 4

10. Permanent Party Enlisted Dormitories

The area and occupancy requirements listed in the following table are construction standards for Permanent Party Enlisted Dormitories, and not assignment standards. Programmers must use the anticipated number of occupants established by the current approved Dorm Master Plan process as the first step in developing a dormitory design.

New Construction

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 Enlisted Dormitories. 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^2 (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^2 (118.4 SF) for each of the two rooms, and placed a 47 m^2 (506 SF) limit on the gross area of the module. Additionally, a limit of 66 m^2 (710.4 SF) per module (33 m^2 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^2 (118.4 to 183 SF) for Net Living Area, eliminates the gross module area limit, but retains the 33 m^2 per person gross building area limit.

New Criteria and Constraints

The Air Force has conducted several dormitory workshops to develop specific guidance toward the development of this design guide. 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^2 with the gross building area limited to 66 m^2 per module, leaving only 19 m^2 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^2 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 net living area/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 individual module as referenced in the table below.

4 Bedroom Modules

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. Due to the provision of private baths, genders may be mixed within a four-bedroom module much more easily than could be done in a two-bedroom or three-bedroom module.

The table above 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	2BDRM/ Balcony	3BDRM/ Balcony	4BRDM/ Balcony
Gross Building Area	33m² (34,088 SF)	33m² (34,088 SF)	33m²(34,088 SF)	33m² (34,088 SF)
Number of Baths	48	96	96	96
Number of Kitchens	48	48	32	24
Net Living Area per Person	11m² (118 SF)	12m² (129 SF)	13m² (139 SF)	12.4m² (132 SF)
Gross Module Area per Person	24 m² (253 SF)	26.5 m² (284 SF)	26 m² (280 SF)	28.5 m² (305 SF)
Building Plan Efficiency	71%	80%	80%	86%

Renovation

Prototype Development

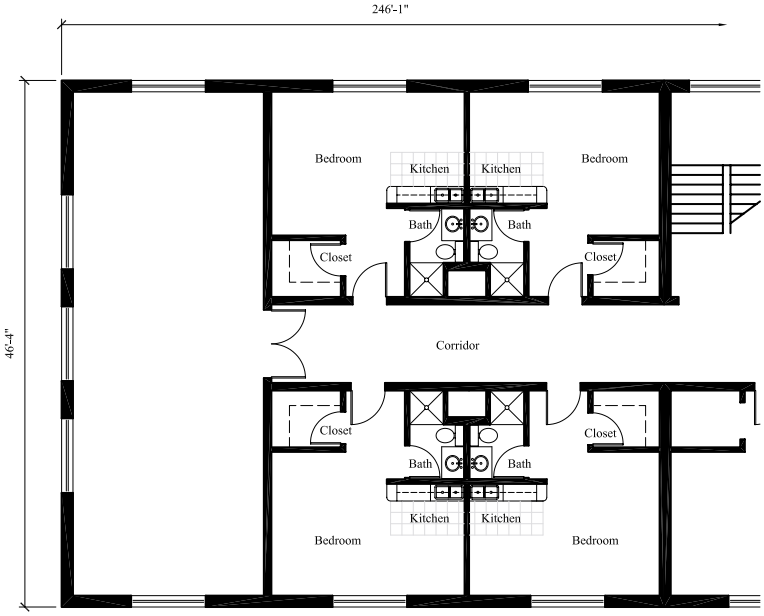
The four-bedroom module design, developed for new construction and based upon the improved and increased Air Force criteria, has also proven valid for renovation, based upon additional analysis and prototype development. Numerous module plans were developed based on two existing building configurations 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

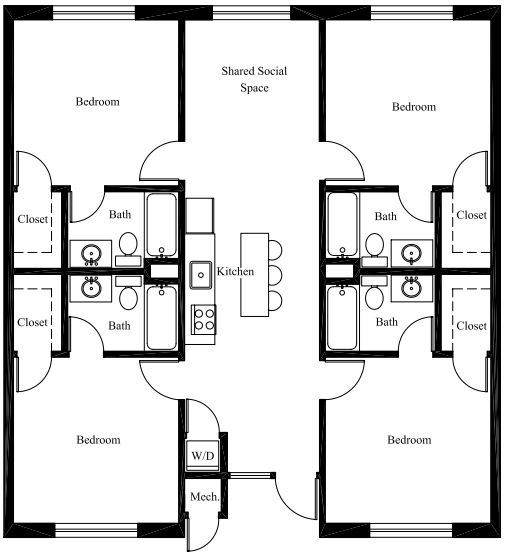
The existing Balcony Access plan adapted well to a new Balcony Access configuration, allowing the exterior shell and stairwells to remain intact. A Corridor Access configuration was also developed, but requires the addition of interior stairwells to access module entrances. The existing Corridor Access 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

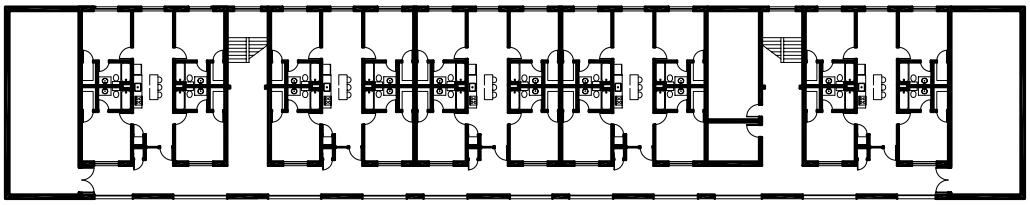
Although it is slightly more expensive to provide private baths than shared baths, this cost is offset by only providing half as many shared kitchen spaces in a four-bedroom module than are required for two-bedroom modules. The cost of renovating existing dormitories to meet this new standard is comparable to renovations cost 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.



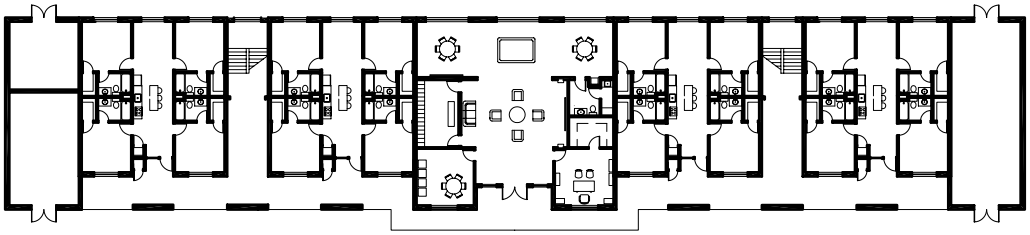
Existing Corridor Access Dormitory Plan figure 5a



Renovation balcony Access Floor Plan Figure 5b

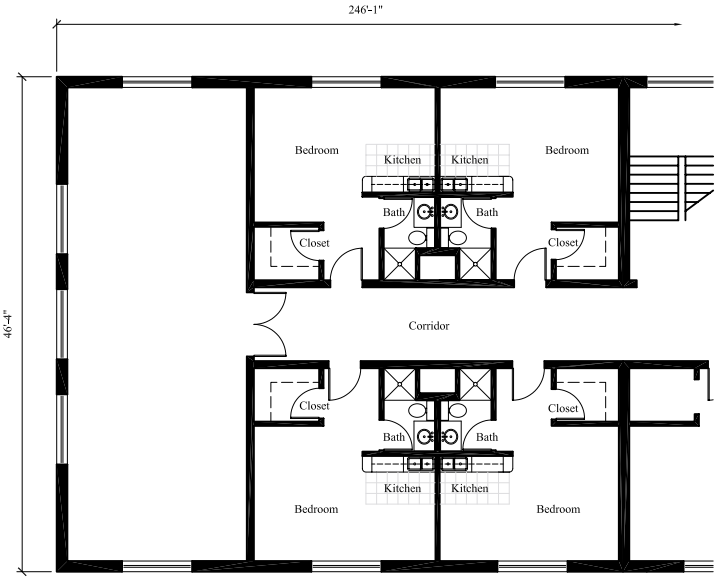


2nd and 3rd Floors



Ground Floor

Renovation Balcony Access Building Plan figure 5c



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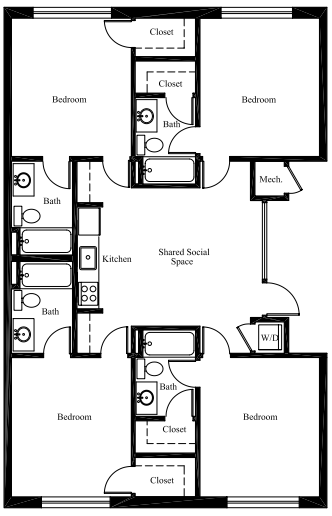
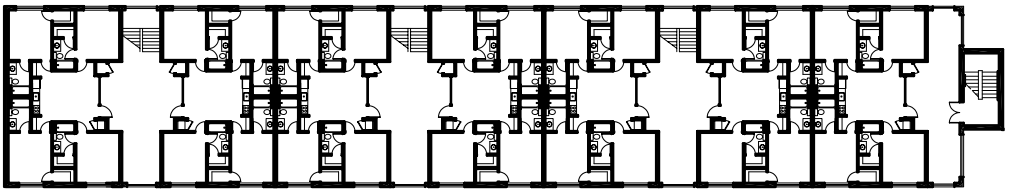
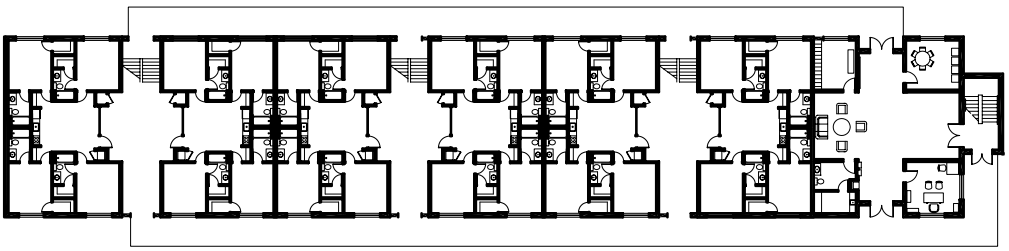


Renovation Corridor Access floor Plan figure 5d

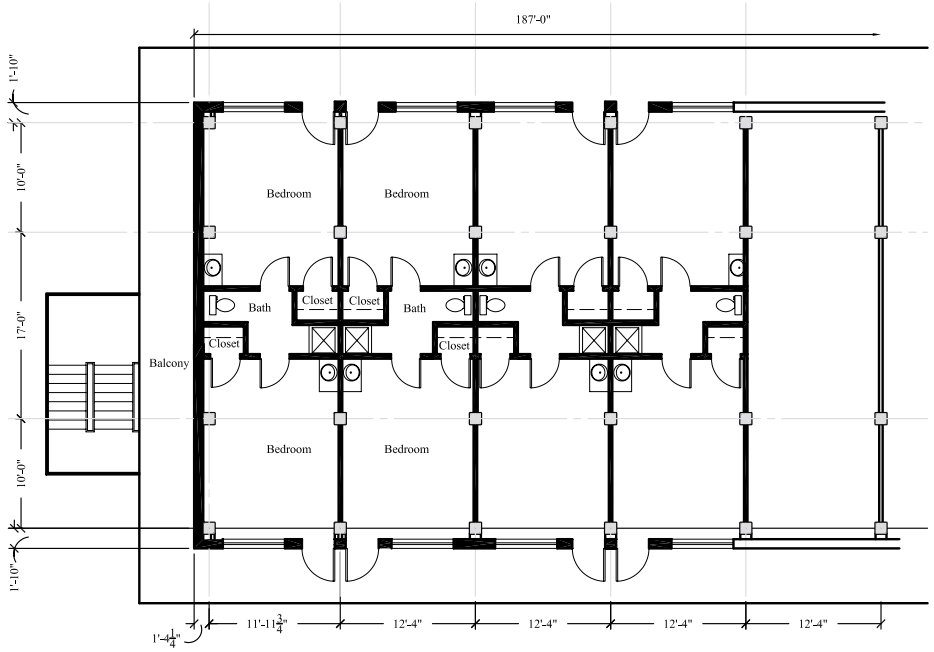


2nd and 3rd Floors

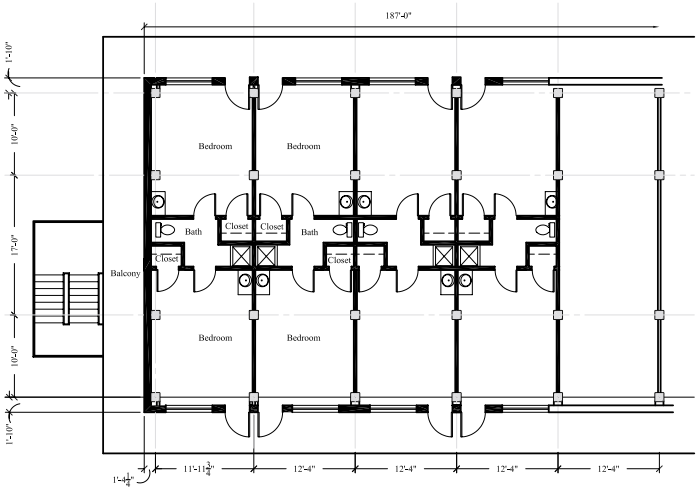


Ground Floor

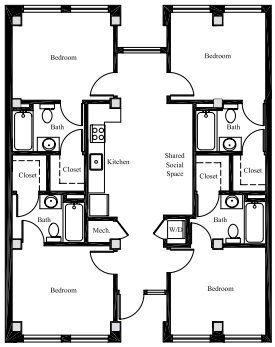
Renovation Corridor Access Building Plan figure 5e



