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Civil Engineering

**FACILITIES EXCELLENCE PROGRAM
AND STANDARDS HANDBOOK**



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This handbook implements provisions of AFD 32-10, *Installations and Facilities*. This handbook provides guidance and standards to be applied in achieving facilities excellence within Air Force Space Command units. Standards have been proven by experience in industry and in other military applications to be effective in maintaining the most cost efficient life cycle for the physical plant and infrastructure supporting our missions. It applies to Headquarters Air Force Space Command (AFSPC) and its subordinate units. It does not apply to the Air Force Reserve or Air National Guard.

SUMMARY OF REVISIONS

This publication incorporates numerous changes that supersede the 1996 version. These changes include updates to references, added information on sustainable/green design, xeriscape design, updates to the Interior Design Material Selection Charts, and new chapters concerning Mechanical, Civil and Electrical engineering standards. Also a Glossary of References and Supporting Information is included. A bar (|) indicates a revision from the previous edition.

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CHAPTER 1

THE FACILITIES EXCELLENCE PROGRAM

1.1. Program Philosophy:

1.1.1. Purpose:

1.1.1.1. The Facilities Excellence Program has two main functions. First, it provides efficient, fully functional facilities that support our mission and represent a wise investment of public funds. This aspect of facilities excellence involves quality design, construction, maintenance, and repair of our facilities and infrastructure to assure mission requirements are fully met at an appropriately low life-cycle cost. Second, facilities excellence assures the optimum use of existing facilities to minimize new Military Construction requirements. In this context, facilities excellence is not “gold plating,” but the provision of facilities that fully meet mission needs, and the needs of the people performing that mission, both functionally and aesthetically. The Facilities Excellence Program is more than a list of specific projects published at the end of the Facilities Excellence Plan (FEP). It is a mindset and a philosophy that should be an integral part of every project.

1.1.1.2. Facilities excellence extends beyond just the physical facilities, it must incorporate sustainable strategies and technologies. Sustainability and Facilities Excellence go hand in hand. It is also an attitude and a state of mind that motivates people to take pride in, and care for their working and living environment. This document has incorporated sustainability strategies and technologies. They include using sustainable materials and concepts. The appearance of the workplace has a notable positive impact on the pride and productivity of a unit. Facilities excellence promotes an attitude of attention to detail, and can contribute to pride in the workplace, pride in the individual, and pride in the unit performance. This translates to improvements in mission performance and productivity. Another aspect of facilities excellence is supported by the self-help program, wherein people can provide for their own facility needs much sooner, and create the element of pride of accomplishment that fosters higher unit performance. Facilities are often cared for more closely when self-help improvements are accomplished. Facilities excellence is a journey, not a destination.

1.1.2. Facilities Excellence Guide. Command policy, general guidelines, specific guidelines, and pictorial examples of facilities excellence within AFSPC are included in the *AFSPC Facilities Excellence Guide* published by HQ AFSPC/CE.

1.2. Facilities Excellence Plan (FEP):

1.2.1. Purpose:

1.2.1.1. Achieving facilities excellence requires careful planning and articulation of standards. While this handbook defines Command-wide standards, there are many standards that are and must be unique to an installation, whether the installation is a large installation, small installation or a small geographically separated unit. To assure these installation-specific standards are fully developed and consistently applied, a FEP is required at each installation, regardless of its size. AFSPC installations with or without a Comprehensive Plan or General Plan should develop the FEP as a stand-alone document. Installations with a Comprehensive Planning Framework in place may include the FEP as a chapter within this document. When an AFSPC organization is a tenant

on a non-AFSPC installation, the FEP should include standards only for those issues or areas for which the AFSPC organization has responsibility. Coordinate the FEP with the host-tenant. The FEP must recognize the cultural, environmental, climatic and existing facility conditions particular to an installation and define the appropriate styles, finishes, materials and furnishings to be used to achieve the best facility life-cycle costs and still retain the appropriate environment for people to achieve their highest productivity and efficiency.

1.2.2. Elements:

1.2.2.1. The Facilities Excellence Plan Should Include The Following Elements:

1.2.2.1.1. A mission statement for the unit. For large installations, this should include the host unit, such as the wing, and significant major subordinate units such as groups and tenants. The statement should be a concise one or two paragraph statement clearly defining the mission performed by the unit, and characterizing the types of facilities required to support that mission.

1.2.2.1.2. A brief description of the installation. This section of the plan should provide essential statistics of the installation, such as the size of population it supports, the number of acres, number of buildings, miles of roads, etc. It should also include a clear description of the regional, cultural, and climatic conditions and existing architectural styles and materials to be found on the installation. This section should provide a basis for the selection of architectural styles and materials that have been selected as the installation standards. Include example photos illustrating desirable features in this section.

1.2.2.1.3. Definition of standards to be implemented at the installation. These standards should, as a minimum, define the acceptable quality, style and materials to be used for the following:

1.2.2.1.3.1. Exterior building character. Define building character zones if needed due to the size or location of the existing architectural or building styles or types. Identify and justify the architectural theme or themes used on the installation. Strive to create a thread of continuity without causing monotony when defining architectural schemes.

1.2.2.1.3.1.1. Roof system. Define acceptable roofing systems, styles, materials, colors and finishes. Always consider energy efficient roof systems first. (Example: Energy StarTM rated roof systems)

1.2.2.1.3.1.2. Fenestration. (Defined as the arrangement, proportioning, and design of windows and doors in a building facade) Identify the style of fenestration that is acceptable. Include specific information related to fenestration such as laminated, double or triple glazing, tinting, window frame material, acceptable window styles, and colors of window frames and window glazing.

1.2.2.1.3.1.3. Exterior finishes and materials. Clearly define the exterior finishes and materials that are both acceptable and specifically not acceptable on the installation. Define where the various finishes and materials are appropriate. Show examples of approved and allowed colors, textures, and decorative items as necessary.

1.2.2.1.3.1.4. Paint colors. Define the approved exterior paint colors for all applications. Define where these colors are appropriately used. Provide paint product numbers, using industry standard and actual paint chips to eliminate guesswork. All paint

must meet Environmental Protection Agency's (EPA) recommended recycled-content for reprocessed latex paints. For GSA procurements, EPA recommends that procuring agencies refer to Commercial Item Description (CID) A-A-3185 when purchasing reprocessed paint. (<http://www.epa.gov/cpg/products/paint.htm>)

1.2.2.1.3.2. Building interior finishes. Define approved facility interior finishes. It is recommended that color boards be prepared showing examples of interior finishes and how they coordinate with other elements of the interior environment, such as ceiling materials, floor coverings, trim, furnishings, etc.

1.2.2.1.3.2.1. Floor coverings. Define the style, color, quality level, and appropriate application for the various approved floor coverings to be used on the installation. Include specific information for carpet, vinyl tile, linoleum, stained floors, special floor coverings in shop and maintenance areas, and raised computer room flooring. All installations must meet or exceed the Engineering Technical Letter (ETL) 00-6, *Air Force Carpet Standard*. See EPA recommendations for low traffic wear carpets and carpet cushion with recycled content. (<http://www.epa.gov/cpg/products/carp-cush.htm>)

1.2.2.1.3.2.2. Furnishings. Furnishings include modular, freestanding, and systems furniture styles, configurations, electrical wiring, communications connectivity, minimum standards, and colors if applicable. Style of furniture may also be noted. Include sample furniture configurations of offices that meet the space requirements.

1.2.2.1.3.2.3. Wall coverings. Define the colors, textures, quality levels, and appropriate application for the approved wall coverings used on the installation. All vinyl wall covering will be a minimum of a Type II vinyl, 20-21 ounces except in GOQs where residential grade vinyl or Type I Vinyl is acceptable. Any fabric wall covering must meet the UBC 8-2, *Corner Burn Test*.

1.2.2.1.3.2.4. Interior plants and artwork. Identify approved plants and artwork styles to be used on the installation, and where they are appropriate. Provide guidance on the height and spacing of artwork.

1.2.2.1.3.2.5. Trim materials. Define trim elements as to style, color, material, texture, and size for such elements as baseboard trim, chair rail, and door and window trim. Include elements such as the appropriate door hardware, and light fixture type, finish and style. Clearly articulate where these trim elements are appropriate, by individual building or room if necessary.

1.2.2.1.3.2.6. Interior color palettes. Define approved interior color combinations. Define the type and quality level of materials to be used in various applications.

1.2.2.1.3.2.7. Interior signage. Define the style, type, material, lettering size and font, to be used on all interior signs on the installation, or by facility or zone if applicable. Select a system that allows easy changes to lettering. Signage should also conform to the requirements of UFC 3-120-01, *Air Force Sign Standards*.

1.2.2.1.3.2.8. Window treatments (i.e., drapes, blinds). Define the type of window treatment to be used, along with the approved colors, style and texture. Standardize

treatments within buildings or groups of buildings to the maximum extent possible. All window treatments must meet class-A fire rating.

1.2.2.1.3.3. Landscaping. Define the style and kinds of landscaping to be employed on the installation, by zone or application (i.e., parking lot, building entries). Define the materials to be used, including the type, color and size. Clearly identify the appropriate application for the various types of approved materials. Include an approved plant list suitable for the environment and climatic conditions yet with enough variety to avoid monotony.

1.2.2.1.3.3.1. Xeric materials and outdoor plant list. Define the materials to be used, including the type, color and size. Clearly identify the appropriate application for the various types of approved materials. Include an approved plant list suitable for the environment and climatic conditions yet with enough variety to avoid monotony. See Chapter 4, paragraph 4.4. for xeriscaping details.

1.2.2.1.3.4. Edging, paving and curbing. Define the approved materials, styles and colors to be used in various applications throughout the installation. Identify appropriate applications of approved materials by zone or area if necessary. Show examples of correct usage.

1.2.2.1.3.5. Exterior amenities. Define appropriate exterior amenities for the installation. Provide specifications/definitive drawings where appropriate. Exterior amenities should be consistent with the architectural theme of the installation or area. These amenities would include trash receptacles, newspaper vending machines, and similar items.

1.2.2.1.3.5.1. Exterior furniture and playground equipment. Define the style, colors, texture, and type of exterior furniture and playground equipment to be used throughout the installation or area. Consider playground equipment and surfaces made from recovered materials. (<http://www.epa.gov/cpg/products/plgrndeq.htm>)

1.2.2.1.3.6. Exterior signage. Exterior signs include directional, traffic, informational signs, and all other signs on the installation. Define the specific materials, mounting scheme, etc. for the installation. These standards should be consistent with the AFSPC standards provided elsewhere in this handbook and comply with UFC 3-120-01 *Air Force Sign Standards*.

1.2.2.1.3.7. Fences. Define the approved styles, materials, colors and sizes for fences throughout the installation. Identify locations where different styles and types of fences are appropriate. Include the installation Fence Plan (see **paragraph 2.1.2.**) either directly or by reference.

1.2.2.1.3.8. Utility and dumpster enclosures. Define the installation standards for the size, style, materials, colors, and type of utility and dumpster enclosures to be used on the installation.

1.2.2.1.3.9. Exterior lighting. Define the type, style, and kinds of exterior lighting and where it is appropriately used. Define approved lamp fixture types from pedestrian walkway bollards to street lamps. Do not use fixtures / luminaries that produce light pollution, unnecessary glare or in any way create a safety hazard for drivers or pedestrians. Control light leaving the site protecting the night sky.

1.2.2.1.4. Dormitories and military family housing. Define the standards for interiors, exteriors, common areas and recreational areas in and around dormitories and military family hous-

ing. Where features exist that are unique to dormitories and/or family housing, reference the Housing Comprehensive Plan, the Enlisted Dormitory Guide and ensure it is coordinated with the FEP.

1.2.2.1.5. Other special interest items. Articulate and define standards for other special interest items specific to a particular installation. This may include historical features, parks, monuments, or special display areas.

1.2.2.2. Wherever possible, include photographs, samples or color boards in the FEP to clearly illustrate and define standards.

1.2.3. Supporting Plans. Incorporate installation level plans, such as the Fence Plan, Sign Plan, Paint Plan, Curbing Plan, etc., into the FEP by reference. This can help avoid redundancy.

1.2.4. Projects to be Accomplished. The final section of the FEP should include the Facilities Project Program list IAW, AFSPCI20-1008, *Facilities Board*. Identifying specific projects to be accomplished within the next two years that will incorporate the base Facilities Excellence Plan. It should also include a tentative schedule for completion. The identified projects must be coordinated with the current Installation Military Construction (MILCON) Program and Sustainment, Restoration and Modernization by Contract (SRMC) project lists. Reference AFI32-1032, *Planning and Programming Appropriated Funded Maintenance and Repair, and Construction Projects*.

1.2.5. Annual Review. The FEP should be reviewed and revalidated annually by the installation IAW AFSPCI32-1008, *Facilities Board*. Provide a copy with any changes to HQ AFSPC/CEC to assist in resource advocacy. Insert into the FEP a cover page letter signed by the installation commander endorsing the revalidated FEP.

1.3. Facilities Excellence Recognition Program:

1.3.1. Purpose. A key element of the AFSPC Facilities Excellence Program is the Facilities Excellence Recognition Program (FERP). This program biennially recognizes the large installation, small installation geographically separated unit, and missile alert facility that has the best-maintained facilities within AFSPC. It emphasizes the development and execution of facilities excellence plans for each installation to ensure the program is strategically managed, and encourages spirited competition between AFSPC installations in providing quality of life improvements, and high appearance standards. The full objectives, procedures, and awards presented under this program are included in AFSPCI 32-1001, *Facilities Excellence Recognition Program*.

CHAPTER 2

FENCE STANDARDS

2.1. General:

2.1.1. Applicability. All AFSPC installations should install fences and screens IAW the standards established in this chapter and adhere completely with the provisions of AFI 31-101, *The Air Force Physical Security Program* for controlled and restricted areas. The Type A fence identified in AFI 31-101, will be used for all possible permanent restricted areas. AFSPC units tenant on another MAJ-COM/DoD installation will adhere to the host command fence policy.

2.1.2. Fence Plan. Fences are necessary to protect property, define boundaries, and conceal unsightly equipment. Each installation should have a Fence Plan that minimizes fence requirements and identifies appropriate solutions for fencing where required due to the generally undesirable visual aspects and the cost of maintenance. The fence standards approved for an installation should be a part of the FEP. The plan should identify approved fence styles and material types and where they should be used. Fence styles should be compatible with the installation architectural theme. Apart from the FEP, the Fence Plan should address priorities, phasing, and tentative schedules for funding and execution. Careful planning is necessary to assure fences satisfy the intended purpose with the appropriate materials.

2.2. Types Of Fences And Screens:

2.2.1. Perimeter Fences. Perimeter fences will be installed at all AFSPC installations where encroachment or civilian intrusion may occur. Wings should evaluate each site for the perimeter fence requirement. Thule AB, Clear AB, and Ascension AFS are examples of installations, which may not require perimeter fencing because of their isolated geographic locations. Perimeter fences will normally be a minimum of 6 feet high and may be chain link, decorative metal, masonry, concrete, or a combination thereof. The perimeter fence will establish a legal boundary and a physical barrier to unauthorized entry.