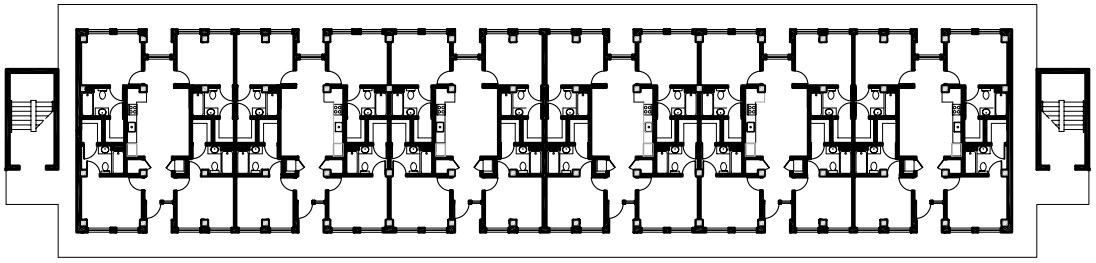
Existing Balcony Access Dormitory Plan figure 5f



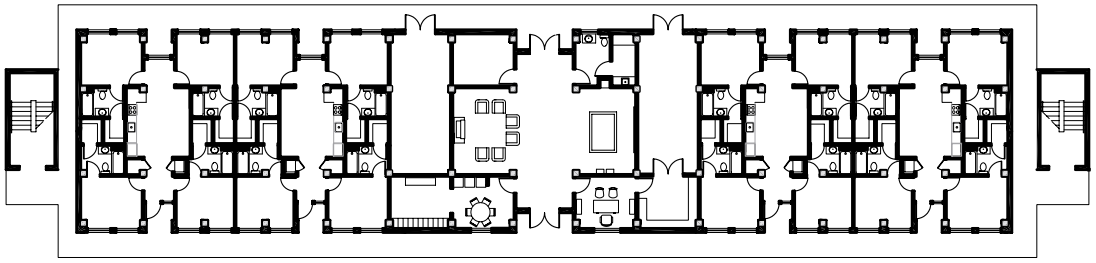
Existing Balcony Access Dormitory Plan figure 5f



Renovation Balcony Access Floor Plan figure 5g

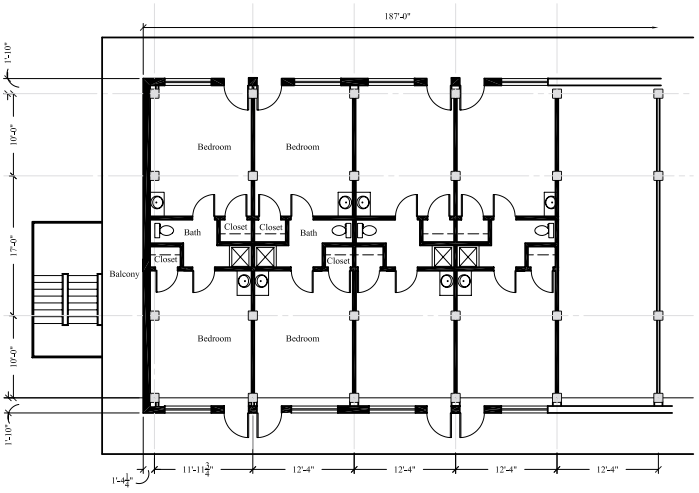


2nd and 3rd Floors

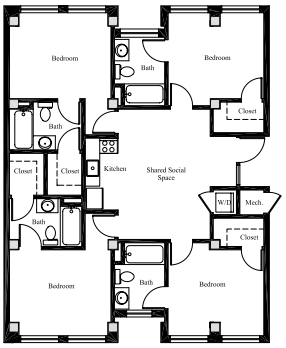


Ground Floor

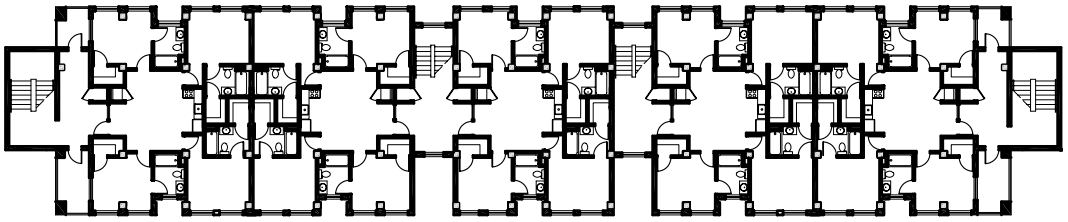
Renovation Balcony Access Building Plan figure 5h



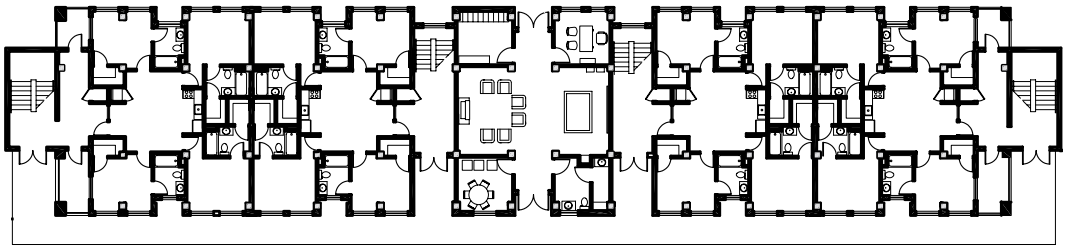
Existing Balcony Access Dormitory Plan figure 5f



Renovation Corridor Access Floor Plan figure 5i



2nd and 3rd Floors



Ground Floor

Renovation Corridor Access Building Plan figure 5j

Construction Standards—New Construction and Renovated Permanent Party Enlisted Dormitories

Grade	E1 – E4
Minimum Net Living Area per Person	12 m^2 (129 SF)
Recommended Net Living Area per Person	12 – 14 m^2 (129 – 150 SF)
Maximum Net Living Area per Person	17 m^2 (183 SF)
Number of persons per module	4
Kitchen configuration	Semi-private (shared by 4)

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

Required Spaces and Sizes—New Construction and Renovation
Permanent Party Enlisted Dormitory

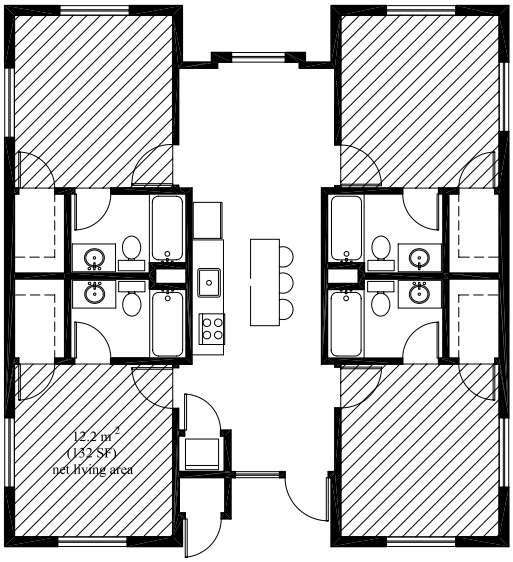
Required Functional Space	Minimum Net Area	Maximum Net Area	Recommended Net Area
Private Living/Bedroom Area, 1 per person	12 m^2 (129 SF)	17 m^2 (183 SF)	12 – 14 m^2 (129 – 150 SF)
Private Bathrooms—1 per person (1 toilet, 1 combination tub/shower or 1 separate shower, and 1 lavatory vanity—min 762 mm (30 inches) wide)	3.25 m^2 (35 SF)	Based on available area	3.25 m^2 (35 SF)
Private Walk-in Closet—1 per living/bedroom area	1.86 m^2 (20 SF)	Based on available area	1.86 m^2 (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)	Minimum 11.5m^2 (123 SF)	Based on available area	11.5 m^2 – 28m^2 (123 – 300 SF) including shared kitchen, shared social space and/or seating/dining area, laundry and utility
• Kitchen—1 per module, shared by 4 persons	Included in Shared Common Area	Included in Shared Common Area	At a minimum includes: double-bowl sink; 2-burner cook top combination microwave/convection oven, range hood with exhaust fan, storage cabinets, and disposal where permitted
• Laundry Area—1 washer/1 dryer per module—shared by persons (may be stacked)	Included in Shared Common Area	Included in Shared Common Area	0.93 m^2 (10 SF) per appliance actual footprint/ 1.95 m^2 (21 SF) per appliance—circulation and access inclusive. Laundry per module recommended—centralized laundry as option with allowed ratio 1 washer/8 persons and 1 dryer/6 persons
Multi-Purpose Area—at least one such space per dormitory (includes game room, television room, exercise room, administration area, etc.	25 m^2 (270 SF)total	Based on available area	0.19 m^2 (2 SF) per person for each multi-person area plus 7.4m^2 (78 SF) administration area—total area to be used based on local requirements
Vending Area—one area per dormitory recommended	2.32 m^2 (25 SF) each vending area	Based on available area	7.43 m^2 (80 SF) per vending area based on local requirements

Required Spaces and Sizes—New Construction and Renovation
Permanent Party Enlisted Dormitory continued

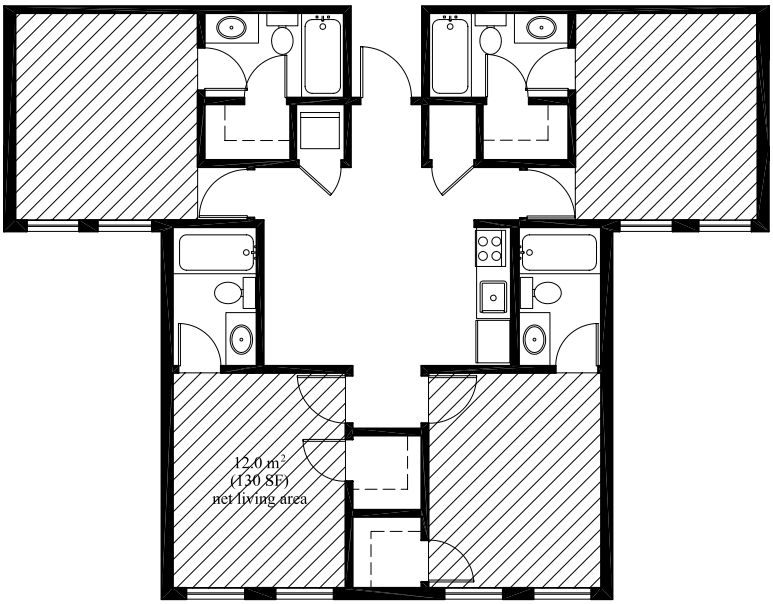
Required Functional Space	Minimum Net Area	Maximum Net Area	Recommended Net Area
Mail Service—1 box per person, centrally located within the dormitory campus—location per force protection requirements	As required	As required	Requirements dependent on local conditions—not applicable at OCONUS locations
Accessible Public Toilets	9.3 m^2 (100 SF) per dormitory	Based on available area	9.3 m^2 (100 SF) per dormitory
Supply Storage Room	9.3 m^2 (100 SF) per dormitory	Based on available area	9.3 m^2 (100 SF) per dormitory
Bulk Storage (may be in-room, in-module or centralized area)	2m^3 (70.6 CF) per storage cubicle	Based on Available Area	2 m^3 (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

Net Living Area

Net Living Area is generally defined as the floor area of the living/bedroom space, measured to the inside face of the room walls as indicated by the shaded areas on the following module plans. Provide a total of between 12 and 14 m^2 (129 – 150 SF) Net Living Area in each room. In no case should the Net Living Area per person be less than 12 m^2 (129 SF).