2.2.2. Security Fences. Security fences interior to the installation boundary should be minimized and present the appropriate degree of security for the resources being protected. These fences may be chain link, decorative metal, masonry, concrete, or a combination thereof. Theme fence (generally the design and materials relating closest to the installation's architecture) is usually the costliest because of the materials and workmanship involved. The use of theme fencing should be limited to high-visibility public areas. Other less costly but effective fence designs should be considered for other functional use areas of the installation.

2.2.3. Chain Link Fences. With few exceptions, chain link fencing should be used only for perimeter boundaries, security for restricted or controlled areas (i.e. flightlines, launch complexes, missile alert facilities, critical communications facilities), and for some industrial areas. Chain link fencing may also be appropriate for Military Family Housing to define yards and restrain small children or pets. If chain link fence is used, outriggers with three-strand barbed wire and/or concertina wire should only be used for designated permanent restricted areas. Continually challenge the need for outriggers on chain link fencing. Bulk storage or equipment yards for Supply, Transportation, and Civil Engineering, etc., do not require the barbed wire outrigger and/or concertina wire on the top of chain link fence. Chain link fence should be corrosion resistant material to reduce maintenance.

Coated fence fabric is recommended, and where used, fence posts must be coated with the same material. Wood, metal or vinyl slats will not be used in chain link fencing. When concealment of structures or equipment is a primary purpose of the fence, a type other than chain link should be used. Always consider a thick screen of evergreen plant materials may be more appropriate.

2.2.4. Metal Fences. Other metal fencing can be used if it is compatible with the installation architectural theme. This kind of fencing can provide effective security and screening when used appropriately. Any type of metal fencing should be corrosion resistant to reduce maintenance. Barbed wire fence is discouraged, but may occasionally be appropriate, such as in areas where government land is leased for grazing purposes.

2.2.5. Wooden Fences. Wooden fencing can be an alternative for screening, but should be evaluated for life-cycle-cost when compared to a permanent material. When used, wooden fences should be stained/treated to complement adjacent color schemes and to reduce maintenance. Consider the use of galvanized metal vertical posts instead of wood. Wooden fences are most appropriate in recreational and housing areas. Plant materials are an excellent method of “softening” the visual impact of wood.

2.2.6. Masonry and Concrete Fences. Masonry and concrete fences are attractive and durable, but have a higher initial cost, and thus should be used sparingly. However, they may compare favorably on life-cycle costs. They should be used when screening is a major function of the fence. The materials used must match adjacent facilities and/or comply with the installation FEP. Long masonry or concrete panel walls are very monotonous and should be staggered, or otherwise articulated. Masonry walls should be capped and sealed to minimize efflorescence. Masonry walls are recommended at installation gateways and to separate housing from adjacent land uses.

2.2.7. Equipment Screens. Careful attention must be given to fences intended to screen heating, ventilation, and air conditioning (HVAC) equipment. Provisions must be made to allow adequate airflow for proper operation of HVAC equipment and to provide sufficient maintenance space. Metal fencing surrounding electrical equipment should be avoided if possible, but if used, must be bonded and grounded according to the National Electrical Safety Code and the National Electrical Code.

2.2.8. Earth Berms. Earth berms can be effectively used in place of conventional fencing. Berms are appropriate in high-visibility public areas with undesirable views to provide concealment where security is not a great concern. When used, earth berms must be appropriately landscaped and maintained. Ensure that berms are not too large (out of scale) or too steep to mow. Establish maximum slope criteria.

2.3. Mow Strips:

2.3.1. Design. When installing new fences, consideration should be given to installing a mowing strip under the fence to reduce grass and shrub trimming requirements. Mow strips can be either of concrete or gravel. Mow strips are recommended for built-up areas requiring frequent landscaping maintenance or lawn mowing, and where appropriate, under high security fences. They are not recommended in xeriscaped areas and undeveloped areas.

2.3.2. Concrete Strips. Concrete mow strips should be a minimum of 12 inches wide (6 inches either side of the fence centerline) to enable grass-mowing equipment to adequately trim grass to eliminate the need for further manual trimming with “string-trimmers” type equipment.

2.3.3. Gravel Strips. Gravel mow strips should be a minimum of 24 inches wide (12 inches either side of the fence centerline) and be treated or configured with an underlayment to prevent vegetation growth.

CHAPTER 3

HARDSCAPE STANDARDS

3.1. Curbs:

3.1.1. Applicability:

3.1.1.1. All AFSPC installations should install curbing according to the AFSPC standards established in this chapter and the provisions of joint services manual, TM 5-822-2, *General Provisions and Geometric Design for Roads, Streets, Walks, and open Storage Areas*. Existing curbing should not be replaced just to conform to these standards, but should be brought into conformance as streets, roads and parking areas are repaired or constructed new. AFSPC units tenant on another MAJCOM/DoD installation will adhere to the host command curbing policy.

3.1.1.2. AFSPC is committed to providing curbing for all installation streets and parking areas. For the purpose of this policy, streets are defined as paved roadways in built-up areas of installations. Roads are defined as paved roadways connecting dispersed built-up areas. Curbing offers the following benefits: channels and confines vehicle traffic more effectively; provides for control and management of storm water runoff; prevents shoulder erosion of paved surfaces; provides a safer separation between pedestrian traffic and vehicle traffic; prevents vehicle access to landscaped and turf areas, thus reducing erosion and environmental damage; and presenting a more ordered and defined appearance to our installations.

3.1.1.3. All paved streets in cantonment or built-up areas should be curbed. Dirt and macadam roads will not be curbed. Perimeter roads need not be curbed. Paved roads that traverse long stretches of undeveloped areas need not be curbed if they have proper drainage, built-up shoulders, and minimal intersecting roads. When planning curb construction, careful consideration must be given to possible impacts on storm water management. High curbs requiring backfill can alter existing storm water drainage patterns and disturb on-site percolation. Storm water permits may also be required by regulatory agencies, with associated retention ponds, swales, or other water control devices.

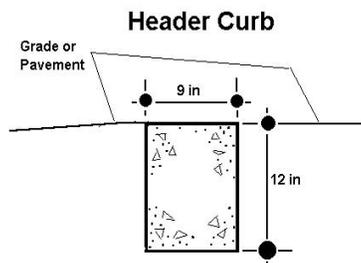
3.1.2. Curb Types:

3.1.2.1. Three types of curbs are acceptable for use at AFSPC installations. They are barrier curbs; mountable curbs; and header curbs. All curbs will be concrete made from cement containing fly-ash with a range of 15 to 35 percent to total cementitious material EPA Guideline Item (<http://www.epa.gov/cpg/products/cement.htm>). Asphalt curbs are not appropriate, as they are not durable and expensive to maintain. Selecting an incorrect curb section for a particular application is not an improvement to an uncurbed street.

3.1.2.1.1. Barrier curbs (**Figure 3.1.**) are most appropriate for parking lots and interior installation streets. Barrier curbs will have a face that ranges from steeply sloped to nearly vertical and at least 6 inches high. These curbs may need cut-outs for handicapped access, mower access, and possibly drainage cuts. They should be used wherever stricter vehicle control to prevent access onto turf or landscaped areas is required. Where barrier curbs are used, the ground surface should be level with the back, elevated edge of the curb.

3.1.2.1.2. Mountable curbs (**Figure 3.2.**) are appropriate for housing areas and interior installation streets. They do not normally need cut-outs for handicapped access or for mower

Figure 3.3. Header Curb.



3.1.3. Painting. Painting curbs is prohibited.

3.2. Parking Areas:

3.2.1. Design:

3.2.1.1. Parking areas should reinforce the experience of arrival at a pedestrian place. Landscaped visual buffer areas between the parking lot and the road, and between the facility and parking should also be provided. Trees are a positive enhancement and are preferred to provide shading and reduce heat island affects. Avoid trees that drop fruit, sap or seeds. Consider low maintenance xeriscaping concepts and avoid high maintenance landscaping in these transition zones. Consider the relation between the facility and the road. Create parking areas that will serve two or more facilities whenever possible while avoiding the look of “a large sea of asphalt.”

3.2.1.2. Parking areas should be as unobtrusive as possible while providing safe and convenient parking for users. Parking lots should not be allowed to become long-term storage areas for vehicles. Do-it-yourself maintenance is authorized only in Services auto hobby shops and is prohibited in parking lots and other areas.

3.2.1.3. Off-street parking areas are preferred. On-street perpendicular parking spaces are highly discouraged.

3.2.2. Curbs at Parking Areas. All parking lots will have perimeter curbing of the barrier type. Parking blocks are strongly discouraged since they are difficult to maintain and “lock-in” specific parking arrangement/layout; however, they are sometimes necessary in existing lots to prevent bumper overhang at sidewalks. Design new parking lots to allow for bumper overhang without parking blocks. Parking on turf, unimproved grounds, or landscaped areas is prohibited, except by service vehicles. Provide curb cuts for handicapped access as necessary.

3.2.3. Parking for the Disabled:

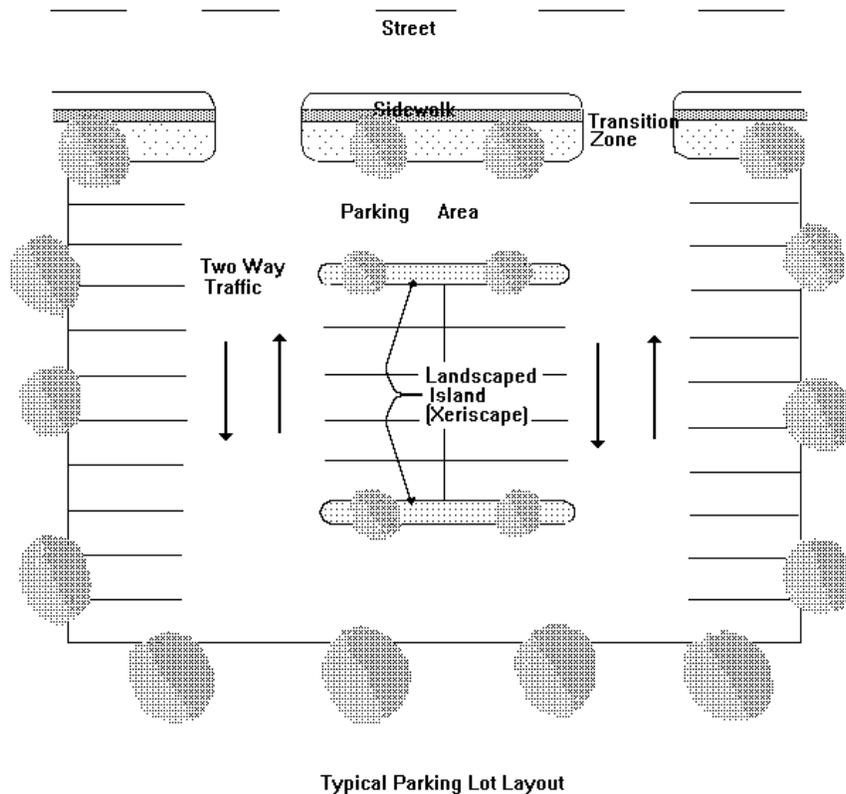
3.2.3.1. Provide parking for the disabled in accordance with *ADA Accessibility Guidelines (ADAAG)* and *Uniform Federal Accessibility Standards (UFAS)* for quantity and dimension. Provide the international symbol (white graphic on blue field) at each handicapped parking space.

3.2.3.2. Parking for Motorcycles.

Ensure motorcycle parking areas are constructed of concrete to avoid damage to pavement from motorcycle stands.

3.2.4. Parking Islands. Large parking areas should have islands to define parking areas. It is highly recommended that islands in parking lots be landscaped with plants and trees, not grass, which requires greater maintenance requirements. Where plants alone are used, low maintenance plants are preferred. If island areas do not use live plants, gravel, pavers or other decorative treatment should be used. All parking lots will be striped with white stripes to define parking spaces. **Figure 3.4** provides a schematic diagram of a typical parking lot layout.

Figure 3.4. Typical Parking Lot Layout.



3.2.5. Orientation of Parking Spaces. 90 degree parking with two-way circulation is preferred for all parking lots since it requires the least land for a given number of vehicles and avoids confusion for motorists.

3.2.6. Access to Service Areas. Provide access to service area and dumpsters through parking areas when appropriate. Keep this access as distant from the main entrance of the facility as possible. Separated service drives are encouraged. Consider Force Protection issues.

3.2.7. Area Screening. Open storage lots should have visual screening.

3.3. Sidewalks And Walkways:

3.3.1. Design:

3.3.1.1. Sidewalks and walkways should be placed to facilitate pedestrian traffic between facilities, prevent erosion, and enhance installation appearance. Sidewalks shall be of concrete made from cement containing fly-ash at a range of 15-35 percent cementitious material. Asphalt sidewalks not recommended because of durability, and maintenance, Sidewalks should be a minimum of 48 inches wide. Wider sidewalks are recommended where pedestrian traffic volume warrants. A five-foot width is more appropriate where two-abreast walking is likely to occur. Comply with *ADA Accessibility Guidelines (ADAAG) and Uniform Federal Accessibility Standards (UFAS)*.

3.3.1.2. Eliminate the narrow planting strips between sidewalks and the curb if on-street parking is permitted. For safety reasons, separate sidewalks from high-traffic roadways by at least 6 feet.

3.3.1.3. Use paving brick or stone walkways only to emphasize high profile facilities or to achieve some special effect. Use these types of walks sparingly because they are traditionally more expensive and require more maintenance than concrete sidewalks.

3.3.1.4. Ensure Military Family Housing areas have well developed sidewalk systems with a sidewalk on at least one side of every residential street. Sidewalks on both sides of residential streets are preferred.

3.3.1.5. Avoid planting trees or shrubs too close to sidewalks. As these plants mature, their root systems can damage or destroy sidewalks, and mature plants may obstruct the sidewalk without extensive pruning and plant maintenance.

3.3.1.6. Do not obstruct sidewalks and walkways with signs, plants, outdoor furniture, utility equipment or poles. These features can create safety hazards for pedestrians.

3.4. Streets And Pavements:

3.4.1. Layout:

3.4.1.1. Lay out all roads and streets parallel to contours whenever possible to reduce erosion, visual impact, and grades. Preserve natural features, such as rock outcroppings, natural drainage patterns, and vegetation whenever possible when siting new roads or streets.

3.4.2. Hierarchy:

3.4.2.1. Develop roads and streets in a three tier hierarchy whenever possible. The three tiers are primary, secondary and tertiary. Develop each for the appropriate function.

3.4.2.1.1. Primary roads and streets connect main installation components such as the main cantonment area, community center, and flightline areas. These are the highest volume streets on an installation.

3.4.2.1.2. Secondary roads and streets connect installation components to one another and to support facilities, such as cantonment areas to industrial areas, or commercial areas to housing areas.

3.4.2.1.3. Tertiary roads and streets are normally unpaved access roads or residential streets in housing areas. Consolidate existing access roads and streets to minimize installation impacts whenever possible. Careful consideration should be given to installing "speed bumps" or other speed control devices on tertiary streets in housing areas. Care should be taken to con-

sider safety issues that speed bumps present to two-wheeled vehicles. Installation Commanders have authority to install “speed bumps” if local conditions warrant.

3.4.3. Intersections. Create and maintain clear sight triangles (unobstructed lines of sight at intersections) at each intersection corner. The size of the clear sight triangle must match the speed of the vehicles approaching the intersection. This area forms a clear sight triangle, which must be clear from 2 feet to 6 feet in height. Provide intersection corners with appropriate radii based on the type of road, street and vehicle.

3.4.4. Markings. All road markings shall be painted or tape striping. Use low lead coatings for traffic markings. Do not use solid lines where curbing delineates road edges.

3.4.4.1. Use a 4 inch wide, single white stripe to mark parking spaces. Use parallel 24-inch wide, reflective white stripes to denote crosswalks. Place the crosswalk stripes parallel to the roadway. Avoid yellow painted stripes.

3.4.5. Utility Cuts. Avoid utility or other cuts in pavement. Whenever possible, use tunneling technology to go under pavement with conduits or pipes. Place extra utility line conduits during road or street construction or prior to repaving to provide capacity for future growth.

| 3.5. Installation Entry Control Facilities:

3.5.1. Layout:

3.5.1.1. Particular attention must be paid to the arrangement of all elements that are part of the installation Entry Control Facility (ECF) to assure adequate security, safety and control of visitors. See the *Air Force Entry Control Facilities Design Guide* for current information concerning basic guidelines for organizing, evaluating, planning, programming and designing Entry Control Facilities ECFs for AF installations worldwide. ECFs must now be configured to allow security to be quickly and easily be enhanced.

3.5.1.2. ECFs serve as the entry point for all personnel, visitors, and deliveries to AF installations. The objective of ECFs is to prevent unauthorized access and maximize vehicular traffic flow. Priorities in the design of ECFs are Security, Safety, Capacity and Image.

3.5.1.3. Because the ECFs are the first buildings visitors and personnel see when entering an installation, the design must convey an immediate impression of professionalism, strength, and permanence. Show a commitment to facilities excellence and convey the Air Force’s commitment to the protection and safety of AF personnel.

3.5.1.4. The main gate complex should have a minimum of dual traffic lanes in each direction to facilitate high traffic volumes during peak periods. Refer to MTMC Pam 55-15, *Traffic Engineering for Better Gates*. Lane width or spacing should permit safety for security personnel standing between lanes. The guardhouse should be located on a traffic island located between the entry and departure traffic lanes. Vehicle circulation should be provided IAW the *ECF Design Guide*. The ECF layout must be capable of maximizing vehicular traffic flow under elevated force protection levels to eliminate undue delays that would affect base operations and off-base traffic circulation while maintaining vigilance against acts of terrorism.

3.5.2. Barricades. Provide appropriate barricades around the guardhouse at each gate to prevent errant vehicles from crashing into the guardhouse and injuring the guard. The barricades should be

integrated into the facility design and should be disguised as planters, decorative walls, or sign mounts. Care must be taken to not obstruct the field of view of the guard in the guardhouse.

3.6. Gates:

3.6.1. Each gate must have a positive means of securing the installation perimeter. Rolling gates are recommended, especially at the main gate, rather than swinging gates. Where snow and ice buildup occur, a cantilevered, sliding gate may be more practical. Other barricade devices may be appropriate for installation specific security requirements.

3.6.2. Gate mechanisms should be discreetly concealed from all directions using decorative walls or landscaping. This concealment feature should be incorporated into the design of the gate facilities.

CHAPTER 4

LANDSCAPE STANDARDS

4.1. LANDSCAPE PLAN:

4.1.1. General:

4.1.1.1. Landscape architecture is the art and science of designing exterior areas to improve visual appeal and functionality. It is one of the most effective means of improving the appearance and unity of an installation. Quality landscape architecture design and implementation also improves the quality of life for our people and visitors. Each installation should develop a Landscape Plan consistent with the installation's Comprehensive Plan. The plan should include the landscape elements of vegetation, landforms, water features, pavement and walkway materials, site amenities, and lighting to maintain continuity throughout the installation. These elements can then be used to address specific site concerns such as buildings, parking, streets, pedestrian and bicycle movement, plazas and courtyards, open space and natural areas, accommodation of local wildlife needs (especially for endangered or threatened species), and handicapped accessibility. AFSPC units tenant on another MAJCOM/DoD installation will adhere to the host Command's standards. Landscape standards must meet the Air Force Antiterrorism Force Protection Standards.

4.1.1.2. Landscaping should be included in the design of any project. Project should not be considered complete until the entire landscape plan, both plant materials and site amenities, are installed.

4.1.2. Plan Components. The Landscape Plan must include a plant list that identifies the types and species of plants that are native to local environment and appropriate irrigation practices. The plan must provide for development of the total built-up environment of the installation. Careful planning and design are as essential for landscaping as they are for building design to assure the right balance is maintained and the desired environment is created. The plan should address considerations and constraints for both developed and undeveloped areas on our installations to create and successfully manage the natural environment. A complete landscape plan is required before installation of any new landscaping. Consult local experts and installation grounds maintenance to develop planting specifications for the local area.

4.1.3. Assistance and Guidance:

4.1.3.1. The services of a professional landscape architect should be acquired whenever possible, preferably through an open-end A-E contract, to help develop landscape plans for the installation and site plans for individual areas on an installation where landscaping is being modified.

4.1.3.2. Landscape design guidance is provided in the HQ AFCEE *USAF Landscape Design Guide* which is available on the AFCEE website; (www.afcee.brooks.af.mil/dc/products/dcproducts.asp).

4.1.3.3. The degree of formality of the planting scheme should reflect that of the accompanying architecture, plaza, or courtyard. Plant materials are preferable to man-made fencing unless security is required. Plants "soften" the area and divert the eye to the textures, colors, and variety of shapes of the trees and shrubs. Plants are especially suitable for screening electrical transformers, etc., where safety dictates that all surrounding metal must be set back a minimum of 8 feet.

4.1.4. Plant Uses:

4.1.4.1. Use vegetation to provide shade, minimize glare, and deflect undesirable winds for most CONUS installations. Use deciduous trees at the south, southeast and southwest sides of a facility to provide desirable summer shade and allow solar gain during the winter. Use evergreen trees and shrubs to control winds and provide year-round screening.

4.1.4.2. Plant materials are preferable to man-made fencing unless security is required. Plants “soften” the area and divert the eye to the textures, colors, and variety of shapes of the trees and shrubs. Plants are especially suitable for screening electrical transformers, etc., where safety dictates that all surrounding metal must be set back a minimum of 8 feet.

4.1.4.3. Preserve the existing landscape whenever possible. Use natural forms and features in landscape planning. Minimize irrigated, high maintenance areas and encourage natural vegetation whenever possible.

4.1.5. Formal Planting. The degree of formality used in a planting design should reflect the character of the accompanying architecture, plaza, or courtyard.

4.2. Trees:

4.2.1. General:

4.2.1.1. Trees are the focal point of all landscaping efforts. Select native trees appropriate to the local environment to minimize maintenance, enhance durability, and provide the greatest longevity. Avoid trees that drop fruit, sap or seeds. Use long-lived and disease-resistant species.

4.2.1.2. Use small trees in plazas and courtyards to provide enclosure or screening. Use medium trees near buildings, parade grounds and pathways. Use large trees near streets, parking lots, and large open space. High branching trees are recommended near parking and streets to provide shade, reduce heat gain, and avoid physical or visual hindrance.

4.2.2. Planting:

4.2.2.1. Avoid planting trees too close to paved surfaces and buildings. Anticipate the growth, root structure and mature size of trees (both diameter and height) when selecting a plant site. Avoid planting trees where they will interfere with the installation infrastructure, such as sewer lines and electrical power distribution systems, as they grow and mature. Remove trees that are too close to structures or that interfere with infrastructure components.

4.2.2.2. Avoid planting trees in rows except to accentuate a major feature in a formal way; i.e., a straight-line, major boulevard. Natural informal clusters and groves of trees are preferred.

4.2.2.3. Use a 5-gallon minimum size for shrubs, a 2 1/2 inch caliper minimum for trees, and a 1 gallon minimum for groundcovers. Carefully install plants to their proper depth and remove all burlap, wire or plastic.

4.2.3. Care:

4.2.3.1. Irrigate or hand water new trees regularly for the first two years to ensure establishment of the root system.

4.2.3.2. Avoid major pruning of trees in natural and park areas unless required for safety, the health of the tree, or in highly visible locations. Trees in courtyards and in prominent locations should be pruned by skilled personnel to produce dense growth and control heights.

4.2.4. Mowing Strips. Provide a mowing strip using wood mulch (no herbicides) around trees and other plant groupings to prevent damage from grounds maintenance equipment. Size the mowing strip to allow for tree growth and to accommodate a mature tree.

4.3. Shrubs:

4.3.1. Selection:

4.3.1.1. Use low maintenance shrubs with four-season appeal at building foundations, sign bases, and at monuments, memorials, and other static displays. Mulch around shrubs to reduce weed propagation and retain moisture.

4.3.1.2. Use plant materials with dense surface coverage to control erosion from wind and water.

4.4. Xeriscaping:

4.4.1. The term Xeriscape is derived from the Greek word xeros, which means dry. People who are unfamiliar with the terminology often confuse the word "xeri" with "zero." The result is that a wrong impression is created that causes Xeriscapes to be thought of as landscapes where no water is required, and only a few "desert plant" species can thrive. The erroneous image of hot and dry, gravel and dirt, with cactus and no green lawns is perpetuated.

Table 4.1. Common Xeriscape Misconceptions.

Common Xeriscape Misconceptions (Adapted with permission of the author from http://bcn.boulder.co.us/basin/local/misconcept.html)	
Xeriscape is not Dry Only.	Though dry-only landscaping can be spectacularly colorful and even lush, a limited area of higher water use landscape is consistent with wise water design. Heavily irrigated athletic field turf, for example, is justifiable since it serves a specific function and recovers quickly from heavy use. Keep in mind though that turf requires the most water and maintenance of all plant types.
Xeriscape is not rocks and gravel only.	Organic or inert mulches applied to proper depths will reduce water needs and weed growth while providing visual interest and surface erosion control. Organic mulches such as pine needles and shredded or chipped bark provide the added benefit of improving the soil through decomposition.

Xeriscape is not planting that grows without irrigation.	Xeriscapes can have highly irrigated, as well as dry zones. The point is: Put the correct amount of water to the plant. Do not waste water by watering to excess. Starting new areas of dry plant areas will still require a season or more of supplemental watering to allow the plants to get established.
Xeriscape is not about native plants only.	Although there is a large array of regional native plants within each climate zone, non-invasive / non-native plants with a successful history can be an appropriate addition to water-wise landscaping.
The term, "Xeriscape Plant" is technically a meaningless term.	Xeriscapes can have highly irrigated, as well as dry areas, so the term " <u>xeriscape plant</u> " means nothing. The term " <u>Xeric plant</u> ," however, is a good term. It refers to plants that thrive in largely dry conditions for most of the time.

4.4.1.1. The objective for using Xeriscape design principles is to provide attractive design solutions which save money, water and maintenance. Xeriscape designs can easily be lush, rich, and green. Xeriscapes do require watering, and do support many different species of plants including zones of turf. Xeriscape designs are appropriate for all climate zones where water supplies have limits, and the cost of water is a concern. Reference the *USAF Landscape Design Guide* for additional detailed guidance.

4.4.1.2. Distinguishing features of Xeriscaping that are important to the Air Force include, but are not limited to the following:

1. Water costs are rising.
2. Water supplies are diminishing or are limited in most regions where the Air Force maintains installations.
3. Conserving water and money is important and smart.
4. Xeriscape designs use much less water than a traditional turf design.
5. Xeriscape designs often require less maintenance thus saving more money.
6. Appropriate design yields benefits beyond initial cost of construction.
7. Inappropriate maintenance creates additional costs later.

4.4.1.3. Principles of Xeriscape:

1. Plan and Design
2. Size Turf Areas Appropriately With Practicality
3. Efficient and Appropriate Irrigation
4. Use of Proper Soil Amendments

5. Use of Mulches
6. Select Appropriate Plants
7. Appropriate Maintenance

4.4.1.4. Web site: Xeriscape information including, **Table 4.1.** was reprinted with permission from the following web site: (<http://bcn.bolder.co.us/basin/local/misconcept.html>).

4.5. Berms:

4.5.1. General. Use berms to elevate plantings and increase screening effectiveness. Design berms with slopes no greater than 4:1 that blend into the surrounding topography. Where trees or large shrubs are to be planted on the berm, the top should be at least 20 feet wide to provide adequate area for root growth. Where long expanses of berms are used, the height of the top, and width of the berm may undulate to avoid visual monotony.

CHAPTER 5

EXTERIOR SIGN STANDARDS

5.1. General:

5.1.1. Applicability:

5.1.1.1. Concise, orderly, and visually pleasant signage is a critical design element, which creates an ongoing “dialogue” with its users. It directs traffic, identifies facilities, and provides warnings, information, and direction. The signage must respond to functional requirements and signage hierarchy. Signage must be of consistent materials and colors. It must convey concise messages to communicate intent clearly, and be a unifying element for the installation. AFSPC units tenant on another MAJCOM/DoD installation will adhere to the host command exterior sign policy.

5.1.1.2. Signage is one element in the built environment, which should identify AFSPC installations as part of a larger whole, the United States Air Force. Common signage systems can visually communicate this continuity as effectively as building or landscape design. For these reasons, AFSPC accepts UFC 3-120-01, *Air Force Sign Standards*, as the standard with exceptions and additions as noted in this chapter. The standards that differ from UFC 3-120-01 are intended to meet the goals of UFC 3-120-01 while addressing conditions unique to AFSPC.

5.1.1.3. Wing Commanders are delegated waiver approval authority for the AFSPC standards listed in this handbook. Variations and waivers should be recorded in the Facilities Excellence Plan.

5.1.1.4. Signage is a visible statement about the pride and professionalism of an installation. Each installation must ensure that signs are well designed, maintained, and properly located. Rigorously question the need for each and every sign before it is placed on the installation.

5.1.1.5. When applying these standards, the primary objective is to reduce the number of signs on the installation and eliminate the visual clutter that results from too many signs. No sign should be erected unless the information it provides is absolutely necessary. The location, size, height, color, wording, and all other characteristics of every existing sign must be evaluated for this purpose.

5.1.1.6. Eliminate superfluous signs. Do not use signs with individual changeable letters (often referred to as “marquee” type signs) or homemade plywood signs. Stenciled signs and those done with spray cans are also unacceptable. Electronic message signs located near the main entrances are preferred to a multitude of signs with temporary messages.

5.1.1.7. An installation with existing signs, which do not conform, to these standards will transition their signs, as they need replacement. The transition to new signs should be done as part of normal sign maintenance due to deterioration or change of text and not as a wholesale replacement effort.

5.1.1.8. Units of other Commands tenant on AFSPC installations will have exterior signs conforming to AFSPC standards.

5.1.2. Characteristics:

5.1.2.1. The color, style, and mounting of signs must be consistent throughout the installation. Exterior signs will have a standard installation format, color, and size. Brown backgrounds with

white letters are the AFPSC standard for exterior signs. The brown background and white lettering standard will apply to Type A1, A2, A3, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, D1, and D2 signs as defined in UFC 3-120-01 Air Force Sign Standard. To maintain consistency, the back of signs shall be painted or coated to match the brown color on the face of the sign.

5.1.2.2. All exterior informational type signs should be readable both day and night. Illuminate exterior signs only when reflective letters do not provide adequate legibility during darkness or when special emphasis is needed (such as the main gate).