Typical Balcony/Breezeway Access Floor Plan figure 6a



Typical Corridor Access Floor Plan figure 6b

The width of a living/bedroom area should not be less than 3048 mm (10'-0"). The recommended minimum width is 3353 mm (11'-0").

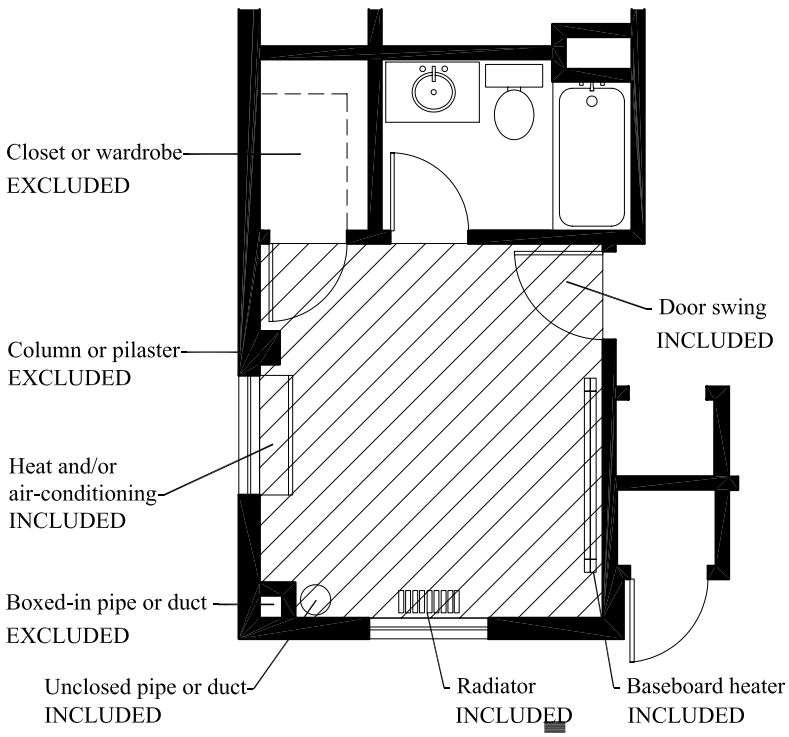
Items <u>included</u> in Net Living Area calculations are:

- All door swings that encroach upon the living/bedroom area (typical in Balcony Access dormitories).
- Mechanical equipment that occurs within the living/bedroom area, such as heat/air-conditioning units, radiators, and baseboard heaters.

Items <u>excluded</u> from Net Living Area calculations are:

- 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 and air ducts)
- The area occupied by the vanity, when the vanity is within the living/bedroom area
- Closets and wardrobes

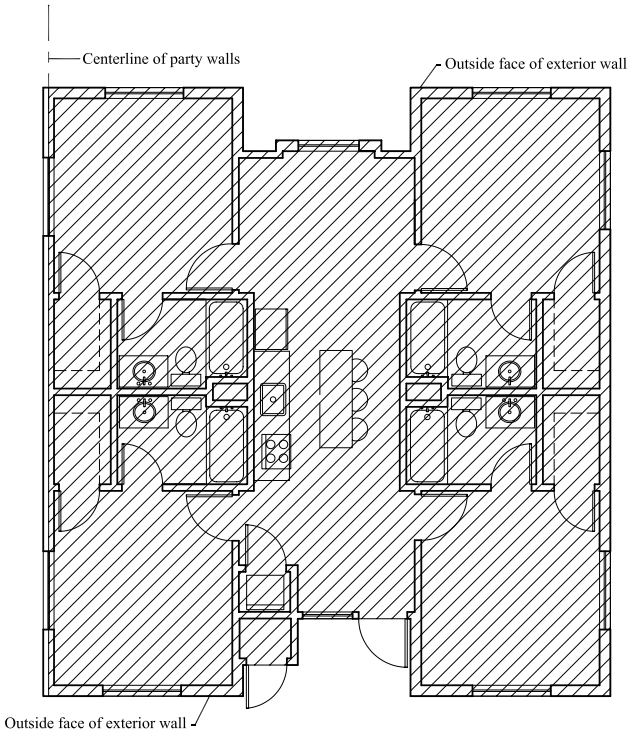
The range of 12 – 14 m^2 (129 – 150 SF) should allow sufficient flexibility for the Net Living Area requirement to be met for renovation projects as well as for newly constructed dormitories. There may be physical limitations present in existing dormitories, such as load-bearing walls, that affect the flexibility of the module layouts, but most existing dorm configurations will permit meeting the minimum Net Living Area requirements.



Measuring Net Living Area Figure 7

Gross Module Area

Gross Module Area is not restrained to a specific area measurement for newly constructed or renovated enlisted dormitories, but is still limited due to the requirement to stay within the Gross Building Area limitation while satisfying all functional and minimum area requirements required for the spaces within the facility. A recommended range is 26.5 – 28.5m² (129 – 150 SF) per person. Designers must remember that the difference between the Gross Module Area and the Gross Building Area must accommodate all of the dormitory functions that occur outside of the module, such as circulation, utility spaces, and exterior wall thickness.



Example of Gross Module Area figure 8

Gross Building Area

Gross building area is measured to the outside face of the exterior enclosure walls. Do not include normal roof overhangs in gross building area. Normal roof overhangs are generally less than three feet wide and are unsupported by columns. 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. Refer to *AFH 32-1084, Facility Requirements* for more information on scope calculation.

The gross building area for Permanent Party Enlisted Dormitories must not exceed 33 m^2 (355 SF) per person. This limitation may be increased by 2 m^2 (21.5 SF) per person for high-rise dormitories (4 stories or more) or for dormitories with site-specific programming requirements.

Newly constructed projects must comply with the design and construction guidance establishing the minimum and maximum size for the Net Living Area and the maximum size of the Gross Building Area. Cost-effective dormitory renovation projects must also comply with the minimum and maximum Net Living Area, but may exceed the maximum Gross Building Area due to pre-existing conditions. Installations desiring a waiver from these planning factors must submit a fully justified request to their MAJCOM/CE, who has final waiver authority.

Special Project 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 must be aware of current unit cost factors. Programmers will only use unit costs; therefore, designers must 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 dormitories often exceed those of other facilities of similar size because of the higher energy demands and occupancy densities. Programmers must 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 complex may justify its own central energy plant, or it may be more cost effective to provide each dormitory with a separate mechanical system, or to 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 dormitories should receive special attention regarding their impact on construction costs. These systems may incur additional 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. Incorporating sustainable design features into dormitories may result in higher initial costs, but should always be justified by a thorough life-cycle cost analysis.

Force Protection. Follow the *Interim DOD Antiterrorism/Force Protection Minimum Construction Standards* for dormitories, and consider the impact these standards have on the overall construction cost of the project. Coordinate with the base security forces personnel for additional local guidance or 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 must consider not only efficiency in design of the individual modules, they must 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 must also consider the impact these factors may have on privacy, functionality, and aesthetics.

CHAPTER 3 FACILITY DESIGN

WRIGHT PATTERSON AIR FORCE BASE

A. SITE DESIGN

1. SITING REQUIREMENTS

Site planning is one of the more important elements of any project design and can make or break the overall success of the enlisted dormitory project. The art of site planning requires the interdisciplinary involvement of the community planner, architect or landscape architect, interior designer, and civil, mechanical, electrical, and communication engineers, as well as the Housing and Dormitory Managers. The quality of the design will suffer if one of these design disciplines is left out of the site planning process. The landscape architect should lead and be responsible for the development of the site plan, coordinating with the other disciplines. Coordination with DoD and Air Force force protection construction standards, and UFAS and/or ADAAG accessibility guidance is critical, and should become part of the design solution.

Community planning is an integral part of site planning. Although the emphasis in dormitory campus planning is to create a residential neighborhood atmosphere, somewhat separated from surrounding base administrative and mission related functions, proximity and access to common public use facilities is desired. 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 these 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.

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 feet). Consider passenger loading and/or drop off areas near the dormitory entrances, providing convenience to residents and their guests. Consider moving vans and delivery trucks, and required easement areas. Follow force protection construction standards in all vehicle access design, critical in determining allowable set-backs, eliminating lines of approach perpendicular to the building. Consider snow dumping, especially in northern tier installations.

Fire Department/Emergency Service

Reference the *International Building Code* (IBC) for a minimum separation required between dormitories and the closest adjacent building. This separation is for fire protection purposes but may also be dictated by force protection requirements and local fire protection policies. Provide access to fire protection vehicles from three sides. Obtain width, weight, and turning radii of fire fighting vehicles from the base fire department.

Service Vehicles

Access streets and parking areas should be designed to accommodate service vehicles. Where interior court areas are proposed between adjoining dormitories, consider designing the main pedestrian walks to accommodate such vehicles. As an example, these walkways must 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 base provides bus service, designers should consider developing shelters and walks to serve enlisted personnel needs. Bus shelters must 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 feet) wide. All other sidewalks should be 1.8 meters (6 feet) wide. Design and grade sidewalks to provide barrier-free access to the first floor of all dormitories and to any outdoor use areas associated with the dormitories.

Provide connections to other functional areas of the base with pedestrian circulation systems. Consider including links to jogging/biking trails as part of the site development process. In northern tier locations, 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

Include outdoor passive and/or active use areas in all dormitory facility development plans. Where appropriate, design pavilions to become an integral part of the dormitory complex. The pavilions must complement the architectural style and materials of the dormitories. Plan for and provide additional amenities such as barbecue grills, tables, benches, lighting, and landscape plant materials. Outdoor activity areas must be carefully coordinated with indoor social activity areas.

Service Entrances

Where possible, separate service entrances associated with mechanical rooms or mechanical enclosures from resident parking areas.

3. Parking

Resident Parking

Provide one parking space per dormitory resident. Parking areas should be sized to local conditions and may be reduced. Additional visitor parking with the exception of accessible parking, is not required, but may be an option based on local requirements. This results in a significant area of paving which, if not planned properly, will have a negative impact. This parking ratio applies to most dormitories, but may be reduced based on the parking needs of the specific project. 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.

Grading can help to create a transition zone within parking areas, between parking and dormitories, and between multiple groups of dormitory facilities. For instance, terraced parking areas can break up the expanse of parking and reduce the visual impact.

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 enlisted personnel. As an exception, bases in OCONUS locations provide quarters for civilians (DoDDS teachers, AAFES, Red Cross, etc.) and may require special provisions for persons with disabilities. Provide accessible parking spaces for visitors with disabilities in accordance with the *Uniform Federal Accessibility Standards* (UFAS) and the *Americans with Disabilities Act (ADA) 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 complex area. Provide all bicycle parking on concrete surfaces adjacent to sidewalks or first floor building corridors. Parking areas must be covered and screened from view of the general public. Consider covered bicycle parking enclosed on a minimum of 3 sides, 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 Permanent Party Enlisted Dormitories is one of the more important aspects of site planning. 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 must work closely together to achieve optimal design results.

Grading

Grade the site to achieve an orderly transition from the point where enlisted personnel enter the site by automobile or on foot to the point where they are at the first floor entrance. Site grading must 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.

Dormitories 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 must 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 must work together to use landforms to soften the impact of parking on the landscape and to positively enhance force protection of the dormitory campus. 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 enlisted dormitory complex. All site water must 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 feet), 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 is similar to putting icing on the cake. Along with the landscape development and signage, this element gives the project a finished appearance. Site furniture that is in harmony with the architectural style of the dormitory facilities complements the building, and makes the outdoor spaces more usable and appear more organized. 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 must coordinate the 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.

Site Lighting

Site lighting is an integral part of any dormitory project. Provide lighting to ensure occupants have a means of safely moving between outdoor spaces. Consider the base's design standards, if available, in the selection of luminaries and poles. All signage and lighting must be in compliance with the installation's standards. The selection of materials and locations must 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. 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. 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. Design exterior lighting such that zero direct-beam illumination leaves the building site.