5.2. Sign Master Plan:

5.2.1. Components:

5.2.1.1. The Installation Commander is responsible for the signage program. Each installation should prepare a Sign Master Plan, which includes the location and content of every existing and proposed exterior sign on the installation. The plan must include both a site plan and a sign schedule. It should also define the approved materials and finishes for mounting, posts, foundations, etc., to be used for each type of sign. The Sign Master Plan should be a component element of the installation FEP.

5.2.1.1.1. To develop a Sign Master Plan, use a current installation layout map, showing all streets, structures and other major features. Identify and number each sign on the site plan to establish the sign location.

5.2.1.1.2. Prepare a schedule of all existing and proposed signs. Indicate the sign number, message, sign type, and a reference to the applicable structural installation drawing. It is recommended that signs be categorized in the sign schedule into the following categories as defined in UFC 3-120-01 *Air Force Sign Standard*: Exterior Identification Signs; Direction Signs; Regulatory Signs; Motivation Signs; and, Information Signs.

5.2.2. Civil Engineering Responsibilities:

5.2.2.1. The Base Civil Engineer is responsible for developing, implementing, and maintaining the Sign Master Plan as well as eliminating inappropriate or unnecessary signs.

5.2.2.2. The Sign Master Plan cannot be prepared without actually touring the installation. Vegetation or other obstacles may in fact hide a location which looks clear on the plan.

5.2.2.3. Each existing sign on every installation must be reviewed every two years to verify need and condition. Extraneous and unauthorized signs are to be removed.

5.3. Types Of Signs:

5.3.1. Identification Signs:

5.3.1.1. Installation Identification (Entrance) Signs:

5.3.1.1.1. Installation identification signs introduce the installation to all visitors. Their organization, design, quality, and maintenance create a first impression that sets the tone for the visitor's reaction to the installation.

5.3.1.1.2. Type A1 and A2 installation entrance signs shall be on a raised base constructed of materials consistent with the local and installation architectural style. No text or graphics are

to be placed on the base of the sign. To create a professional, command-wide image, AFSPC installations must exhibit consistency in the design of type A1 and A2 entrance signs. While the structure holding the sign may vary to conform to local materials, conditions, and predominant installation architectural style, the sign face itself must conform to the standards in UFC 3-120-01 *Air Force Sign Standard*, unless approved otherwise by waiver.

5.3.1.1.3. The sign face shall show the following information only:

Air Force Symbol

U. S. AIR FORCE

Installation Name

5.3.1.1.3.1. No unit names, unit mottoes, or names and titles of individuals are permitted.

5.3.1.1.4. Graphics should normally appear only on the side of the sign facing incoming traffic, but the backside should present an acceptable appearance.

5.3.1.1.5. Low maintenance landscaping and ground mounted lighting is required.

5.3.1.1.6. Installation entrance signs will be replaced by attrition only and will not be changed if the physical condition and message of the existing sign is satisfactory.

5.3.1.1.7. Use the Type A3 Installation Entry sign to identify secondary entrances with limited public access. Mount on a sign structure that also holds the installation warning sign.

5.3.2. Military Facility Signs:

5.3.2.1. Military facility signs consist of three types: building name, building number, and building address. This section covers facility signs in general, specific guidance for each type is provided in UFC 3-120-01 *Air Force Sign Standard*.

5.3.2.2. Locate freestanding facility signs near the main entrance and make sure they can be read from the street. It may be necessary to use more than one sign when there are widely separated main entrances. In all cases, signs must be kept to a minimum.

5.3.2.3. Some existing buildings may have signs engraved into the facade of a building. Do not use engraved signs on new or existing buildings.

5.3.2.4. Facility signs should not be replaced unless required for normal signage maintenance, which includes damaged, faded, or changes of text to sign.

5.3.2.5. Unit awards are not authorized for display on facility signs. Units should recognize receipt of these awards in appropriate displays within their facilities.

5.3.2.6. Unit nicknames, unit mottoes, and names or titles of individuals are not authorized on facility signs.

5.3.2.7. There are several distinct styles of facility name signs: individual, raised letters attached to the building; base and post-mounted freestanding signs (stand-alone); and signs attached to the building. For consistency, the same style should be used throughout the installation, except that individual, raised letters may be used on an installation with the other styles. A single facility should not typically have both a wall-mounted sign and raised letters attached to the building; however, both may be practical in some instances. Using raised letters and a freestanding sign should be avoided unless the building is widely separated from the main access roads.

5.3.2.8. Individual numbers mounted or painted directly on a building are to be avoided.

5.3.2.9. Building name signs which are attached to the building or that are stand-alone may provide the functional or organizational name, but not both. Generally, only one organizational name will be on a sign.

5.3.2.10. If a building houses more than one organization, the sign should normally include only the major tenant. If there is no clear major tenant, the names of two or three co-equal organizations may be included on the sign.

5.3.2.11. In some instances, the names of high priority units, or those destinations that are most often sought by people, who are new to the installation, should be included on the building sign.

5.3.2.12. If more than three co-equal organizations wish to be identified, and the order of preference cannot be agreed to, then a general designation, such as Base Administration, should be used.

5.3.3. Approved Facility Signs:

5.3.3.1. Type B1: This sign type is used to identify the highest-level flag bearing (MAJCOM or numbered Air Force) Headquarters on an installation. The emblem must be the MAJCOM or numbered Air Force shield: 12 inch by 12 inch for base mount, 8 inch by 8 inch for post mount, full color.

5.3.3.2. Type B2: This sign type is used to identify a lower level flag bearing (Wing Level) Headquarters on an installation. The emblem will be the Wing shield mounted in the upper left corner of the sign. All emblems will be 6 inch by 6 inch, full color.

5.3.3.3. Type B3: This sign type is used to identify Squadron Level Headquarters, Squadron components, detachments, and non-military equivalents. (**NOTE:** Individual raised letters mounted on the building are authorized in lieu of Types B1, B2, and B3 signs.) No emblem should be used for this type of sign.

5.3.3.4. Type B4: This sign type is used to identify all other buildings or organizations. Emblems are not authorized for B4 signs on AFSPC bases.

5.3.4. Facility Number Signs:

5.3.4.1. Type B5: This is a facility number sign, which is required on all facilities. Facility numbers painted directly on the building are unacceptable. Although building shapes and other irregularities occasionally require variations, facility numbers should normally be on the right corner of the front facade of every permanent building. Only one facility number sign needs to be visible from a single vantagepoint. Lettering and sign color should be white on standard brown. In some instances it may be necessary to deviate from the color standard to ensure visibility. Avoid bold accent colors.

5.3.5. Building Address Signs:

5.3.5.1. Every occupied facility will have a building address sign containing the address number consistent with US Postal Service protocols. The building address sign shall contain only the address number (not the street name) and will not be combined with the facility name or facility number sign. The building address sign should normally be attached to the building near the entrance where mail may be delivered. Lettering and sign color should be consistent with other signage on the installation where possible. As building configurations and other conditions vary

widely, the location, size, color, and other characteristics of address signs must be determined on a case-by-case basis. It may be necessary to deviate from the color standard to ensure visibility. Avoid bold accent colors. Include building address signs in the Sign Master Plan.

5.3.5.2. The Installation Commander may determine if facility numbers may be omitted from sign types B1, B2, B3 and B4 if building addresses are the primary means of locating organizations or buildings. If building numbers are omitted from these type signs, they must be omitted from all of those type signs on the installation.

5.3.6. Community Identification Signs:

5.3.6.1. Third party commercial signing must be integrated with the installation signage system. It should not be garish or obtrusive.

5.3.6.2. Sign standards should be included in the approval package for all commercial enterprises on the installation.

5.3.6.3. Sale and other special event signs taped to or painted on windows, banners attached to building exteriors, and other temporary type signage is unacceptable.

5.3.6.4. Backlighted and neon signs are discouraged on all AFSPC installations.

5.3.7. Destination Signs:

5.3.7.1. There are many potential destinations on any AF installation--too many to list on direction signs. At the same time effective direction signs can help to make the installation easier to use and can avoid confusion and disorientation. Used together with proper street identification, signing and effective installation maps, they form the key to visitor orientation on the installation.

5.3.7.2. The content and location of all direction signs must be developed in the installation Sign Master Plan to create a logical system to direct visitors from the point of entry, through every intersection to their final destinations. Be concise and to the point. Use the guidance provided in UFC 3-120-01 *Air Force Sign Standard* for direction sign placement, mounting, etc.

5.3.7.3. Since not every destination can be listed, priorities must be established for listing destinations. Give the highest priority to those destinations that are most often sought by people who are new to the installation. Consequently, direction signs should lead to activities likely to have a great deal of first time traffic such as the Commissary, Base Exchange, Hospital, Lodging Office, etc.

5.3.7.4. Maps should indicate the same names that are used on direction signs and the security police should give directions consistent with the sign and map terminology.

5.3.7.5. No more than four directions should appear on a single direction sign. If there is a need to show more than four directions, a second sign may be used, but not more than two direction signs may be used in such a situation. Group those destinations in the same direction.

5.3.7.6. All graphics: The message, arrows, borders, and the sign background shall be of reflective materials to facilitate nighttime visibility.

5.3.7.7. Graphics generally should appear on only one side of the sign because the sign will be placed in advance of an intersection, however two-sided signs may be used where appropriate. Check the locations for height and obstructions.

5.3.7.8. Do not place directional signs near organizational or facility identification signs unless absolutely necessary.

5.3.7.9. The following two types of direction signs are approved for use on AFSPC installations.

5.3.7.9.1. Type D1: This type sign shall be used at roadways with speed limits in excess of 25 miles per hour.

5.3.7.9.2. Type D2: This type sign shall be used at roadways with speed limits of 25 miles per hour or less, at parking lots, and along major pedestrian routes where confusion might otherwise exist.

5.3.8. Street Signs:

5.3.8.1. There will be one street name sign for each street at each intersection.

5.3.8.2. Signs will be mounted not more than 15 feet from the cross-street curb line, and the bottom of the sign should be not less than 7 feet above the ground. The locations must be consistent throughout the installation. Locate signs away from trees or other obstructions that may block views.

5.3.8.3. A full-color Air Force Space Command emblem is required at the left of the lettering on all street signs.

5.3.8.4. Signs will have a standard vertical dimension of 6 inches. The number of letters in the street name will determine the length, with 30 inches being the maximum length allowed. Lettering will be 4-inch upper case. For long street names, use narrow stroke widths to stay within the length parameters.

5.3.8.5. Colors will be white letters on Standard Brown background. Lettering will be reflective for visibility during darkness.

5.3.8.6. Avoid abbreviating street names. Conventional abbreviations for street (ST), avenue (AVE), and boulevard (BLVD) are acceptable.

5.3.8.7. Street signs shall be mounted on signposts matching other posts on the installation. Signs mounted on light standards or other utility poles are unacceptable.

5.3.9. Regulation Signs:

5.3.9.1. Regulation signs have three sub-categories: Highway/Traffic, Installation Warning, and Parking Regulation. Signs in all three categories should be kept to a minimum number as they can be confusing and clutter the appearance of an installation.

5.3.10. Highway/Traffic Signs:

5.3.10.1. This handbook does not include Highway Traffic signs since this category is normally not regulated by the installation. Specific information can be found in the Manual on Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration.

5.3.11. Installation Warning Signs:

5.3.11.1. Legal requirements for AF installation-warning signs, controlled area signs, and restricted area signs are contained in AFI 31-209, *The AF Resource Protection Program*, and AFI 31-101, *The AF Physical Security Program*.

5.3.11.2. Use the Air Force installation warning sign, controlled area sign, and restricted area sign at all personnel and vehicle entry points. Both the message and the background panel for all installation warning signs must be reflective. This type sign is often overused. Restrict the number and location of signs to those absolutely necessary to ensure security and control and as required by the applicable regulation. More signs only lead to confusion and clutter without improving security and control.

5.3.11.3. If working dog teams are used inside or around a posted area, the military working dog team notice should be placed directly below the sign panel.

5.3.11.4. Several other notices, such as a solicitation warning or photography prohibition, may be required by regulation at installation entry points. These notices should be placed directly below the installation warning sign or they may be combined on a separate sign structure. Such signs should only be erected in response to a need, not just “in case they may be needed someday”.

5.3.11.5. The characteristics of these signs must be exactly as defined in UFC 3-120-01 *Air Force Sign Standard*. Authorized types of warning signs for AFSPC are both the E1 and the E2 type signs.

5.3.12. Parking Regulation Signs:

5.3.12.1. Where possible, reserved parking should be designated by area, not individual spaces, as individual designations change frequently. Use flag-style signs or arrows within signs to bracket multiple reserved parking in order to avoid the visual clutter of numerous signs.

5.3.12.2. Where individual parking spaces are designated, the sign should be painted metal on low posts (approximately 4 feet high) beyond the curb. Avoid mechanically attaching signs to the curb. Designations painted directly on the curb are unacceptable.

5.3.12.3. Design and color of parking signs should match other signs on the installation.

5.3.13. Motivation Signs:

5.3.13.1. Motivation signs have their place on AFSPC installations, but they must be carefully controlled to assure they do not become an eyesore or a nuisance. Electronic message signs can minimize the need for separate motivational signs.

5.3.13.1.1. Motivation signs must be included in the installation sign master plan. They must be consistent with the objective they are designed to promote.

5.3.13.2. Type F1, F2, and F3 motivation signs, as defined in UFC 3-120-01 *Air Force Sign Standard*, are authorized on AFSPC installations.

5.3.13.2.1. Normally only two type F1, motivational signs are authorized on an installation. One should be at the air terminal entrance to the installation, and the other at the main road entrance. If there is not an air terminal entrance, only one type F1 motivational sign should be installed. Neither should be used if the installation has electronic message signs.

5.3.13.2.2. The type F1b changeable letter sign is not authorized except at the air terminal entrance if electronic message signs are not installed on the installation.

5.3.13.2.3. The type F3 unit morale sign, if used, must have a brown background when the unit emblem is displayed.

5.3.14. Information Signs:

5.3.14.1. These signs are useful to provide educational information for visitors and installation personnel. Examples of information signs include signs explaining exhibits or monuments and signs giving directional guidance to pedestrians. Informational signs are required to show hours of operation for Services Facilities. Also included are signs at hazardous waste accumulation sites and points.

5.3.14.2. Illustrations on informational signs should conform to the standards provided in UFC 3-120-01 *Air Force Sign Standard*. They should be installed only where necessary and must be consistent with the characteristics of other signs on the installation. They normally do not require lighting or reflective materials.

5.3.14.3. Monumental type informational signs are discouraged.

5.3.14.4. As informational signs are typically for the use of pedestrians, paths or walkways are usually necessary to the sign from a parking lot or main circulation route. These paths may be gravel, or hard surfaced depending on the usage and other conditions. Gravel paths should be edged to prevent the intrusion of vegetation and to define the desired walkway.

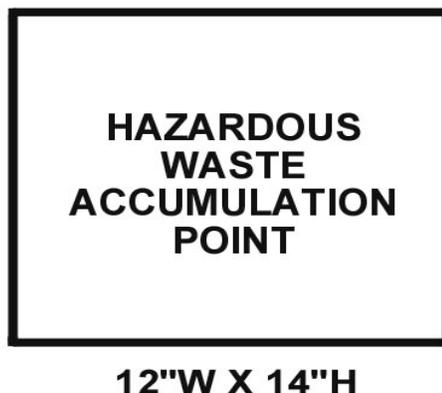
5.3.14.5. Landscaping in the vicinity of the sign and the exhibit(s) provides a finished appearance and professional setting.