Consider motion detection and photo sensitive sensors to achieve energy efficient lighting design.

Sustainability

Incorporate sustainable design concepts into the dormitory campus. Consider recycling centers and containers and other refuse 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 provide ease of use and service ability.

Signage

Follow the guidance contained in *AF Pamphlet 32-1097, Sign Standards Pamphlet*, and as supplemented in the base'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 force protection guidance 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.

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
- Climatic data
- Existing vegetation
- Soil quality
- Hydrology
- Topography
- Spatial and program analysis
- Circulation patterns
- Security requirements
- Maintenance requirements

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 preventers in accordance with building codes. In cold climates, locate backflow preventers in the mechanical room. Where freezing is not a problem, locate backflow preventers within screened mechanical enclosures. 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 basic functional activities must be addressed in permanent party enlisted dormitories. These three basic functional categories are interactive, and designers must fully understand the relationships between these categories. The designer must take an overall approach to creating a fully integrated facility. The three basic functional categories are:

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
- Room games
- Outdoor sports
- Outdoor relaxation areas

Service Activities

- Mail delivery
- Vending
- Bulk storage
- Administrative support

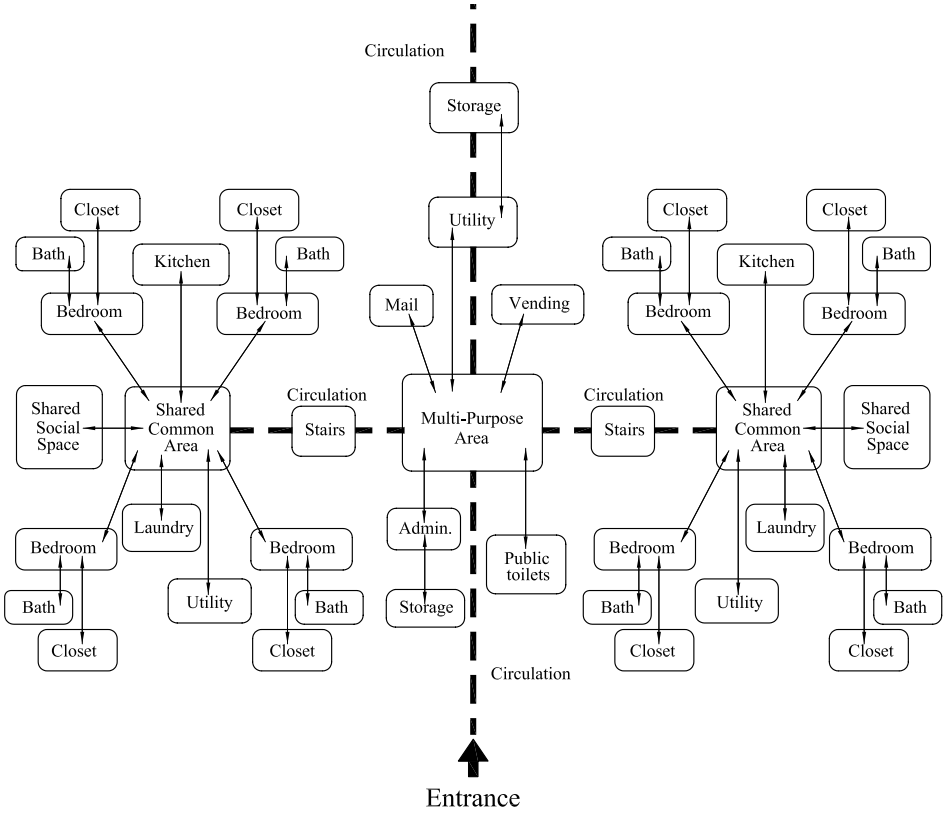
Successful dormitory designs require well-designed outdoor spaces integrated with the dormitory building. There are two basic categories for outdoor spaces:

Sports Areas

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

Other Recreational Areas

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



Dormitory Functional Relationship Diagram figure 9

2. Building Configuration

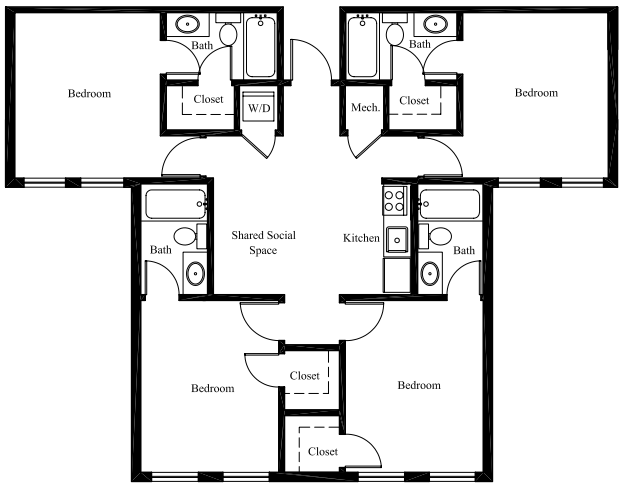
The three basic functions are linked together by circulation spaces, and the functions are typically arranged in one of three configurations:

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

Additionally, there are three types of circulation to dormitory rooms that apply to Permanent Party Enlisted Dormitories:

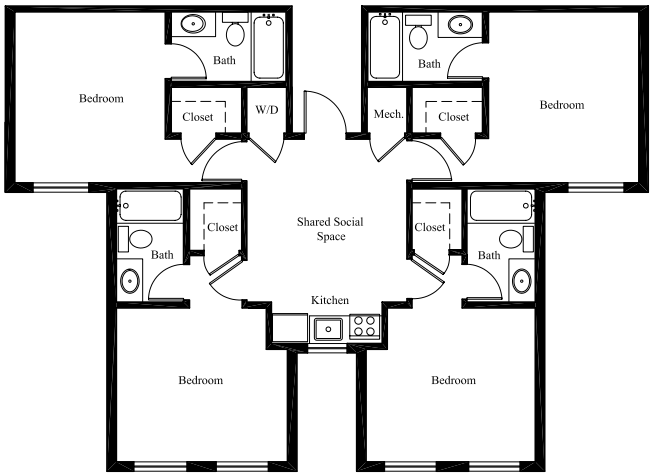
- **Corridor Access:** access from interior double-loaded corridors
- **Balcony Access:** access from exterior balconies or sidewalks
- **Breezeway Access:** access from breezeways in a garden apartment arrangement

Figures 10a – 10j show typical module plans and building configurations for each type of facility. These are the basic building blocks from which Permanent Party Enlisted Dormitory programs are developed. These designs are not mandatory standards, but are provided to serve as examples and to illustrate critical design issues. The module layout may vary provided that the required Net Living Area, minimum dimensional clearances, and maximum gross building area conform to established criteria.



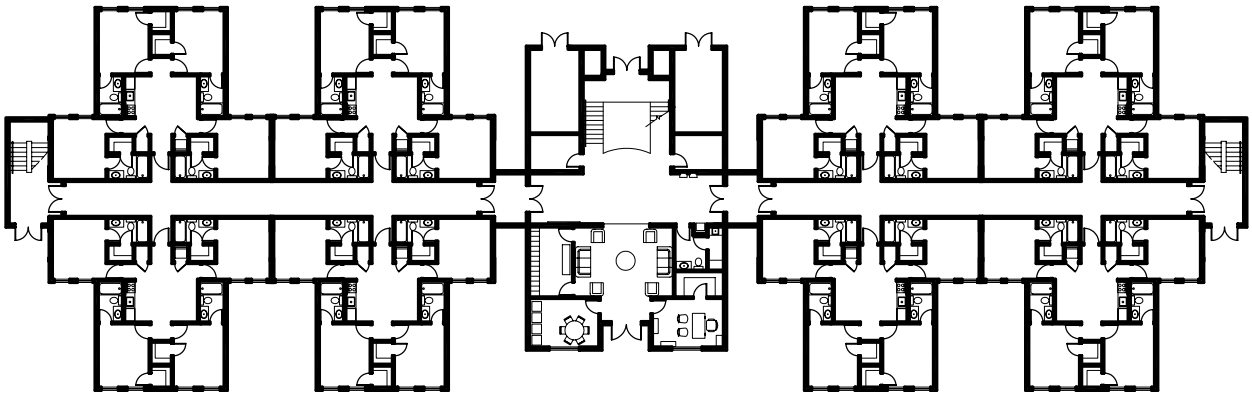
Net Living Area 12.0 m^2

Corridor Access Floor Plan Figure 10a

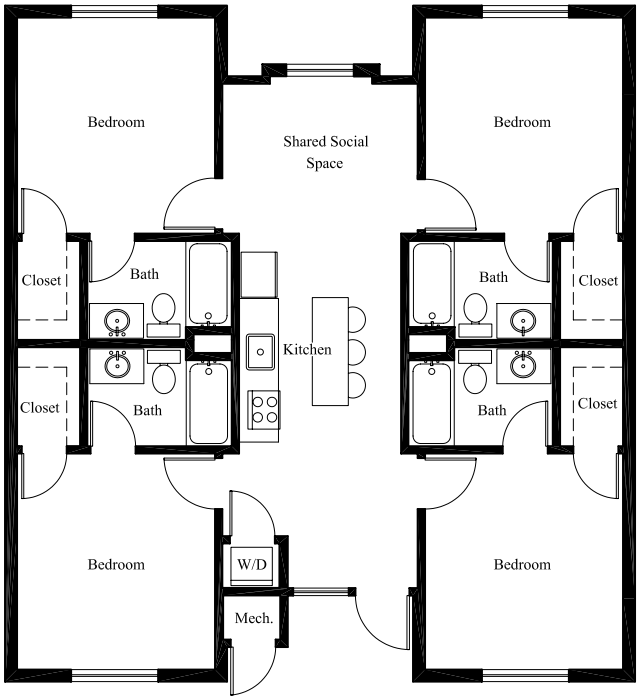


Net Living Area 12.0 m^2

Corridor Access Floor Plan Option Figure 10b

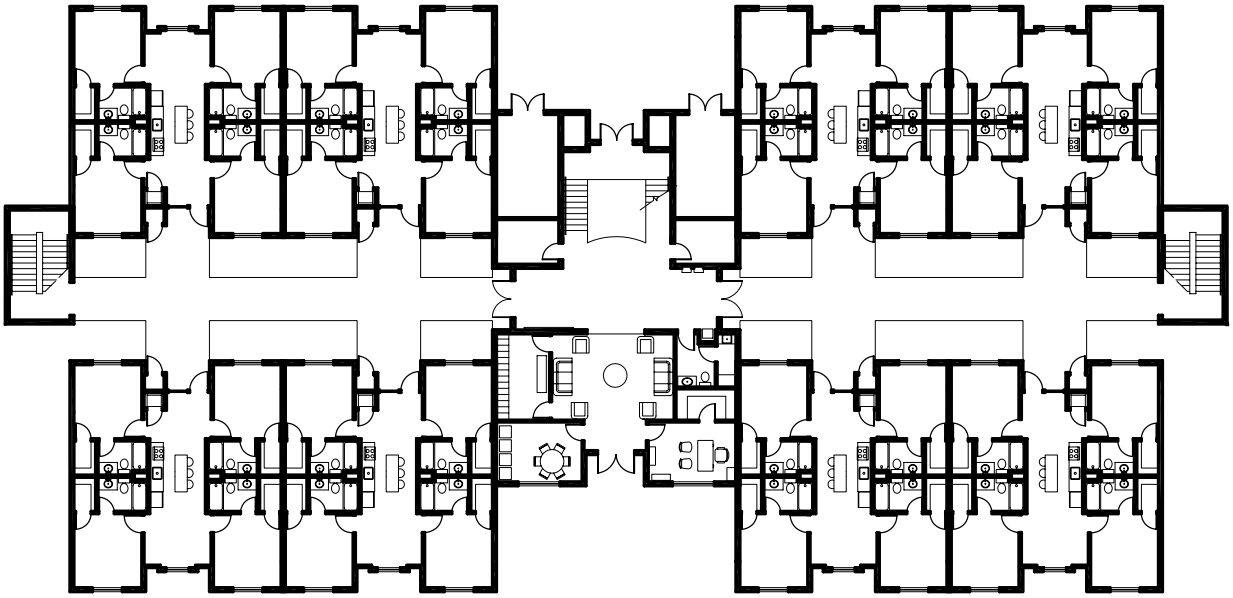


Corridor Access Building Plan Figure 10c

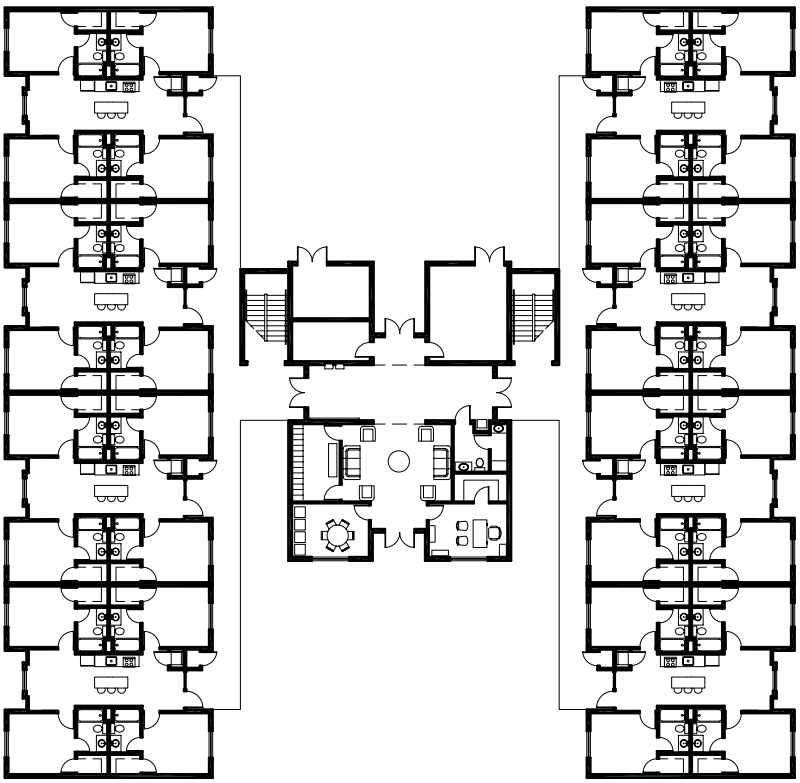


Net Living Area 12.2 m^2

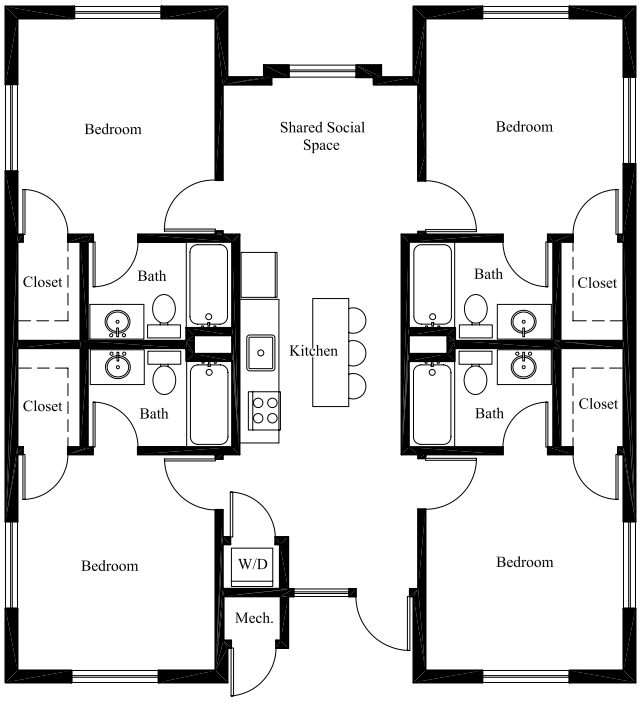
Balcony Access Floor Plan Figure 10d



Balcony Access Building Plan Figure 10e

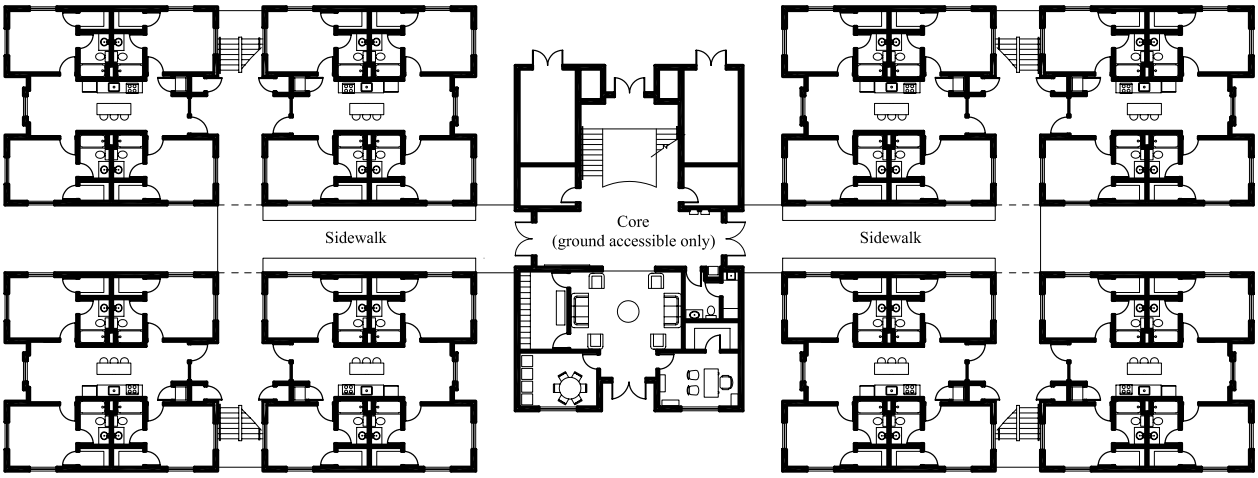


Balcony Access Building Plan Option Figure 10f



Net Living Area 12.2 m^2

Breezeway Access Floor Figure 10g



Breezeway Access Building Plan Figure 10h

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.

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. Interior/Exterior Relationships

A holistic approach to dormitories is vital to insure 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.

Force Protection construction standards referencing building set back distances from parking and roadways must be incorporated during this coordination process.

4. Privacy/Social Interaction

Privacy for residents is an important design factor, but must be tempered with the concept of "buddy care." Dormitories serve as homes for the residents, and should be designed in as much as practical to avoid an "institutional" appearance or feeling. Corridor Access dormitories offer a moderate degree of privacy since the living/bedroom areas are typically somewhat buffered from the central hallway by kitchens, baths, and closets. Balcony Access dormitories with direct exterior access for each resident have the perception of offering a greater sense of privacy, but must consider the circulation on the balcony that is directed past the resident's only window. Breezeway Access garden apartment style dormitories offer a greater degree of privacy by limiting the number of modules accessed by a single stair, reducing noise and pedestrian traffic. Shared social space

within the 4-person module is a functional requirement for Air Force Permanent Party Enlisted Dormitories, but designers should strive to achieve a balance between the social space and the privacy of each bedroom.

5. Noise Considerations

Give attention to the 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). Design non-public support areas (utility spaces, trash collection and mail service access) to avoid conflict with public residential functions.

6. Architecture

Andrews Air Force Base

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. Dormitories 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.

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, etc., are elements that 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 dormitories 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. Use tight-fitting, insulated, commercial-grade windows for dormitories. Light-duty residential grade windows are not acceptable. Windows and glazing shall meet force protection construction standards minimum requirements. Low emissivity (Low E) double pane glazing is recommended for increased thermal performance, ultraviolet retardation, and maximum light transmission. Install heavy-duty insect screens on all operable windows. Size windows at between 10 and 15 % of the floor area they serve. Windows serving residential units must be operable and sized for emergency egress in OCONUS locations, quarters may be provided to civilians (DoDDS teachers, AAFES, Red Cross, etc.) thus special provisions may be required for persons with disabilities, including access to windows as a secondary means of egress. 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. For privacy and force protection, dormitory entrance doors should be locked with access by residents only, keyed to match module locks also. Doors must be fully weather-stripped, include a heavy-duty metal threshold and minimum ½" grade change to prevent drafts, dirt, water, and insect entry, and must be thermally insulated. Entry doors for dormitory modules should be sound-insulated and must have a peephole for viewing visitors. Consider keyless (credit card type) locksets for all module entry doors. 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. 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. In OCONUS locations, quarters may be provided to civilians (DoDDS teachers, AAFES, Red Cross, etc.) thus special povisions may be required for persons with disabilities, including door specifications and constructions.

Moisture Control

Special construction considerations, not limited to HVAC systems, are required for dormitories in humid areas. Refer to *Engineering Technical Letter (ETL) 93-2, Dormitory Criteria for Humid Areas* for specific guidance.

Buckley Air Force Base

Exterior Finish Materials and Systems

Select reliable, conventional building systems for dormitories, 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. Designers must consider durability, functionality, economy, low maintenance requirements, and architectural compatibility when selecting exterior finish materials. Many dormitories are constructed of load-bearing CMU exterior walls with a brick veneer finish. Other dormitories are built with single-wythe split faced or ribbed CMU. In both cases, the CMU wall is furred with gypsum board on the interior of the modules. Some dormitories have successfully utilized exterior insulation finish systems (EIFS) as the primary exterior wall finish. While this is a good system in terms of 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 dormitories should 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.

7. Functional Area Requirements

This section presents criteria applicable to the design of each functional area of an enlisted dormitory. These include:

- 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 (in module)
    - Shared social space (one per module, shared by 4 persons)
- Utility Space (mechanical, electrical, data, communications and plumbing)
- Bulk Storage (can be incorporated into module or located separately)
- Mail Service (can be located outside if appropriate and as coordinated with force protection requirements—required where USPS delivers to base housing)
- 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)

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.

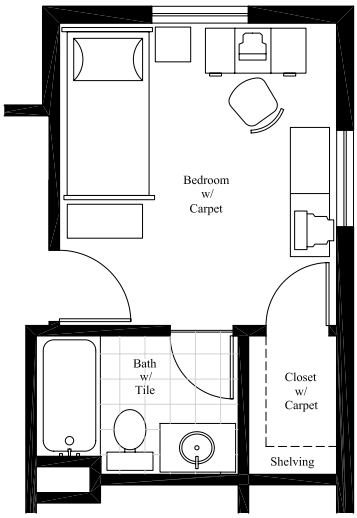
Living/Bedroom Area

This area is the net living space for one E1 through E4, and is shown graphically by the shaded areas in Figures 6a and 6b. Consider the following:

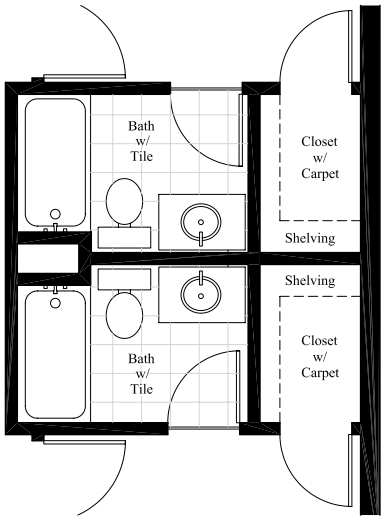
Typical Bedroom

- 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, it must be furred with 13mm ($^1/_2$") or thicker gypsum wallboard, or plaster/lath veneer.
- Provide wide-angle peepholes and deadbolts on all module entrance doors.

- Provide automatic door closers on entrance doors for Corridor Access dormitories. Balcony Access and Breezeway Access entrance doors do not require automatic closers.
- Provide an entry door lockset with an integral deadbolt and master entry capability (either by key or card, at local option). Corridor Access dormitory entrance doors require sound insulation. Exterior doors require thermal insulation.
- The minimum dimension of the living/bedroom area should not be less than 3048 mm (10'-0"). Minimize doorways or openings in perimeter walls of the living/bedroom area in order to enhance flexibility in furniture arrangement. See Figure 11 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 Building Systems Design, Acoustics for additional acoustical design requirements.



Typical Living/Bedroom Area Figure 11



Typical Bathroom Plan Figure 12

Vanity Area and Bathroom

Each resident shall have a private vanity, located within the bathroom (preferable), in the living/bedroom area, or in its own dedicated alcove. See Figure 12 for typical bathroom layouts. 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.
- The vanity must be at least 762 mm (30") wide and must have an integral bowl, countertop, and integral backsplash. The vanity counter top should be 787 mm to 914 mm (31" to 36") above the floor.