5.3.14.6. Both G1 and G2 informational signs are appropriate on AFSPC installations. They must conform to the standards established in UFC 3-120-01 *Air Force Sign Standard*, except that the graphics may be omitted if they provide no useful information. In some instances, the lettering (but not the sign) may also be larger.

5.3.14.7. The standards for the hours of operation signs for Services facilities are out-lined in a policy letter from AFSPC Services dated Oct 2000.

5.3.14.8. One hazardous waste accumulation point sign is required at each accumulation site or point. It should be affixed to the gate or door of the accumulation enclosure. Characteristics of the sign are as shown in **Figure 5.1**. below.

Figure 5.1. Hazardous Waste Accumulation Point Sign.



5.3.15. Electronic Message Signs:

5.3.15.1. These signs are an effective way to reduce overall signage, keep information current, and more quickly respond to changing information requirements. Their use is authorized and encouraged at AFSPC installations. They should be located only at primary entrances to the installation and, where applicable, on or near the Base Operations building as the principal arrival point at the installation. They should be permanently mounted on a base or on the Base Operations building.

5.3.15.2. Include landscaping and other amenities to provide a setting for the signs.

5.3.15.3. At entrances to the installation, these signs will normally be oriented to be visible to incoming traffic a minimum of 200 ft. beyond the Entry Control Facility.

5.3.15.4. Signs should only provide information about events important to a large number of people on the installation.

5.3.15.5. Designate an organization to be responsible for the message content. Only authorized personnel should have access to the equipment, which controls messages.

5.3.16. Military Family Housing Signs:

5.3.16.1. The name and rank of family housing occupants may be displayed at or on all quarters. Due to various configurations of the quarters these signs cannot be located in the same place for all buildings, but should be visible from the main street and be consistent for color, style, and mounting technique throughout the installation for the same type of buildings.

5.3.16.2. Name and rank signs may be painted on a suitable sign material or may be of the slip-in type. Any type of sign painted directly on the building is unacceptable.

5.3.16.3. Colors should match the other signs on the installation where possible, but may vary if necessary for contrast with the building on which they are mounted. They should not be of bright colors.

5.3.16.4. Address signs are to be posted on the buildings and must be visible from the street and consistent for the same type of buildings. Address signs will have only the address number, not the street name. Address signs and name/rank signs are not to be combined on the same sign.

5.3.16.5. Each building will also have a separate building number sign installed (not painted) on the building. As much as possible, these signs shall be located consistent with other building number signs on the installation.

5.3.16.6. Lettering, color, size, etc. for all three signs should be uniform for the same building.

5.4. Signs For Historic Buildings:

5.4.1. Applicability:

5.4.1.1. Historical buildings and buildings eligible for designation as historical buildings under AFI 2-7065, *Cultural Resources Management Program* will not have signs attached except for building numbers and address signs. Building number signs must be anchored only in masonry joints or other readily repairable features of the building to avoid permanently defacing the building. Building name signs will be freestanding.

5.4.1.2. In no case should signage engraved in the facade of a historical building be removed.

5.5. Wall Mounted Signs:

5.5.1. General:

5.5.1.1. When attaching logos (or any signs) to buildings, special care must be taken in selecting the method and location of anchorage to minimize defacing the building when it becomes necessary to change the logo or sign. The attachment hardware will be a nonferrous metal to prevent rust streaking the building finish.

5.5.1.2. Usage of the individual, raised letter style should be limited to major buildings, which require sign changes very infrequently. This style sign should provide the functional name, not the organizational name, i.e. "Personnel", not XXst Personnel Squadron. Size the letters in proportion to the building or the installation standards.

5.5.1.3. Colors for raised letters should be brushed, clear aluminum, Standard Brown, or a contrast with the wall on which they are mounted. Colors for contrasting letters will be approved by the Installation Commander or his/her representative.

5.5.1.4. As the letters are applied directly to the surface of the wall rather than to a background panel, they must compete with the architectural details of the building. A minimum 12" capital letter is typical for one and two story administrative buildings. Larger letters are used on larger buildings. The Helvetica typeface should be used, in either medium or regular, depending on the building characteristics.

5.5.1.5. Wall mounted signs should be illuminated only if individuals unfamiliar with the installation normally use the building during hours of darkness.

5.6. Typography, Graphics And Sign Placement:

5.6.1. General:

5.6.1.1. Graphics on buildings are not permitted. Graphics include building large names and numbers, “racing stripes”, murals, slogans, shields, crests, and pictographs. Large size (super-graphic) facility signs are not acceptable.

5.6.1.2. All lettering and numbers will be Helvetica regular or medium as specified in UFC 3-120-01 *Air Force Sign Standard*. Lettering rules must strictly follow the guidance provided.

5.6.1.3. Good judgment is the key to deciding where the lines in a sign message should break. The lines should be balanced so that the sign does not look awkward. Usually, single ideas or names should appear on the same line.

5.6.1.4. As a rule, numbers should occur as numerals, unless otherwise specified in the authorized unit name.

5.6.1.5. Names should be spelled out in full whenever possible. If abbreviations are required, they must be official Air Force abbreviations.

5.7. Sign Mounting Details:

5.7.1. General. Materials and installation should conform to UFC 3-120-01 *Air Force Sign Standard*.

5.7.1.1. Anodized or factory treated and permanently colored aluminum tubing or square steel stock is preferred for facility signposts. Ensure the selected material is used throughout the installation and is architecturally consistent with the standards set for the installation for style and color.

5.7.1.1.1. Posts for traffic control signs should be non-galvanized metal (if they are to be painted) or a vinyl sleeve over post if galvanized metal or tubular aluminum is used.

5.7.1.2. Signs other than those governed by the *Manual on Uniform Traffic Control Devices* (MUTCD), warning signs, and morale signs with specific graphics will be reflective sheeting engineer grade brown with white letters.

5.7.1.2.1. Reflective signs must conform to *Federal Specification LS-300C* and the MUTCD. The reflective sheet must be LS-300C, Type 1, Table III, Reflectivity II (high intensity encapsulated lens) for building numbers, regulatory, warning, street names, directional signs, and building identification signs.

5.7.1.2.2. LS-300C, Type 1, Table II, Reflectivity I (engineer grade) may be used for less critical signs, such as parking signs.

5.7.1.3. Aluminum or galvanized steel should be used for signs to reduce the possibility of rust.

5.7.1.3.1. Aluminum stock should be 12 gauge (.0808 inches) or thicker.

5.7.1.4. Posts and cross-members, mounting hardware, and exposed sign backs must be painted or factory coated to match the color of installation building architecture and local sign standards. Reflective sheet color will be engineer-grade brown on sign face.

5.7.1.5. Assure that all vertical sign posts are plumb and square with the sign face. All horizontal members are to be level and square with sign-faces. Signs should face oncoming traffic and be structurally capable of withstanding local wind conditions.

5.8. Emblems:

5.8.1. General:

5.8.1.1. Emblems may be attached to buildings; however, frequent changes in building occupancy and logo design cause changes, which are expensive and can leave multiple fastener holes in the building finish. Therefore, the attachment of emblems to buildings should be minimized.

5.8.1.2. Buildings will normally have no more than two shields. Where multiple shields are used, the higher echelon shield will be on the left, when facing the sign.

5.8.1.3. All emblems and regalia shall be consistent with the AF Heraldry standard.

5.8.1.4. Shields will not be replaced just to conform to these standards. Replace shields only when the organizational unit changes, or when deteriorated or damaged.

5.8.1.5. If pictograph symbols are used on any sign, use the standard pictograph symbols shown in UFC 3-120-01 *Air Force Sign Standard*.

CHAPTER 6

FACILITY EXTERIOR STANDARDS

6.1. General:

6.1.1. Elements. Building exteriors are the basis for the most lasting impression of an installation. This impression results from the relationship between scale, massing, proportion, texture, color, proximity to streets and other buildings, and many other elements. To achieve excellence, these elements and their interrelationship to new construction or renovation projects should be considered to enhance the facility's exterior appearance with the natural surroundings. For example, the right exterior color scheme can result in a dramatic improvement to not only the physical appearance of the facility but also to the surrounding area. It must also be understood that the appearance of a facility could be downgraded because of too many exterior elements in the vicinity. These elements should all be addressed in detail in the installation's Comprehensive Plan. AFSPC units tenant on another MAJCOM/DoD installation will adhere to the host command architectural standards and facility exterior policies.

6.2. Roofs:

6.2.1. Standard. The AFSPC standard is to have all roofs sloped to provide positive drainage and to preclude rainwater or melting snow from ponding on roofs.

6.2.2. Materials:

6.2.2.1. Roofs may be of many different types of materials, consistent with the installation architectural theme. Standing seam metal roofs are a cost effective roof system and are recommended where consistent with the architectural theme.

6.2.2.2. Avoid gravel roofs whenever possible since they are difficult to maintain, continually shed gravel, and are easily damaged when maintenance work is required on roofs or roof mounted systems. In many instances, however, gravel surfaced built-up roofs are the only feasible alternative. In these situations, minimize roof-mounted equipment and install walking surfaces to access the equipment that must be roof mounted.

6.2.2.3. Incorporate, where appropriate, high-albedo roofing materials. High-albedo materials can save cooling energy directly by reducing the heat gain through a building envelope. 'Albedo' is a measure of the radiation reflected from a material compared to that falling on it. With high-albedo (reflective) materials, up to 85% of the incident short-wave radiation can be reflected, thus reducing the heat gain in buildings. Significant savings in cooling energy may be possible. Depending on the type of high-albedo surface, the typical lifespan ranges between 10-50 years. In addition to saving energy, high-albedo paints and coatings can increase the life span and structural integrity of roofs. Less maintenance may be required.

6.2.3. Equipment. Avoid roof mounted equipment whenever possible. Where roof mounted equipment, appurtenances, vents, etc. are needed, they must be screened to complement the building architectural style, massing, materials and color schemes. No unpainted or mismatched objects should be visible.

6.3. Doors And Windows:

6.3.1. Glazing. Windows should be a minimum of double glazed, and in extreme climates triple glazing may be cost effective. Where blast protection is called for consider laminated glass with appropriately deep frame bite. Factory applied tinting is acceptable, but should be limited to gray or neutral colors. After-market tinting is strongly discouraged because of the added maintenance burden it creates and because it is not sufficiently durable.

6.3.2. Frames. Window frames of factory-finished aluminum are preferred. Anodized aluminum window frames reduce maintenance costs and are virtually maintenance free for the life of the window. Where blast protection is called for use frames of the appropriate gauge and depth of bite on the glazing to help ensure the frame does not fail to hold the glazing due to an over-pressure.

6.3.3. Doors. Exterior doors in all facilities must be durable and meet safety requirements. Access to all facilities must meet ADDAG and UFAS standards.

6.4. Exterior Wall Finishes:

6.4.1. General:

6.4.1.1. Exterior wall finishes should be consistent with the architectural style adopted for the installation, and as maintenance free as possible. Brick, exposed aggregate concrete panels, color impregnated stucco, factory finished metal panels, exterior insulation finish systems, and textured concrete masonry block are acceptable types exterior systems. Use the appropriate integral or factory applied color to achieve the best life cycle cost.

6.4.1.2. When constructing new facilities minimize the amount of painted exterior wall and trim. Wherever possible, use prefinished systems for trim and appurtenances such as rain gutters and downspouts.

6.4.2. Materials:

6.4.2.1. Concrete block with integral color is an acceptable exterior wall finish for facilities in industrial areas and storage warehouses, but it should be minimized in high traffic areas. Plain concrete masonry block is not acceptable as an exterior finish in medium and high use areas and for facilities with a high customer service population. Depending on the architectural style of the installation, architectural concrete masonry units, such as split face block, fluted face block, and shadow block may be effectively used as an exterior finish. Integrally colored masonry units matching the installation color standards will preclude the high costs of recurring maintenance and painting. Masonry block and mortar must be sealed with an appropriate integral or applied sealant to prevent water absorption, infiltration and efflorescence. Avoid using paint on concrete block whenever possible.

6.4.2.2. Wood is not recommended as an exterior wall finish material because of its high maintenance cost and susceptibility to decay.

6.4.3. Paint:

6.4.3.1. Paint is a common exterior wall treatment. Exterior paint colors must be compatible with the surroundings and consistent with the installation architectural and color theme. Where paint is necessary for the exterior of a facility, use only non-lead, no-VOC (Volatile Organic Content) or low-VOC paints. All paint must meet Environmental Protection Agency's (EPA) recommended recycled-content for reprocessed latex paints. For GSA procurements, EPA recommends that procuring agencies refer to the Commercial Item Description (CID) A-A-3185 when purchasing

reprocessed paint. (<http://www.epa.gov/cpg/products/paint.htm>). Control the number of color schemes used on the installation. Avoid having more than three acceptable schemes if possible.

6.4.3.2. Change colors only when existing surfaces need repainting. Ensure the correct paint color scheme is included in the recurring paint program.

6.4.3.3. If radomes require painting, white is the only acceptable color to minimize heat/solar absorption.

6.4.3.4. Exterior equipment (transformers, meters, air handling units) should be painted the same color as adjacent surfaces so they will blend in and become less visible and obtrusive. The goal is to minimize the visual impact of the equipment. Avoid painting all equipment and appurtenance dark brown. Dock bumpers, guardrails, bumper posts, and similar apparatus should also be painted to blend with the surroundings, consistent with safety requirements.

6.4.4. Paint Plan. Develop a Paint Plan for the installation, defining the installation color schemes and trim colors to be used on each facility type or defined area on the installation. Areas of the installation, which have unique architectural or design characteristics, should be defined as such within the standards. Variations to architectural themes and color schemes can elevate the overall aesthetic experienced when moving from one area to another. Retain professional design assistance in selecting the exterior colors and styles. Avoid large areas of bright color and colors that fade easily. Strive to create continuity without causing monotony when defining color schemes.

CHAPTER 7

INTERIOR STANDARDS

7.1. Interior Design Objectives:

7.1.1. General. The impact of interior design on the well-being and productivity of our people is extremely important as most of our time is spent indoors. Integration of engineering, architectural, and interior design considerations result in the creation of a “seamless” interior. The structural, electrical, and mechanical systems enhance the architectural and interior design features and vice versa. The combined elements of each discipline should create a fully integrated environment where the occupant loses sight of the “how” and “why” the facility works and simply enjoys being there.

7.1.2. Philosophy. Quality interior design reflects “understated excellence” and assures that facilities are attractive, sustainable, environmentally safe, operationally efficient, and maintainable. The interior designer must strive for sound, economical, functional, and aesthetic design achievements. Well-designed facilities satisfy the user’s needs, install pride in ownership, and promote productivity in the workplace. Standards for interior finishes and furnishings must be an integral part of the installation FEP.

7.1.3. Function. Functional interior design ensures that each aspect of the interior environment performs efficiently for the user. A good working relationship between the user and designer will help accomplish this goal. Each facility type presents unique functional requirements that will ultimately affect the selection of finish materials and furnishings. It is important for the designer to investigate all aspects of these requirements through the user.

7.1.4. Cost Effectiveness. All interior selections must reflect the best buy for the Air Force in terms of aesthetic value, maintenance characteristics and life-cycle costs. Inexpensive, short-term solutions do not necessarily produce cost savings over time.

7.1.5. Durability. Durable designs and finishes help facilities pass the “test of time.” The designer must be concerned with material durability and wear while considering budget restrictions and monetary resources. Selection of quality materials and products must also be appropriate to the function and level of use. Extra consideration must be given to products specified in heavy-use areas and specific functional areas.

7.1.6. Maintainability. The use of easily maintained finishes is critical. While certain finishes may provide excellent durability, the designer must give serious consideration to maintenance and the effort required maintaining the appeal of certain products. It is critical to be familiar with finishes that wear well with low maintenance requirements.

7.1.7. Compatibility. Each installation has its own architectural and environmental compatibility plans reflecting regional, environmental, and architectural considerations. The designer should be familiar with the installation’s plans to achieve a unified sense of scale, tradition, and facilities excellence.

7.1.8. Design. Facilities must meet as many “human” needs at as many levels as possible, especially the need to feel good about one’s surroundings. Working and living environments are increasingly within the control of those who design and build them. The design team’s responsibility is to provide a facility, which fosters productivity and job satisfaction. Well-designed interiors can provide an envi-

ronment that contributes to achievement at work and enhances pleasure and relaxation in recreational facilities.

7.1.9. Creativity. Budget constraints place increased importance on design creativity. Proper planning and research of innovative design features will help the designer provide quality facility interiors within restricted budgets.

7.1.10. Flexibility. Flexible designs are essential to meet the dynamic requirements of our mission. While the primary function of each facility must be the priority, the designer must keep in mind that functions evolve, and facilities may require future modifications. Rapid technological advancements often demand upgraded equipment, power and communications requirements.

7.1.11. Timelessness. The elements of pure design, including structural expression, suitability of materials, harmonious visual and tactile features, and classic furnishings will always remain the foundation of good design. Designers should avoid trendy or dated finishes and design features. Interiors should be creative but not extreme, reflect quality but not opulence, and be capable of being updated without requiring major changes to materials, spaces and functions.

7.2. Interior Design Approach:

7.2.1. General:

7.2.1.1. A professional Interior Designer, qualified by education, experience and often, state registration, is concerned with space planning, functional layout, life safety codes, sustainable design, American with Disabilities Act compliance and the selection of furnishings and materials to fulfill the functional requirements of interior spaces. AFSPC expects architectural and engineering firms, the Naval Facilities Engineering Command, and the Army Corps of Engineers to use qualified professional Interior Designers. AFSPC encourages wing commanders to establish an interior design position on the base engineer staff to provide design and technical review expertise. All too often, poor interior design negates much of the effort and cost expended on a facility by the other design disciplines.

7.2.1.2. The Interior Designer begins to formulate solutions for a design only after they have a clear picture of the user requirements and the installation's FEP. The information can be accumulated through meetings with users and surveys conducted by the interior designer. As much information as possible should be gathered at the onset of design to eliminate surprises at later stages of the design.

7.2.2. Programming. Military interior design projects are typically classified into the two categories shown below and are many times programmed differently depending on the type of project and past history. Refer to the *AFCEE Interior Design Presentation Handbook* for information on programming for interior design projects. There are two types of interior design packages and they both relate directly to the other. Funds for interior finishes and furnishings must be an integral part of the programming documents.

7.2.2.1. Structural Interior Design (SID). The process involves the selection and coordination of interior materials and finishes that are part of the building or are built-in permanent items. A SID is required for all projects to get a completed finished facility.

7.2.2.2. Comprehensive Interior Design (CID). This process involves designing, selecting, and developing interior materials, finishes, special effects, and furnishings for an integrated visual

design theme (architectural and interior design). CID requirements, therefore, include structural interior design features. The furniture part of the package includes accessories, artwork, lamps, trash receptacles, chalk and tackboards, signs, window coverings, plants, chairs, desks, files, tables, etc. This process includes developing an environment for a totally compatible architectural and interior facility.

7.2.3. Space Planning:

7.2.3.1. Personal/Public Spaces. Provide for the personalization of each user's space including display of personal items, within limits. Develop a clear definition between the public and private areas of a facility.

7.2.3.2. Traffic Flow. Traffic patterns must be arranged to allow for an orderly flow of operation and adhere to life safety codes. Provide a clear understanding of the horizontal and vertical circulation. Create major and minor spaces that will establish focus, attention, and orientation. The first dominant major space is the entrance to a facility, which should be designed as a visual focal point that leads into the other major and minor spaces throughout the facility. Signage is a very critical element in the success of a working traffic pattern. Circulation paths should anticipate and accommodate the number of personnel in the facility.

7.2.3.3. Functional Relationships. Consider different groups of people and their working relationships. Identify and prioritize which employee/work groups need to be located adjacent to each other. Identify the relationships and interactions of individuals within a work group.

7.2.3.4. Status And Function. Identify special requirements for circulation, public/private space separation, VIP areas, informal gathering spaces (coffee bars, break rooms, and shared equipment space), and storage (filing, coats, supply, etc.). The occupant's rank and position will influence the square footage and selection of materials.

7.2.3.5. Equipment Usage. Identify all equipment and its users within each facility or each area of the facility. Provide equipment sizes, electrical requirements, ventilation requirements and weight if heavy. Remember that almost all administrative spaces have computers and supporting equipment.

7.2.3.6. Efficient Use Of Space. Maximize the use of all spaces for their functions.

7.2.3.7. Flexibility. Recognize that future modifications and function changes may require adjustments within a space to accommodate staff size changes and new technology.

7.2.3.8. Aesthetics And Comfort. Create an atmosphere that increases human comfort and efficiency in a pleasing way. Visual comfort as well as ergonomically comfortable furniture needs to be considered.

7.2.3.9. Recycling. Identify and create a location where recycling activities shall occur. Materials to be considered for recycling are office paper, aluminum cans, cardboard, and newspapers. Check with the Environmental Flight for the type of materials currently being collected at the installation.

7.3. Architectural Design:

7.3.1. Codes And Regulations. Applicable AF instructions, policies and pamphlets, as well as life safety, fire codes and local and federal regulations must be followed in all designs. Identify all appli-

cable codes early in a project to minimize the need for reselections or rework. Be aware that codes apply to furnishings as well as finishes. All Air Force facilities now have to comply with the *Uniform Federal Accessibility Standards* (UFAS) and the *American Disabilities Act* (ADAAG).

7.3.2. Location Influences:

7.3.2.1. There may be site-specific factors, which influence design solutions. It is the designer's responsibility to determine which factors need consideration and determine the best method of addressing each.

7.3.2.1.1. Architectural Compatibility with Existing Facilities. The existing local architecture (Design Context) must be considered when determining a facility's architectural characteristics. Significant positive design elements that exist in the "design context" can be used to create continuity in the fabric of the installation. Using elements that exist in the design context such as the repetition of colors, lines, textures, shapes, proportions and massing of forms will help ensure the new or renovated facility looks as though it belongs to the existing context of the installation. The goal of architectural compatibility is to create continuity while avoiding monotony. Where no significant elements exist within the adjacent context, the designer should look to the regional context to establish an architectural character. The Facilities Excellence Plan must define and document architectural style or style areas on the installation. The designer must work with the project architect to ensure the complete coordination of interior and exterior designs for the best interest of the user and function of the space. The interior and exterior should have recurring lines, shapes and color to create an overall impression of compatibility.

7.3.2.1.2. Historic Preservation Requirements. The National Historic Preservation Act requires federal agencies to consult with the State Historic Preservation Officer and Advisory Council on Historic Preservation regarding proposed changes to properties listed on or eligible for listing on the National Register of Historic Places. The Secretary of the Interior Standards for the Treatment of Historic Properties provides guidelines for making sure that selections do not compromise a facility's historic integrity.

7.3.2.1.3. Cultural Beliefs and Customs. Many nationalities and religious groups attach significance to certain colors, patterns and materials. Some are considered sacred, good influences and prestigious, while others are considered taboo. For instance most Western cultures consider black the color of mourning. Some Middle Eastern groups wear head coverings of patterns significant to their nationality or religion. The designer must investigate any customs or cultural influences that might become protocol issues.

7.3.2.1.4. Current Mission. Each individual mission in AFSPC dictates certain design features and requires that our facilities address the unique tasks at hand. For example, sometimes windows are downsized or eliminated due to mission requirements. In these cases, designers need to emphasize other architectural elements and finishes to ensure a pleasant atmosphere for the users.

7.3.2.1.5. Availability of Materials and Resources. Some materials are not readily available or economically shipped to all locations. When designing a project for remote locations, consider cost, import/export rules, and availability before specifying a product.

7.3.2.1.6. Special Climatic and/or Maintenance Problems. The designer must take into account local climatic conditions when selecting materials and finishes. Special maintenance

requirements should be identified for heavy snow or rain, very arid or humid climates, exposure to salt water, unusual soil conditions and sand, and high levels of sunshine.

7.3.2.1.7. Security Requirements. The user must provide information regarding any special security requirements that need to be included in the project and validate and provide information from the appropriate agency before design begins. When dealing with facilities that have special security needs, security clearances might have to be obtained for the designer and contractor completing the job.

7.3.2.1.8. Environmental Considerations. It is extremely important that Environmental Flight personnel be consulted during planning for any new construction or major renovation to ensure cultural and historic constraints are identified and considered. These personnel will help assure compliance with public laws, such as the Clean Air Act, Clean Water Act, Endangered Species Act, Historic Preservation Act, and with Presidential Directives dealing with pollution prevention, energy conservation, affirmative procurement (EPA Guideline Items) and others.

7.3.3. Noise Levels. Designers should consider both interior and exterior noise levels. Proper acoustical design depends on a careful ratio of reflective to absorptive surfaces so that excess reverberation and disturbing sound intensity levels can be eliminated. The type of noise disturbance and function of the space will determine the adequate level of sound control (white noise).

7.3.4. Light. Light and its affect on the environment are critical to the interior design of a space. The quality and placement of light sources are as important as light level in obtaining the functional and the aesthetic intent of the spatial designs. The designer should be aware of how the light source affects space perception, finishes, colors, and textures when making design decisions. The function of the room or facility will influence the system type and amount of lighting required.

7.3.4.1. Numerous studies show that natural light and use of full spectrum fluorescent light positively affects both physical and mental health. In the work environment, people tend to have more job satisfaction if they have some contact with natural light through windows, skylights, atriums, and the use of full spectrum light sources. The project architect and the user must work with the designer to provide natural lighting in the most functional, cost-effective manner. The interior designer should be involved in the selection of artificial light fixtures and sources to help ensure: functional and aesthetic compatibility, elimination of glare and color washout, assurance of color integrity and finish materials, flexibility in light control, adequate supplemental light for maintenance where required, proper lamping (bulbs) per fixture based on life cycle cost and replacement lamp availability, compliance with life safety codes.

7.3.5. Proportion. Room dimensions should be appropriate for the function. This is easier to accomplish in new facilities, although many things can be done in renovation projects to change the perceived size of the room or space without actually changing its dimensions. Some of these are discussed in the Color Concept section. The designer must create a balance between a space and the furnishings within it. The scale and mass of items placed within a space greatly affect how that space is perceived and its usability. The interior should be comfortable for the user without feeling crowded or under furnished. Furnishings within a space must also relate to each other in a harmonious manner providing focus and balance for the viewer.

7.3.6. Physical And Behavioral Requirements. Human comfort and well being are priority considerations. The minimum physical requirements include appropriate levels of lighting, temperature,

humidity and background noise. Some individual control of these elements is desirable. As with all aspects of design, the function of the space will determine the desirable amount of user control, depending on individual or group preference, the activities involved, and time spent within the space. The designer must address the behavioral needs of the occupants, including safety and security, privacy, personal space, and visual/directional orientation.

7.3.7. Color Concept. Color preference is very personal, and individual interpretation of color varies widely. However, the true properties of color are constant. The designer must have knowledge of these properties and their relationship to the functional, spatial and lighting aspects throughout the space. The designer and user must separate personal taste from professional design. The following general guidance directs attention to special areas of consideration when selecting color schemes for facilities.

7.3.7.1. Timeless Appeal. Provide timeless color coordination that will be attractive to the majority of people.

7.3.7.1.1. Use neutral colors for permanent background finishes to support a variety of color schemes, i.e., architectural materials such as ceramic tiles, stone, and bathroom fixtures.

7.3.7.1.2. Vary the intensity of color and create patterns to provide visual relief from the monotony of neutral colors.

7.3.7.1.3. Use accent colors for finishes that are subject to periodic change and to create interest in focal points. For example, carpet, wallcoverings, upholstery, and panel fabrics.

7.3.7.1.4. Provide small amounts of intense color in accessories and artwork for visual stimulation.

7.3.7.2. Space Perception. Use color to enhance the spatial qualities of an area.

7.3.7.2.1. Use warm colors to make a room seem smaller, more “human” in scale. Warm colors appear to advance toward the viewer.

7.3.7.2.2. Use cool colors to make a room seem larger and more spacious. Cool colors appear to recede from the viewer.

7.3.7.3. Color Breaks. Use fewer color breaks to make a room seem larger. Many color breaks may make a room look cluttered.

7.3.7.3.1. Paint doors (if applicable) and frames to match the walls in small rooms.

7.3.7.3.2. Avoid accent walls. The use of chair rails and wainscots tend to reduce the size of smaller spaces. Consider the size and scale of the room when a chair rail and wainscot is used.

7.3.7.3.3. Blend wall color with colors found in the carpet.

7.3.7.4. Pattern and Texture. Use pattern and texture to stimulate interest and tie the color schemes together.

7.3.7.4.1. Consider the size of an item when deciding whether it should have a pattern and the size of a pattern to use.

7.3.7.4.2. Vary the surface texture to add visual appeal in a one-color scheme, especially when the introduction of a new color is not desirable.

7.3.7.4.3. Textures affect the way an object reflects light. Smooth, shiny surfaces reflect more light than rough, dull surfaces.

7.3.7.4.4. Glossy surfaces are perceived as cold, while softer, matte finishes are distinguished as warm.

7.3.8. Material Selection. Innovative and creative use of finishes and furnishings is always encouraged. New products are always being introduced to the market and often offer increased performance and aesthetics to the product line. Continuing education in product knowledge and research into product development are essential when making finish and furnishings selections. There are various factors that should be considered when making selections.

7.3.9. Research. New product development should be investigated as well as availability and reliability of existing products and services. A check of user satisfaction in similar facilities may help in making critical design decisions.

7.3.10. Durability. The function of the space will determine the amount of durability required for example a maintenance hangar vs. family housing. Aesthetics and how the finish/materials relate to the other design elements must also be considered, as well as cost justification.

7.3.11. Maintenance. The use of easily maintained finishes is critical. While certain finishes may provide excellent durability, the designer must also give serious consideration to maintenance requirements. The maintenance plans of many facilities have minimal quality assurance. Finishes that wear well and are lower in maintenance requirements perform best. Establishing a maintenance schedule is the user's responsibility with coordination from Civil Engineering.

7.3.11.1. The designer should provide manufacturers suggested maintenance information and emphasize the importance of a regular maintenance schedule to the user. Indicate special products required for the maintenance program.

7.3.12. Life Cycle Cost And Appeal. The designer must consider product performance and longevity of appeal, as well as initial cost when making selections. If the appeal of the surface of a furniture item degrades, the user will want to replace it prematurely. A product that keeps its appearance and shape longer may be a better choice over time even if the initial cost is higher.