- Where space permits, vanity base cabinets should contain 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^3 (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 elect 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.
- If practical, provide a wall mounted storage cabinet with doors and at least one adjustable shelf above the wainscot over the water closet. 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 living/bedroom area must have a minimum of 2.3 m^2 (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 by 1050 mm wide by 2250 mm tall (24" x 42" x 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.

Shared Common Area

Kitchen

The kitchen provides residents with a quality of life amenity similar to enlisted personnel occupying military family housing or living off base. Four E-1 through E-4s will share the kitchen. All built-in equipment must be purchased with MILCON funds. Freestanding equipment is purchased from other appropriations. As a general rule of thumb, appliances that are simply 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 as determined by local requirements. See Figure 13 a – i for a typical shared kitchen.

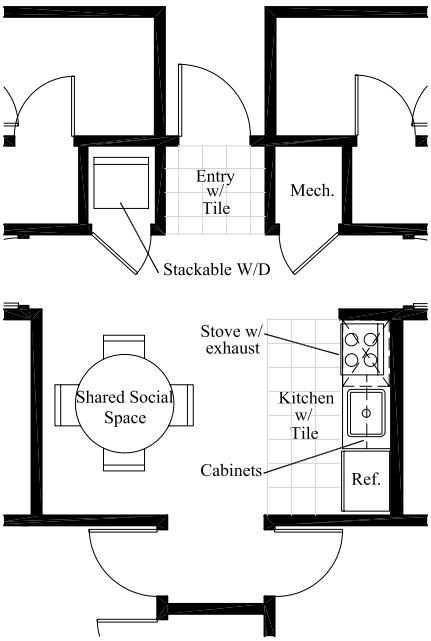
The following requirements must be met in the design of the kitchen:

- Provide a frost-free energy saver refrigerator with a separate freezer compartment and ice maker. Recommended size is 25 cubic foot. Individual refrigerators within living/bedroom areas may be purchased by residents as determined by each installation.
- Provide a double-bowl stainless steel sink. 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 not recommended but are optional if funding allows.

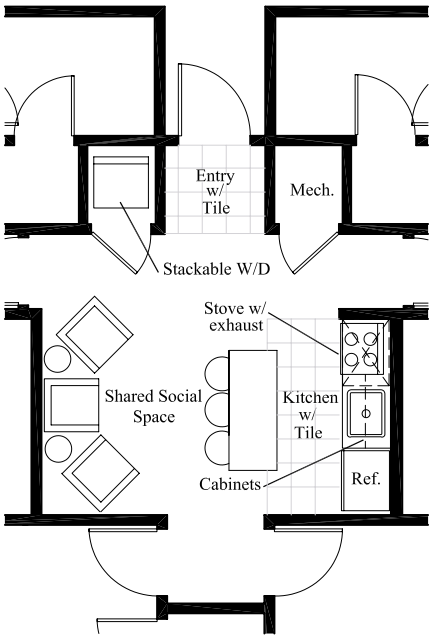
- Provide at least two duplex outlets above the backsplash. These outlets must be GFI if they occur within the specified distance from the sink as defined in the latest addition of the National Electric Code. These outlets are in addition to those required for the range, refrigerator, range hood, oven, 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-burners 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 Enlisted Dormitories. 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. Also 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

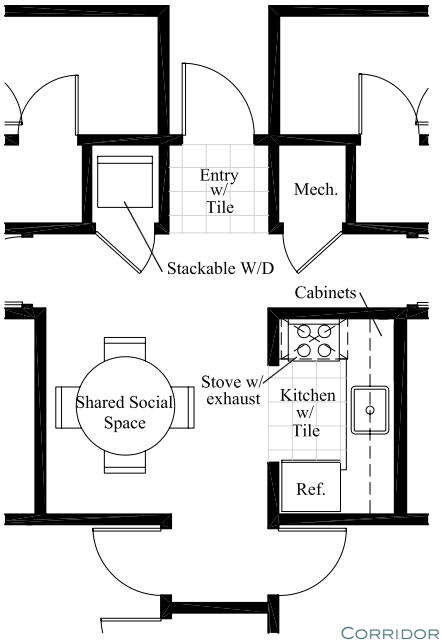
The shared social space provides residents with a common living area to relax together and watch television, eat meals, study and/or play games. This area is located adjacent to the kitchen and laundry areas, enhancing quality of life for the residents, while provide an apartment type setting encouraging interaction and relaxation. See Figures 13a – 13i for optional kitchen/shared social space configurations.



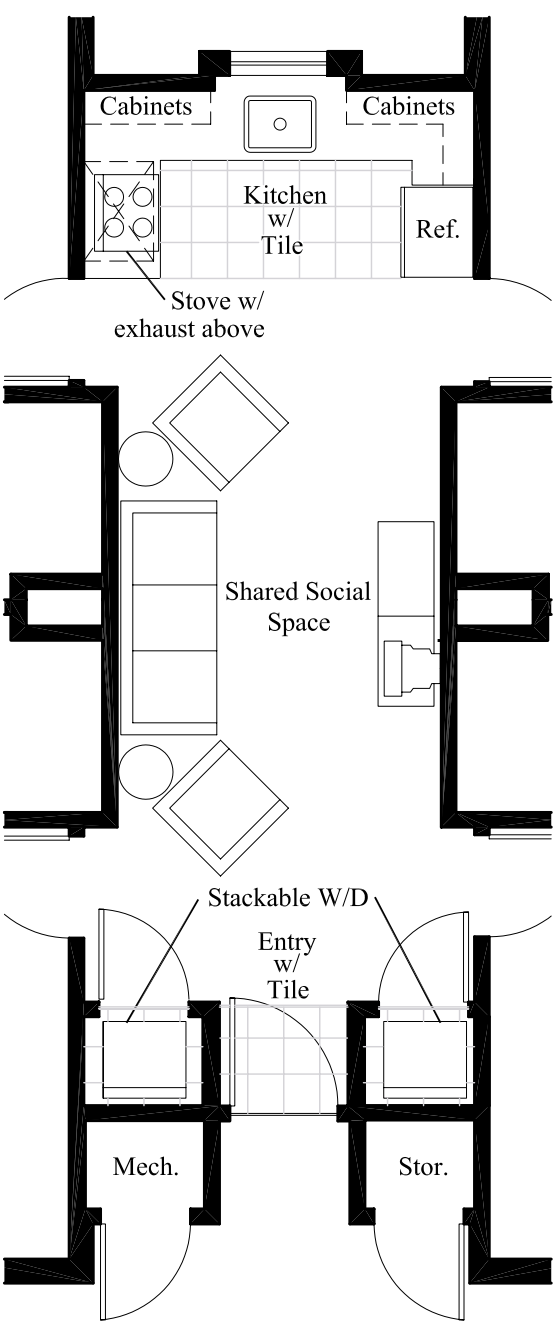
Corridor Access Shared Common Area
Plan option Figure 13a



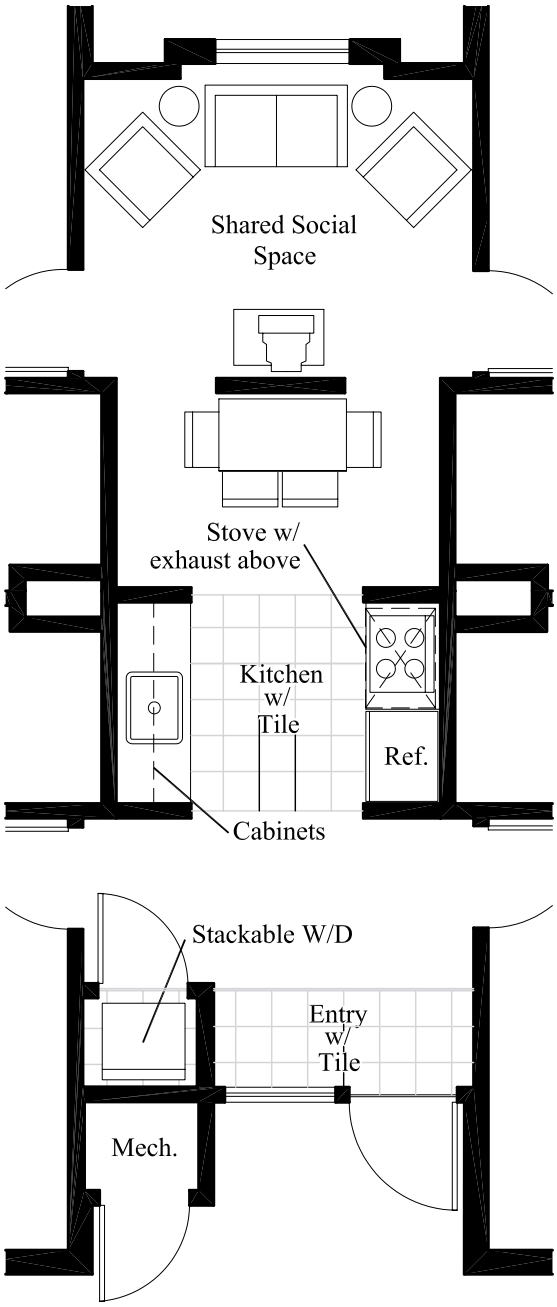
Corridor Access Shared Common Area
Plan option Figure 13b



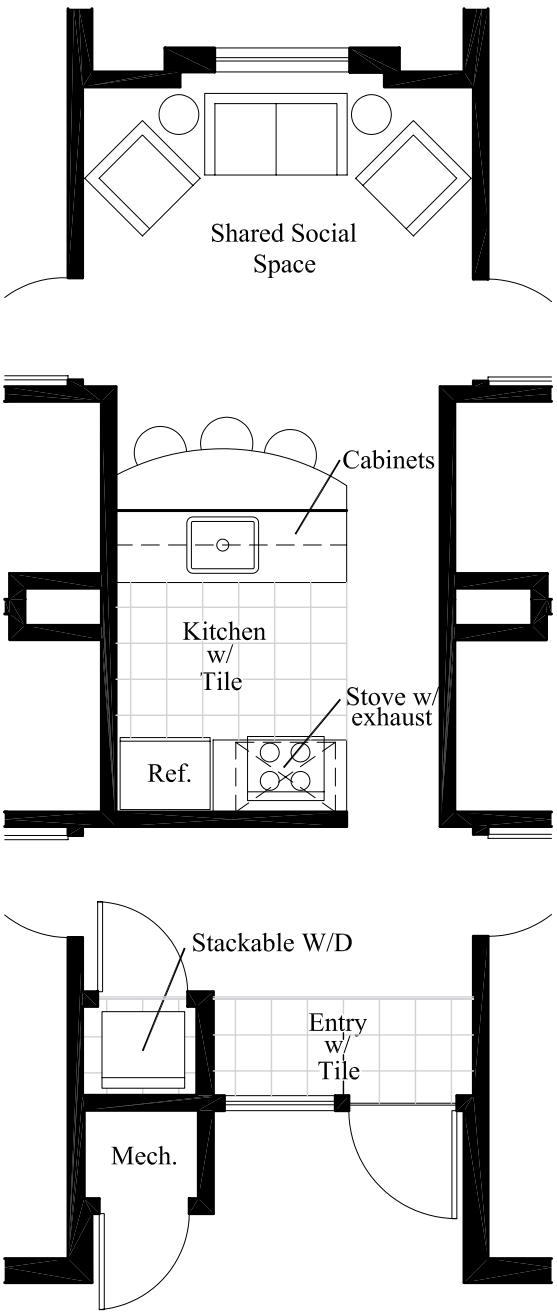
Corridor Access Shared Common Area
Plan option Figure 13c