7.3.13. Product Quality and Performance. Numerous studies show that quality does not necessarily cost more. Quality products perform better and wear longer. Usually these products are backed by manufacturers' warranties to assure the customer's continued satisfaction after installation is complete. Select finishes and furniture items from manufacturers that honor their warranties and have a successful record of standing behind their product. Users need to ensure they keep the warranty information on hand and get items fixed promptly by the manufacturer. Users that do their own fixes may void the warranty.

7.3.14. Environmental Factors. Avoid the use of finishes, adhesives, or furnishings that emit toxic fumes or pollutants during installation and curing. Use paints that do not contain VOCs materials (EPA Guideline Items under the Affirmative Procurement Program). Designers today must consider the effects their selections have on the environment over time. Consider products that are made from recycled materials (EPA Guideline Items under the Affirmative Procurement Program).

7.4. Design Development:

7.4.1. Design Communication:

7.4.1.1. The design development process begins after the designer has a clear picture of the design intent and requirements of the facility. The designer must communicate effectively with the users so their needs are met. During the development of the design, the designer is required to make presentations to convey ideas and make sure everyone understands the design. Design documentation is necessary to illustrate the comprehensive design theme and interior detailing. The designer should provide written explanations such as a design narrative to help the user understand the design and why specific selections were made. Various visual presentations, including renderings, elevations, perspectives, finish and furniture boards must be provided to the user for approval. Renderings and finish boards must clearly illustrate the carefully planned and well-coordinated color concept.

7.4.1.2. The user's satisfaction is an important goal, in addition to the longevity of the design. Educate the user to appreciate the long-term quality of the design. Ensure there is an opportunity for the user to give direct input throughout the submittal process and at each stage of the design development. The final design should not present the user with any surprises or issues not previously identified and addressed.

7.4.2. Required Documents. Specific guidance, presentation format and detailed information on the development of the Structural Interior Design (SID) and Comprehensive Interior Design (CID) packages can be found in the HQ AFCEE *Interior Design Presentation Format Handbook*. The Handbook explains in detail the sections and drawings required during the submittal process and the presentation format. It includes a CID cost estimating guide as well as A-E contract information and an index of reference standards to be used by the Interior Designer during design development.

7.5. Design Execution:

7.5.1. Implementation. Once final approval of the design concept and finishes has been accomplished, a completed design package must be submitted. The contract documents must clearly convey the design intent and provide the information necessary to implement and construct the design. The HQ AFCEE *Interior Design Presentation Format Handbook* provides information on required documents.

7.5.1.1. Scope Of Work. A brief but thorough description of work to be performed by the contractor should be prepared by the designer. This is used by the contracting agent to synopsize the project in the bid advertisement.

7.5.1.2. Drawings. Drawings give a flat picture of the final design and are used by contractors for bidding and construction information, as well as by the customer for adequacy of space and function. The drawings also show demolition plans, new floor plans, reflected ceiling plans, design features, utilities, and finish material placement among other things. Drawings should clearly show the location and type of furniture, as well as elevations for placement of artwork and signage.

7.5.1.3. Specifications. The product specifications are very critical for achieving a successful final product. They must be very detailed to ensure the AF receives quality products, materials and craftsmanship. The specifications should be very tightly written and closely reviewed.

7.6. Interior Design Standards:

7.6.1. Philosophy:

7.6.1.1. The diverse AFSPC mission requires many different and unique facilities to support our programs and people. This presents a challenge for designers regarding quality standards, use of materials, functional requirements and budget limitations. Standardizing interior building finishes throughout AFSPC facilities establishes a benchmark of desired results. Many facilities are multifunctional and accommodate many different organizations, which makes one single set of standards difficult to apply. Following the installation FEP helps ensure a facility keeps its architectural integrity and interior scheme as functions change.

7.6.1.2. The text on the following pages defines standards for building finish materials according to finish application, and criteria for individual building type and functional areas. These standards should be used as general guidelines for choosing the most advantageous products available. Due to varying locations, circumstances and requirements, alternate material choices may be required. The designer must research these with the user early in the project.

7.6.2. Finish Materials. All finish materials must meet current National Fire Protection Association standards, fire codes, abrasion/wareability testing, and ADA requirements. It is the user's responsibility to ensure a product meets all required tests, not the manufacturer. Request verification documentation from the manufacturer; don't rely on the words of a sales representative. The manufacturer can supply technical information with signed test results showing what their product meets or exceeds. If they cannot provide you with test information, do not use them. Where reasonable, order an additional 5 to 10 percent of finish materials to use for replacement and repair. This eliminates trying to track down matching materials in the future.

7.6.2.1. Characteristics:

7.6.2.1.1. Flooring Materials . Floor surfaces should be selected with both function and aesthetics in mind. Durability, resistance to wear, ease in maintenance, comfort underfoot and slip resistance are important features.

7.6.2.1.2. Natural finish or sealed concrete floors are limited to maintenance areas, utility rooms, electrical rooms, storage areas and mechanical rooms. Chemically stained concrete can be a cost effective and attractive way to finish a high use floor area, i.e. lobbies, locker rooms, casual snack bar areas.

7.6.2.1.3. Carpet or carpet tile should be used in most facilities unless functional requirements dictate otherwise. Exceptions are service, maintenance and industrial areas, laboratories, food preparation areas, toilets, and areas requiring frequent cleaning. Only patterned carpets with distinguishable designs of two or more colors and not shades of the same color are authorized. Avoid light colors, bold geometric patterns, and subdued tweeds. This does not include Services facilities, which allow larger patterns in clubs and lodging lobbies. For specific requirements, minimum quality features, types and use locations, and selection guidance refer to ETL 03-3 *Air Force Carpet Standard* and the HQ AFCEE *Carpet Selection Handbook*.

7.6.2.1.3.1. Carpet appearance and durability depend on technical characteristics. Carpets with brand name nylon fibers will wear better and provide more resilience than those made from polyester, acrylic, or olefin fibers. Both fiber and yarn construction affect the luster, dyeability, and crushability of carpets.

7.6.2.1.3.2. Patterned carpets help to "mask" soiling in traffic areas. Use solid colored carpets in executive suites, courtrooms, chapels, and DV type lodging facilities or as a bor-

der or inset. When selecting carpets use a large piece. A small piece will not accurately show all colors or the overall pattern. The carpet sample should be viewed from the floor to see what it will actually look like. Holding it up to your face or looking at it on a color-board attached to a wall is not a true representation.

7.6.2.1.4. Tile. In high traffic areas and/or wet areas use a ceramic mosaic tile, quarry tile, or paver tile with an integral color throughout. Tiles are excellent for durability and low maintenance. These areas include building entries, reception counter areas, food lines, vending areas, food preparation areas, laundry areas, toilets and lobbies. Minimize using tile with smooth glossy finishes, as they tend to be very slippery. It may be used as an accent tile in limited quantities. Grouts should be dark in color to hide stains and should be smallest as possible to avoid staining and fallout of grout material in time.

7.6.2.1.5. Rubber flooring. Is appropriate for vending areas, stairs, landings and some entry areas. Use one consistent color and type throughout a facility. Special rubber stair treads should be used for the stairways.

7.6.2.1.6. Vinyl Composition Tile (VCT). VCT or Linoleum should be limited to maintenance areas, break rooms, vending areas, storage rooms, utility rooms and high traffic corridors. For areas where carpet is not practical or is too costly, VCT or Linoleum may be used with creative patterns or borders. Sheet goods should be used rather than tile in areas where multiple seams are a clean-up problem. This includes clean rooms, laboratories, childcare centers, and medical rooms.

7.6.2.1.7. Raised Flooring. Special consideration must be given when using a raised flooring system in computer mainframe areas and laboratory spaces. These floor systems provide access to the wiring system in the floor and should utilize anti-static conductive floor tiles and/or carpet tiles (below 2.0 KV).

7.6.2.1.8. Recessed Walk-Off Mats. Use in vestibules and on the interior side of doors that open directly to the outside to protect the carpet or tile surfaces. Avoid mats with complicated or garish designs.

7.6.2.1.9. Wall Base . Use rubber base for its durability. A cove style base with a lip at the bottom should be used with rubber flooring and vinyl flooring. A straight style base should be used with carpet. Use pre-formed corners.

7.6.2.1.9.1. Wood base is recommended in upgraded areas. Stain is preferred over painting.

7.6.2.1.9.2. An integral cove base with sheet vinyl flooring should be used in areas where sterilization is a concern. This leaves no seam for liquids to collect. This includes clean rooms, laboratories, childcare centers, and medical rooms.

7.6.2.1.9.3. A tile base should be used with all tile floors. A cove style tile should be used that coordinates with the flooring tile.

7.6.2.1.10. Wall Materials. Interior walls serve various purposes in a facility such as sound dampening, spatial separation, and privacy. A balance between aesthetics and functional needs must be met.

7.6.2.1.10.1. Gypsum wallboard is the minimum standard except for utilitarian areas. Concrete masonry units are restricted to utility rooms, janitor closets, electrical rooms, storage rooms, heavy equipment stairwells and maintenance areas or bays. All other existing block should be furred with gypsum wallboard or filled and covered with wall covering.

7.6.2.1.11. Paint. Use an eggshell or satin paint finish on the walls. A flat paint is not as durable and tends to show scuffmarks quicker. An epoxy semi-gloss paint should be used in moist areas such as kitchens, toilets, laundry and medical rooms. All interior paints should be lead free, with no Volatile Organic Content (VOC) or low VOC.

7.6.2.1.12. Wall coverings. Can be used to add visual interest, soil hiding, enhances design characteristics, and coordinate an overall color scheme. All types of wall covering (vinyl, fabric or acoustical) should be selected for each specific situation depending on the functional and durability requirements. Vinyl Wall coverings are categorized as follows:

Type I (Residential) - 7 oz per sq yd minimum, used in distinguished visitors suites, GOQs and light-use areas

Type II (Commercial) – 20-22oz per sq yd minimum, used for medium-use areas and high-use areas, corridors, and VQ and TLF units.

7.6.2.1.12.1. Acoustical Wall Coverings may be used in auditoriums, education/ training rooms, conference rooms, dining halls, projection rooms, executive areas and large open lobbies. There are various types of acoustical wall materials and wall panels available that vary in levels of soundproofing. Usually the cost rises with a higher level of soundproofing material.

7.6.2.1.12.2. Fabric Wall Coverings can be used in executive suites and executive conference rooms. Some fabric wall covering is hard to maintain and clean and should only be used in specialized areas unless it is manufactured as easily maintainable. All fabric wall covering must meet Fire Codes including a Class A rating and the UBC 8.2 *Corner Burn Test*.

7.6.2.1.13. Ceramic Tile is appropriate for use in all toilet and shower areas. As a minimum, tile must be used on all walls behind wet areas. Tile is preferred on all walls in these areas. Accent colors or varied shapes of tile can be used as a design feature.

7.6.2.1.13.1. Quarry and ceramic tile, brick, glazing and glass block, and decorative polychromatic coatings can be used as function and budget requires.

7.6.2.1.14. Wood. When wood is used for the walls it must have a Class A fire rating. Wood-look pressboard paneling is unacceptable.

7.6.2.1.14.1. Do not use gypsum wallboard prefinished with wallpaper or vinyl wall coverings. This material requires a seam between each panel. The visible seam is not associated with quality permanent construction. The wallboards are very difficult to patch when dented or scratched.

7.6.2.1.15. Chair Rails. Use chair rails in areas where there is high incidence of damage to the walls. This includes corridors with cart traffic, lounges, equipment storage areas and

rooms with perimeter seating. A durable wood chair rail or molded impact resistant plastic bumper guard should be used to protect the wall surface.

7.6.2.1.15.1. Place the chair rail at heights proportional to the wall height and at the appropriate height where the items will be damaging the wall. Usually 36 inches above the finished floor for chair rails and 40 inches for corridors with housekeeping carts.

7.6.2.1.16. Fire Extinguisher Cabinets. All panel boxes and other equipment boxes should be recessed in the wall and match the wall color. All conduit, telephone wires, computer cables, pipes, etc., should be concealed behind the walls or in soffits. All electrical switch plates, electronic devices, fire alarms, and light switches should match in color and coordinate with the overall color scheme and wall color. Ensure any fire alarm equipment that is painted to match the room color is manufacturer applied as to not void the warranty. Door hardware should be standardized throughout an entire facility.

7.6.2.1.17. Ceiling Materials. The appropriate scale of a space is often determined by the height, lighting and detailing of the ceiling. Exposed ceilings should be used only as a deliberate design element or in maintenance areas, utility rooms, and electrical/mechanical rooms.

7.6.2.1.17.1. Gypsum wallboard or plaster ceilings should be used in billeting, residential facilities, toilets, locker rooms, and dormitory sleeping rooms. Water-resistant gypsum board must be used in wet areas. Ceilings should be painted 'ceiling white', which is specially formulated for maximum light reflection.

7.6.2.1.17.2. Acoustical ceiling tile set in a suspended grid reduces the amount of sound that travels within the space and surrounding areas and offers access to structural, mechanical, communication and electrical systems. Ceiling tile standard is a white 2 ft by 2 ft tile with a white grid. Black tile with black grid may be used for projection rooms. A medium to light textured or fissured tile should be used. A heavy texture tile tends to look dirty on the ceiling as it casts shadows. There are many different styles and types of tile available on the market with varying characteristics. Appropriate research should be done to ensure a quality product that meets individual requirements.

7.6.2.1.17.3. Metal ceilings may be used in high visibility areas if planned and designed carefully. Recommend for some high visibility areas a combination of different ceiling treatments along with accent lighting (not track) be used for added interest and design. This is appropriate for public areas, common areas, conference rooms and executive suites.

7.6.2.1.17.4. Equipment added to the ceiling such as speakers, microphones, security devices, HVAC vents, and fire suppression system must match the ceiling color and not create an eyesore. Recess this equipment whenever possible.

7.6.2.1.18. Lighting. Natural, ambient and task lighting should be provided in all areas. Architectural interest can be achieved with coves, soffits, up-lighting, recessed fixtures or with wall mounted fixtures such as sconces rather than just the typical 2 ft by 4 ft or 2 ft by 2 ft fluorescent fixtures. In every case, energy consumption must be considered in the design and energy consumption minimized by using the most energy efficient fixtures and materials that will satisfy the design requirements.

7.6.2.1.18.1. Overall ambient lighting in administration areas should be provided with 2 ft by 2 ft fluorescent fixtures integral to the 2 ft by 2 ft ceiling grid system. Task lighting and flexibility of control should be provided at each individual work area.

7.6.2.1.18.2. Use incandescent or quartz-halogen lamps in dining rooms lodging rooms, food preparation areas, toilets, and other areas where true colors rendition is important.

7.6.2.1.18.3. Floor lamps and table lamps should be used in living areas and lodging to create a home-like feeling.

7.6.2.1.18.4. Lighting in the corridors needs to be carefully planned to avoid accentuating the length.

7.6.2.1.18.5. Bare bulbs are unacceptable. Use fixtures with a diffuser, lenses, globe, or have them concealed by a cove or soffit. Install uniform fluorescent lamp type (all warm white, or cool white etc.) in an area or facility and replace with matching type when re-lamping. Broken, worn or discolored lenses should be replaced with matching lenses.