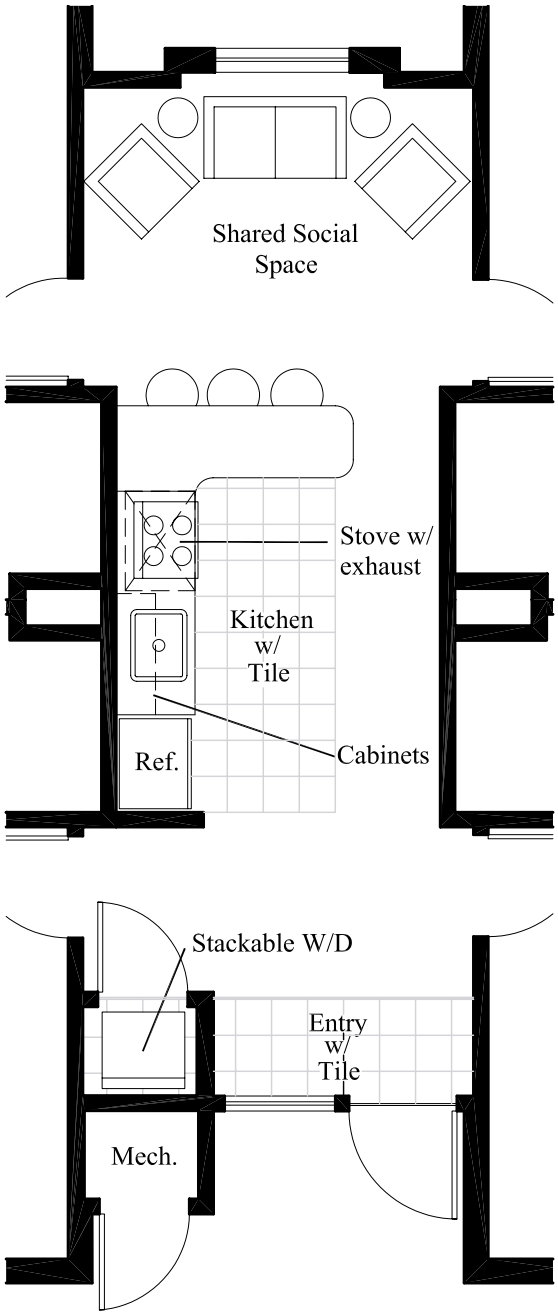
Breezeway/Balcony Access Shared Common Area Plan Option Figure 13d



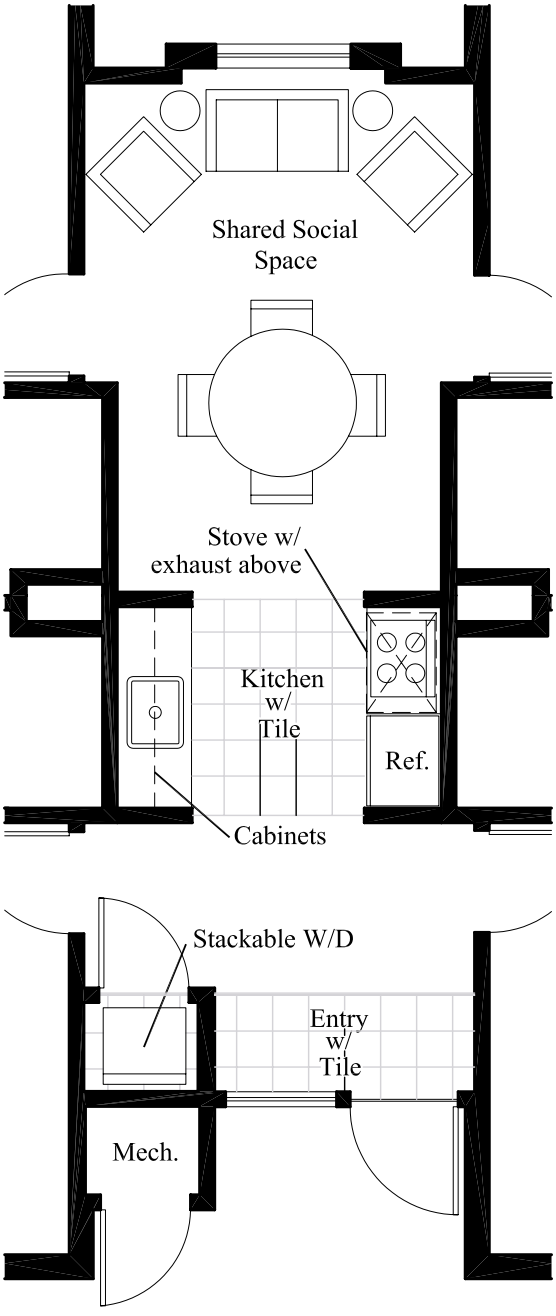
Breezeway/Balcony Access Shared Common Area Plan option Figure 13e



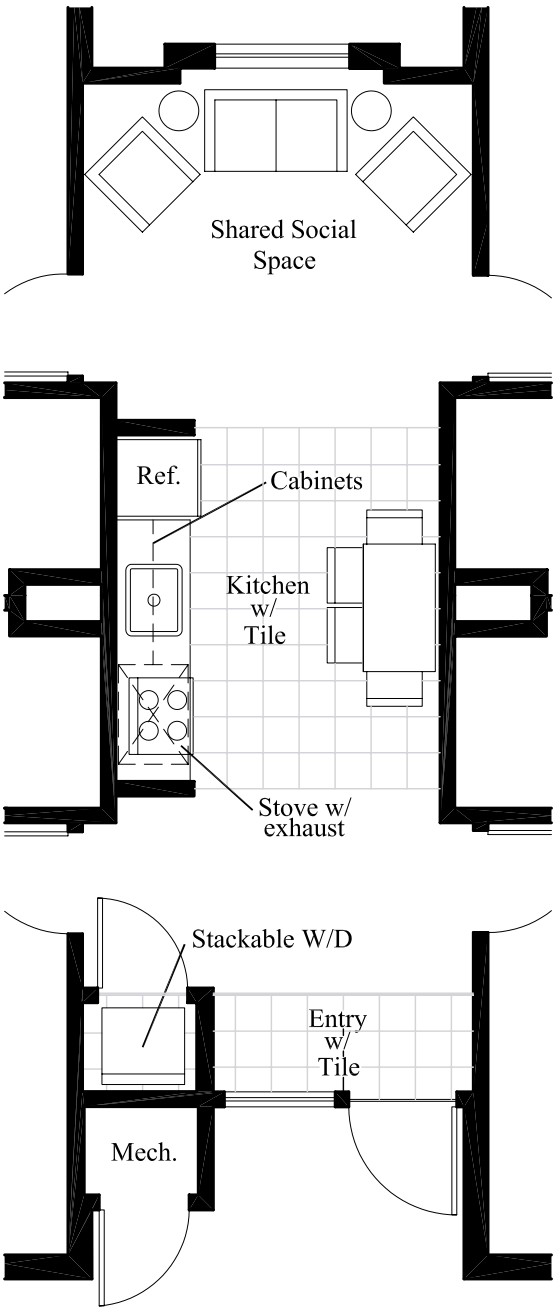
Breezeway/Balcony Access Shared Common Area Plan Option Figure 13f



Breezeway/Balcony Access Shared Common Area Plan Option Figure 13g



Balcony/Breezeway Access Shared Common Area Plan Option Figure 13h



Balcony/Breezeway Access Shared Common Area Plan Option Figure 13i

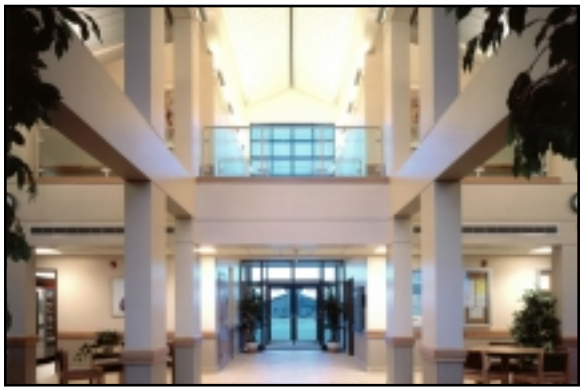
Laundry Areas

Provide 1 washer-dryer set inside the common area of each module, side-by-side or stacked. While in-module laundry is preferred, centralized laundry facilities are optional. Washer/dryer ratios in centralized laundry rooms shall be 1 washer/8 residents and 1 dryer/6 residents.

Designers must carefully address noise isolation, acoustics, humidity, ventilation, and temperature control.

Other laundry area considerations:

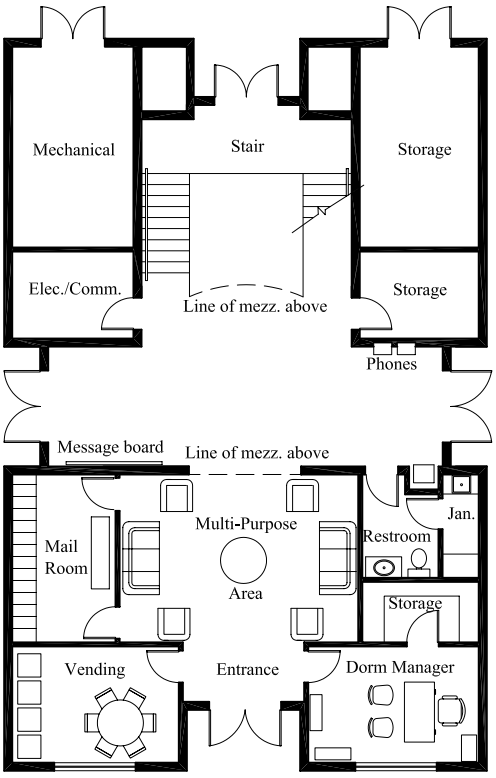
- Conceal all utilities from view, yet provide easy access. Mount utility connections 900 mm (36 inches) above the floor. Design straight-run venting of dryers to avoid lint clogs.
- Provide floor drains for each washer, in addition to the drain in the wall-mounted box.
- Consider providing one recessed,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



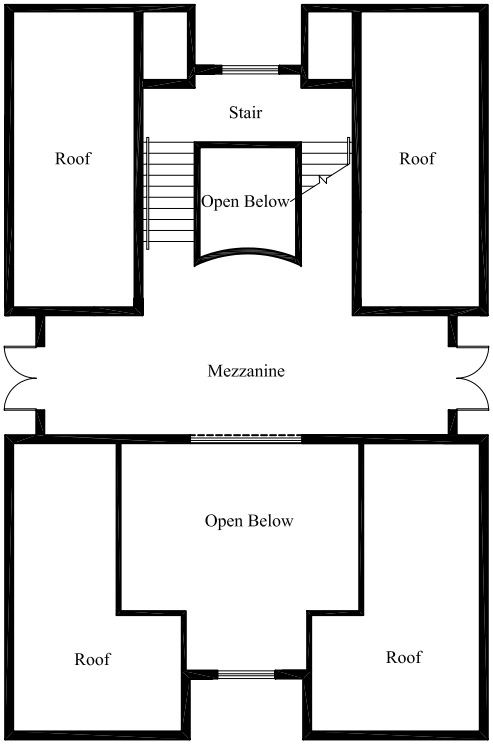
Buckley Air Force Base

Consolidated Support Facilities

See Figure 14 for a typical support facility containing multi-purposes space, including vending area, administration office, game room, television room, and public toilets. It is very important that these centralized spaces be designed as an integral part of the dormitory even though they may be configured as a separate structure. 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 consolidated Support Facility
Ground Floor figure 14



Typical consolidated Support Facility
Second Floor figure 14

Multi-Purpose Space

Multi-purpose space includes study/meeting rooms, game rooms, television rooms, workout rooms, public toilets, administration area, mail, vending and utility areas. Distribute multi-purpose spaces throughout the dormitory, or consolidate them into one larger space on the first floor that allows for several uses. Provide access to persons with disabilities to all public spaces on the first floor dormitory buidings. Consideration must be given to the location of the area to avoid undesirable noise and traffic, while providing the ability to secure the area and/or electronics and equipment as necessary. It is important to locate these spaces to encourage social interaction between the residents. Plan acoustics, lighting, and furnishings to create an environment conducive to the intended activity. Many residents own televisions; therefore, the need for a television room must be evaluated on a case-by-case basis. Provide dimmable lighting and window treatments to control glare in television rooms.

Anticipate the type of activities provided in the design of game rooms. Most game rooms are designed to accommodate pool tables and/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.

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.

Buckley Air Force Base

Buckley Air Force Base

Typical Mail Room

Mail Service

Where mail is delivered to the dormitory, provide one United States Postal Service approved tamper-resistant mailbox per resident. Each mailbox must have minimum dimensions of 150 mm wide by 125 mm tall by 390 mm deep (6" x 5" x 15-½") 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 first 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 force protection requirements, which may preclude location within the dormitory building, or will require the mail room to be located on an exterior building wall.

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.

While mail service must be relatively convenient to the residents, major emphasis must be placed on providing convenient and efficient delivery and pick up. Avoid locating boxes where residents retrieving their mail will become an annoyance to other residents. In large dormitory complexes, it may be desirable to locate 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. Parcel lockers are not required. Residents will pick up large packages at the Base Post Office.

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 first floor of the dormitory building or in the consolidated support facility as required. This space 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 dormitories, vending areas may be distributed throughout the facility.

Administration Area

For most Permanent Party Enlisted Dormitories, the administration area consists of a single office for the facility manager. Locate this office on the first 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 first 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, garden tools, gasoline, and paint. 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 first floor and adjacent to the administration area. The recommended size for this room is about 23.22 m^2 (250 SF).

Bulk Storage

Provide bulk storage per dormitory based on local conditions. 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 per 4 person module, quantity to vary based on local requirements. Each storage cubicle or area should be a minimum of 2 m^3 (70.6 CF), and should be lockable, keyed to match module entrance lockset.

Public Toilets

Where public spaces occur on the first 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

- Avoid an institutional appearance for interior corridors in Corridor Access dormitories. 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.
- Introduce natural light into interior circulation spaces where possible.
- Provide convenience outlets each 7620 mm (25 feet) on center in interior corridors.
- Exposed ductwork, conduit, etc., is not allowed. Provide utility access doors as required.
- 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 dormitories four stories or more in height.

8. Interior Design

See Table 4 later in this section for the Suggested Surface Finish Schedule. For further guidance on interior design standards and criteria, see the *Air Force Interior Design Guidelines*.

Comprehensive Interior Design

The goal of the designer is to provide a total quality residential facility. This residence will be occupied by either gender and by a diverse age group.

The interior design and architectural design of the facility must be integral and related. All dormitory design projects shall include Comprehensive Interior Design (CID) services. CID services may be provided as part of the dormitory A – E's design package, by a professional commercial interior design service, or by in-house Air Force interior designers. CIDs should reference the base quarters improvement plan (QIP) for base-specific information on furniture styles, color schemes, and project-specific guidance.

Quality-of-Life

The interior design has a direct impact on the quality of life for the occupants. Interview typical dormitory residents for invaluable feedback. Consider including the residents in design reviews.

Allow flexibility for the facility occupants to personalize their units. This includes freedom in furniture arrangement and display of artwork and hobbies. Give increased attention to the high-tech personal environment that characterizes today's life-styles (computers, audio-visual equipment, cable television, etc).

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.

Recommended Finish Schedule

Space	Floor	Wall	Ceiling
LIVING UNITS			
Living/Bedroom	CPT	PT, WC	PT
Bathroom/Vanity	CT, PT	CT, PT	PT
Entrance	PT, QT	PT, WC	PT
Common Social Space	CPT, PT	PT, WC	PT
Kitchen	PT, QT	PT, WC	PT
Laundry Rooms	PT, QT, CT	PT	PT
COMMON AREAS			
Entrance	PT, QT	PT, WC	PT
Corridors, Stairs	PT, QT	PT, WC	PT
Multi-Purpose Area (game rooms, tv rooms, admin, mail)	CPT, PT	PT, WC	ACT, PT
Vending	PT, QT	PT	ACT, PT
Storage Rooms	SC, QT	PT	PT
Toilets	CT, PT	CT, PT, WC	PT

LEGEND

Floors

CPT	Carpet or Carpet Tile
CT	Ceramic Tile
QT	Quarry Tile
SC	Sealed Concrete
PT	Porcelain Paver Tile

Walls

CT	Ceramic Tile
PT	Painted Drywall or Plaster
WC	Wall Covering

Ceiling

ACT	Suspended Acoustical Tile
PT	Painted

Carpet

For the latest guidance on carpet, reference *ETL 00-6, 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. Quarry tile, ceramic tile and porcelain paver tiles are good alternatives based on location and use. 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. The option to use commercial grade sheet vinyl is allowable in Pipeline Student Housing only, primarily for main corridors and laundry areas.

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 services 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, such as the Multi-Purpose Area, 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^2 (8 inch square) or 304.8 mm^2 (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 in walls throughout for all wall mounted accessories, including doorstops, bathroom accessories and accessibility requirements.

Lighting

Dormitories 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 lamps as the primary source of illumination, and as used in recessed, table and floor lamps, and wall sconces. Limit fluorescent lighting to utility areas and use color-corrected lamps to provide a warm residential appearance. The designer must be cognizant of lighting for both day and night situations and should 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 blocking in walls throughout for all wall mounted accessories including wall mounted lighting fixtures.

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 for all dormitories. Traverse rods and blinds must be of commercial quality. 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. Beds shall be a minimum 2030 mm (80 inches) long and 990 mm (39 inches) wide, 1372mm (54 inches) wide where space permits. 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 *AFI 32-6004, Furnishings Management, Furnishings Standards*.

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 *AF Pamphlet 32-1097, Sign Standards Pamphlet*.

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 have been conducted in the preparation of this design guide to consider alternative construction types, materials and methods, and cost impacts.

Based on construction type cost comparisons between Type II and Type V, force protection requirements, size and height limitations, and varying climatic issues, analysis shows that Type V construction for Air Force dormitory facilities is not a cost effective option without compromising safety, quality, and durability provided with current Type II construction standards. Thus, dormitory facilities will continue to be constructed as Type II.

Alternative Type II materials and methods are considerations, though, based on new technologies, 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, reduce construction time and cost, and yet, 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

Select an economical structural system based on:

- Antiterrorism/Force Protection requirements
- 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 requirements applicable to the structural design of dormitories include those found in the *Interim Department of Defense Antiterrorism/Force Protection Construction Standards*. Standard 4, Superstructure of this document calls for design of the structural support system to minimize progressive collapse, attaching all interior ceiling, electrical, and mechanical components to the building structure, and using annealed laminated glass on windows and doors.

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 walls should be considered as past designs validate their economic advantages, durability and climate resistance. 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 *Uniform Building Code (UBC)* and the *International Building Code (IBC)* for design load criteria for dormitiories.

2. Acoustics

Careful attention to acoustic design is required for dormitories 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.

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 fluorescent lamp ballasts with a sound level rating 'A'.

3. Heating, Ventilation and Air Conditioning (HVAC)

Antiterrorism/Force Protection

Mechanical and utility systems should comply with the *Antiterrorism/Force Protection considerations contained in Standard 6, Mechanical and Utility Systems:* 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.

System Design

The design of the HVAC system must comply with the criteria set forth in *MIL-HDBK-1190, Facility Planning and Design Guide (Sept. 1987), Chapter 10, Air Conditioning, Dehumidification, Evaporative Cooling, Heating, Mechanical Ventilation, and Refrigeration*. The following is provided in addition to, and in cases of conflict takes precedence over, the above guidance.

In humid areas special design and construction considerations are required. These considerations are not limited to HVAC systems. Refer to *Engineering Technical Letter (ETL) 93-2, Dormitory Criteria for Humid Areas*, for specific guidance. Humid areas are defined as having over 3,000 hours of 19°C (67°F) or higher wet bulb temperatures in combination with an outside design condition of 50% relative humidity or higher, or over 1,500 hours of 23°C (73°F) or higher wet bulb temperature in combination with an outside design condition of 50% relative humidity or higher, based on 2.5% dry bulb and 5% wet bulb temperatures.

System Selection

The selection of the HVAC system is to be based upon the lowest total life cycle costs: include initial costs, operating costs, energy costs, system maintenance and repair costs, and component replacement costs, if not expected to achieve the same life cycle of the systems under considerations. The HVAC system must be designed to ensure that building energy consumption does not exceed DoD energy budget figures. Use of a central plant should be considered for dormitory complexes. A central plant with heating and cooling equipment reduces maintenance and capitalizes on the higher efficiency of larger capacity commercial equipment. Ground-mounted and through-the-wall AC systems may also be considered, as appropriate. Consider the use of renewable energy technologies as part of the selection of the HVAC system or as a supplemental energy source. Reference *ETL 94-4 Energy Usage Criteria for Facilities in the Military Construction Program* for further guidance. 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 ETL 88-4, 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.

Ventilation Air

Provide a central ventilation system to supply conditioned outside air to each room or each module's HVAC unit. 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. If provided to each module's HVAC unit, the module's HVAC unit's fan must run continuously.

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.

Module HVAC Units

When room modules are equipped with individual HVAC units, they 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. Individual HVAC units should be carefully designed or avoided in humid areas to avoid mold and mildew. Special construction considerations, not limited to HVAC systems, are required for dormitories in humid areas. Refer to (ETL) *93-2, Dormitory Criteria for Humid Areas* for specific guidance.

- 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 must be provided for each of the 4 living/bedrooms, plus a separate control for the common shared social space.

- Return Air: Provide ducted return or transfer, do not use ceiling space as return air plenums. Evaluate need for transfer/return air sound attenuation between the sleeping room and common area.
- Constant exhaust in bathroom; central fan tied to fire protection system.
- Consider alternative systems that balance cost, maintainability and control.

Piping System

Where air conditioning is authorized 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.

Perimeter Fin Tube Heating

In areas where perimeter fin tube heating is utilized, provide temperature control for each zone.

Kitchen and Laundry Areas

Provide kitchen area with a minimum of 2.54 L/s per m^2 (0.5 cfm/SF) of supply or transfer air continuously. For all new or renovated kitchens , provide a range hood above cooktops 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 additionally 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. Both kitchen exhaust and dryer venting must be exhausted away from windows and exterior balcony areas.

4. Plumbing

Reference the *Uniform Plumbing Code* (UPC) for plumbing requirements. 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 drinking fountains in multipurpose spaces as required.

Provide hose bibbs on all exterior walls of each building at 30.48 m (100 foot) 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.

Plan plumbing systems for dormitories 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.

5. Energy Performance

Sustainable energy efficient performance in dormitories cannot be achieved solely by individual building systems, but must be supplemented by other design factors as well. Reference *ETL 94-4 Energy Usage Criteria for Facilities in the Military Construction Program* for further guidance

These design factors include:

- Mechanical system and management controls selection
- Thermal insulation characteristics
- Building orientation
- Solar shading
- 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

Provide the following as required:

- 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

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.

Force protection requirements include the installation of a Personnel Alerting system. Coordinate with base security forces personnel for guidance and additional requirements.

Provide metering for electric power per building and as per Air Force requirements.

Provide one quadraplex outlet on each wall of the living/bedroom area, 5 per room, minimum, mounting height per code. Provide ground fault interrupters (GFI) at all wet locations including exterior locations as required.

Prewire and provide two cable television outlets on opposite walls in each living/bedroom area, as well as 2 each two-line telephone jacks located as far apart as practical. Provide a wall mounted public pay telephone per each 12 modules, to be located adjacent to the multi-purpose room in the consolidated support facility. Provide 1 LAN phone line adjacent.

Provide local area network (LAN) and/or FAX/modem connections in each living/bedroom area. Rough-in with empty J-box; provide conduit (minimum 19 mm diameter) with pull-wire for LAN adjacent to each telephone outlet. 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 overall ambient and task lighting in each dormitory room. Incandescent fixtures with dimmer switches are recommended for the living/bedroom area. 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 in dormitory rooms 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.

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 a 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.

Electric or gas is acceptable for appliances based on local requirements. Allow 120v, 208v and gas dryer connections.

Provide exterior lighting of parking areas, building entrances, and walkways. See Chapter 2 for more information concerning exterior lighting. 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 dormitories.

7. Fire Protection/Life Safety

In line with *Antiterrorism/Force Protection Standard 6, Mechanical and Utility Systems*, fire protection systems for dormitories must include seismic detailing.

Fire protection systems must conform to *MIL-HDBK-1008, Fire Protection for Facilities Engineering, Design and Construction*, and to *National Fire Protection Association (NFPA)* fire codes. Based on the *Uniform Building Code*, a dormitory module is classified as an efficiency apartment with an R-1 occupancy. Based on the *Life Safety Code*, this occupancy is classified as an apartment building. Facilities will be of Type II, noncombustible construction as defined by the *Uniform Building Code (UBC)*.

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 *Military Handbook 1008*. 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.

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 first 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.

Provisions for life safety must conform to the requirements found in the latest edition of *NFPA 101, Life Safety Code*.

Travel distance to exits is of particular concern in designing dormitories. 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 sprinklered facility.

Provide carbon monoxide detection as required throughout.