7.6.2.1.18.6. Lighting fixtures need to be carefully selected and spaced. Excessive glare or color can occur if not carefully planned. All wall sconces must meet the ADA guidelines.

7.6.2.1.19. Window coverings. Use window coverings that enhance the overall design scheme and meet the functional requirements.

7.6.2.1.19.1. Use black out draperies in all sleeping rooms.

7.6.2.1.19.2. Maintenance, industrial and laboratory areas should use blinds and not draperies, as they are easier to clean and maintain. Use neutral colored horizontal blinds 1 in wide or vertical blinds 2 in to 3 in wide for most applications. Areas that receive direct, high intensity natural light should consider a blind or window covering with a film that cuts out the glare but still allows natural light to filter in.

7.6.2.1.19.3. A 100 percent inherently fire retardant fabric such as Trevira, Visa, Avora, or FR Polyester fabric should be used for draperies to meet fire standards and allow machine washing. Drapery hardware should be commercial grade, rated for heavy duty. All draperies should be lined with like fabric content as the face of the drapery, with exact matching pleats and weighted at the bottom for proper hanging. Draperies in executive areas should have a sheer behind the drapery for a more formal look.

7.6.2.1.20. Upholstery. Consider the wearability and abrasion testing when selecting upholstery. An industry standard for test wearability is the Wyzenbeck test, measured by “double-rubs” (DR). All upholstery manufacturers should be able to provide testing information. The minimum “double-rubs” is given by functional group and category in **Attachment 2 Tables 1-9**.

7.6.2.1.20.1. Use a patterned fabric, or stain resistant fabrics for areas where there is high probability of staining. The pattern will help hide the stain. Do not use a solid colored fabric for large items of furniture as it will show staining and wear.

7.6.3. Functional Requirements:

7.6.3.1. Functional groups have been created to cluster similar facilities together that have the same requirements. Each functional group has a reference chart in **Attachment 2 Tables 1-9** that illustrates the types of material selections appropriate depending on the “use” category. Specialized functional areas are addressed to provide specific design requirements needed to make the area functional.

7.6.3.2. Some facilities do not fit easily into only one functional group. In these cases, the designer must use judgment in determining the proper blend of interior finishes and furnishings. Examination of several functional groups may be necessary to compile the requirements for one project. For instance a building in the office/administrative group may include a large cafeteria thus requiring information from the food service group.

7.6.3.3. Categories of use as identified in **Attachment 2 Tables 1-9** are:

HEAVY-USE AREAS: wet areas (restrooms, kitchens, laboratories), high traffic areas, and areas requiring maximum product durability

MEDIUM-USE AREAS: Areas used every day, but not by large numbers of people

Generally the finishes do not experience heavy wear and tear

LIGHT-USE AREAS: Areas that experience low traffic and light daily use

7.6.4. Functional Groups:

7.6.4.1. Residential. The residential category is composed of Military Family Housing, unaccompanied personnel housing (dormitories) and missile alert facilities. Attachment 1 provides a convenient reference chart for the types of materials that are most suitable in different use conditions. Refer to the *Air Force Family Housing Guide* and *Enlisted Dormitory Design Guide* for more details.

7.6.4.2. Hospitality/Lodging. Transient housing facilities, consisting of both visiting personnel quarters, and temporary living facilities, fall under the hospitality and lodging category. Carpet corridors in hospitality/lodging facilities to create a welcome inviting feeling. Use solid surface transaction counters and kick plates on all lobby and registration desks. Attachment 2 contains a reference chart for materials that are suitable in different use conditions for hospitality and lodging facilities.

7.6.4.3. Food Service. Food service facilities include dining halls, flight kitchens, open mess facilities (officers and enlisted clubs), snack bars, and cafeterias. Most areas in these facilities can be considered heavy-use because they are subject to high traffic and frequent food and beverage spills. Carpet is required in the seating areas of dining halls, Officers, NCO, and Airmen’s clubs, and golf course clubhouses. It is also desirable in seating areas of some other food service areas such as large cafeterias in administrative areas. Some food service facilities may have wood, metal or other structural materials used for a decorative affect. Structural and mechanical elements can be exposed if blended in the overall design scheme. Consideration should be taken to provide dedicated areas for shared use of microwaves, refrigerators, and counter space with the appropriate amount of space as well as electrical outlets. Use materials that will baffle the noise from the kitchen and dishwashing room. Provide attractive menu boards that coordinate with the room finishes and are easily changeable in the field without having to remove the entire board. Attachment 3 provides a convenient reference chart for the types of materials that are most suitable in different use conditions.

7.6.4.4. Office/Administrative. Office/administrative areas often have the highest number of occupants. These areas vary from private offices, to open bay workspaces filled with conventional and modular furniture, to large arrangements of systems furniture. Consider all areas carefully when selecting finish materials. Care should be taken to coordinate and conceal the electrical, communications and LAN cables. Carpet should be used for all corridors and stairwell landings that are not accessed from a loading dock, industrial area or delivery area. Conference and meeting rooms should be carpeted to help with acoustic controls. Attachment 4 provides a convenient reference chart for the types of materials that are most suitable in different use conditions.

7.6.4.5. Maintenance/Warehouse. Maintenance/warehouse facilities include all functional areas in which vehicles or heavy equipment are operated, chemicals are used, there is exposure to weather, produce dust and dirt, and bulk items are stored. Most areas within these facilities fall under the heavy-use heading. Attachment 5 provides a convenient reference chart for the types of materials that are most suitable in different use conditions.

7.6.4.6. Recreation. Recreation facilities encompass the most diverse functions of all the categories. They include gymnasiums, fitness centers, golf course clubhouses, bowling, youth, child-care, and community centers, skating rinks, libraries, and theaters. Facilities such as fitness centers have constant traffic throughout the day, while facilities such as theaters have high concentrations during short periods. Golf courses, clubhouses and bowling centers contain food services. Many of these facilities require a specialized flooring treatment for each activity and acoustical wall treatments to control sound. Attachment 6 provides a convenient reference chart for the types of materials that are most suitable in different use conditions.

7.6.4.7. Medical. Medical facilities include medical centers, hospitals, clinics and pharmacies. It is important to design medical facilities that are inviting and comfortable for the patients. Consider the wide variety of people in different age groups that will be utilizing the facility. Dispensing window and counters should be large enough to allow room for filling out paperwork and transferring prescriptions. Special materials are available for health care such as antimicrobial flooring and carpet, and cubicle curtain. Attachment 7 provides a convenient reference chart for the types of materials that are most suitable in different use conditions.

7.6.4.8. Educational. Education facilities include grade and high schools for dependent children, specialized training facilities, professional and technical classrooms, and centers for college extension programs. Attachment 8 provides a convenient reference chart for the types of materials that are most suitable in different use conditions.

7.6.4.9. Chapel. Chapel facilities include all facilities on an installation used for worship. This includes community worship, individual meditation, pastoral counseling and religious education. The worship area is a very sacred place and receives a lot of traffic putting it in the high-use category. Although it is high-use it should convey warmth and beauty through the use of wood finishes and furnishings. Attachment 9 provides a convenience reference chart for the types of materials that are most suitable in different use conditions.

7.6.5. Functional Areas:

7.6.5.1. Entry/Lobby. Entrances and lobbies provide the first interior impression of a facility. The first impression of the facility will say a lot about the functions within the building. The architectural features found in the exterior design of the facility may be repeated in the lobby to provide a cohesive transition to the interior environment. Accent flooring design is an effective

means of introducing color or making a smooth transition to the corridors. Durable building finishes should be used to hold up to high traffic and exposure to the outside elements. A recessed access mat or a hard surface walk off area is a must prior to reaching any carpeted area.

7.6.5.2. Corridors. Avoid designing corridors that have a long “tunnel-like” appearance. Careful treatment and delineation of vertical wall surfaces from the horizontal floor and ceiling planes is critical. A combination of a chair rail, lighting that runs the length of corridor, and carpet border only enhances the length of a long corridor. Emphasize vertical elements for balance. Corridors can be made interesting by adding a flooring pattern, lighting to accent artwork, wall washing, or wall sconces.

7.6.5.3. Stairwells/Landings. Stairwells and landings should emulate the finish materials and attention to detail of the surrounding areas and not be treated as a separate entity. Stairwells can be used as a transition space that ties all floors together for a coordinated overall interior design.

7.6.5.4. Restrooms. Design restrooms for easy cleaning and maintenance, but not at the expense of quality. Restroom fixtures should be wall mounted for easy cleaning of the floors. Wall mounted accessories should include a towel source, mirrors; clothes hook for shower area and trash receptacle. All plumbing fixtures, electrical and switch plates, and accessories should be satin-brushed aluminum. All sinks should have a counter and a mirror that runs the entire length of the counter. Toilet and urinal partitions should be a baked enamel finish or if cost permits, plastic laminate. Do not use black seats on a white water closet. The entire water closet should be one color. Partitions for industrial areas should be prefinished metal. Ceilings in all bathrooms and locker areas should be a hard board, water resistant, painted surface. Flooring should be monolithic tile and walls should be tile behind wet areas. Tile is preferred for use on all walls.

7.6.5.5. Locker Rooms. Locker rooms should provide an adequate number of lockers, be well ventilated, and be designed with materials that are easily cleaned and appropriate for wet areas. Space between the top of the lockers and ceiling shall be finished and flush with the front of lockers to avoid dust collecting on top of locker units. Lockers should have a vent on the unit and incorporate a shelf and clothes hook.

7.6.5.6. Conference Rooms. Maximize the flexibility of conference rooms through the use of adjustable lighting, multipurpose seating, creative ceiling finishes, acoustical wall treatment, and multi-media presentation systems. Lighting combinations include fluorescence, incandescent can lights, indirect lighting, individual controls and dimming capabilities. Carefully plan the location of electrical outlets and consider floor-mounted outlets for audiovisual equipment and computers.

7.6.5.7. Break Areas/Coffee Bars. Break areas and coffee bars are important in the office environment to support the needs of the workers. These areas should incorporate a counter area with storage underneath. Designers need to consider a designated space and electrical outlet for a refrigerator, microwave, and possibly vending machines.

7.6.6. Furniture:

7.6.6.1. Specifications in this chapter provide the minimum standards for furniture procured by the AF. A very important feature to consider when purchasing any furniture item is the warranty. Research how each manufacturer deals with their warranties and response time. As a user it is important to use the warranties when a problem arises rather than fix it yourself. When a piece of furniture is altered without the manufacturer’s guidance or assistance, the warranty is void. Too

many times the AF does not use the warranty to its fullest extent. Several different categories of furniture exist with different funding sources.

7.6.6.2. Conventional Furniture. Conventional furniture is the arrangement of freestanding furniture, including, but not limited to: administration furniture, dormitory furniture, lobby furniture, dining furniture, etc.

7.6.6.3. Modular Furniture. Modular furniture is similar to systems furniture except that all work surfaces are floor supported rather than panel supported. It is also referred to as automatic data processing (ADP) or electronic data processing (EDP) furniture. Modular furniture is comprised of components that are usually field replaceable or field reupholstered. For example, a user can just replace a damaged arm rather than a whole chair on site without taking the chair out of commission.

7.6.6.4. Systems Furniture. Systems furniture is defined as the assembly of panels, components, and accessory items that are panel connected and panel supported to form complete individual offices (work areas). It is not freestanding/modular furniture enclosed by panels.

7.6.6.5. Pre-Wired Systems Furniture. Pre-wired systems furniture is that assembly of panels and components hard-wired directly into the building electrical system. The panels contain building utilities such as electrical wiring, convenience outlets, hook-ups for computer equipment and communications wiring.

7.6.6.6. Operational Seating:

7.6.6.6.1. Use a 5-prong base for stability. Casters should be a dual hard wheel for carpet or single soft wheel for hard flooring surfaces.

7.6.6.6.2. Arms should be replaceable or removable in the field. Use a molded plastic arm for most applications as upholstered arms tend to soil easily with high use.

7.6.6.6.3. Chair backs should provide upper back support and contour to provide lumbar support. The seat pan should angle slightly to the back for more comfortable seating towards the back of the chair and have a waterfall front to ease pressure on the back of the knees.

7.6.6.6.4. Conference table type seating requires a swivel/tilt mechanism and height adjustment. Task related chairs should have an additional back angle adjustment with an upright locking position, a seat pan adjustment and a back height adjustment.

7.6.6.6.5. All fabrics should be treated with soil retardant. Base, arms, outer shell and casters should be the same color if all molded plastic. In executive areas the arms may be wood or upholstered and the base may be wood. All other areas should use molded plastic arms.

7.6.6.7. Stationary or Stack Chairs:

7.6.6.7.1. This is multi-purpose seating with stacking, ganging, and tablet arm options. This is appropriate seating for briefing rooms, cafeterias, side chairs for conference rooms and offices, and training areas. When used for stacking purposes, purchase dollies to use in transportation. Tablet arms should be adjustable and move out to the side of the chair when not in use.

7.6.6.7.2. Chair frame should be chrome or a powder coated epoxy finish. Wood can be used in executive conference rooms or executive areas.

7.6.6.7.3. Use four posted legs for chairs that are stationary and not moved around much when occupied, such as perimeter seating in a conference room. Use a sled based chair for a sliding motion when scooting in and out from under a table or desk. Provide appropriate glides for either carpet or hard floor surfaces. Use clear glides on hard floor surfaces as black glides tend to leave marks.

7.6.6.7.4. Seating used in dining facilities or cafeterias should have “wipe-out channels” for ease of cleaning or a separate back and seat that do not touch. This eliminates an area for food to collect.

7.6.6.8. Lounge Seating:

7.6.6.8.1. This is defined as seating that is fully upholstered for lobbies, waiting areas, lounge areas, dayrooms, lodging rooms, and executive private offices.

7.6.6.8.2. All internal frame parts should be kiln-dried hardwood. All exposed parts should be cut from #1 common or better grade of hardwood with uniform grain and color uniformity.

7.6.6.8.3. Frame joints should be carefully fitted and secured with dowels. Frames must be reinforced with corner blocks, mitered to fit, securely glued and screwed into position while the frame is in the clamp to ensure squareness and tightness of joints. Frames held together by staples are unacceptable.

7.6.6.8.4. Seat foundation is to be 8-1/2 gauge sinuous wire springs clinched to insulated tie wires and strapped to the tie rails and back post. Back construction is 11-gauge wire spring construction stretched between top and bottom spring rails and secured with double staples. The spring system should be covered with noise free insulating fabric and stapled to the frame on all sides.

7.6.6.8.5. Seat to be cushioned with 1.80 lbs density polyurethane foam with 32 lbs of construction. Each seat cushion is wrapped with resin treated polyester fiber to give a smooth even finished cushion. The back and arm cushions should be 1.10 lbs density polyurethane foam with 20 pounds for back and 35 pounds for arms compression. Back and arms should be topped with blended fiber batting for a smooth even appearance. All units should be constructed to allow for field reupholstering and repair.

7.6.6.8.6. All upholstery should be treated with soil retardants. All patterns should be matched on the vertical and horizontal for a uniform pattern on the entire piece.

7.6.6.8.7. Waiting area seating for medical facilities should accommodate children, pregnant women, elderly, heavy or tall people, and the physically weak. All seating should have arms to aid people in and out of the seated position. Seats of the chairs shall be firm, level with the floor and not at a decline towards the back of the chair.

7.6.6.9. Tables:

7.6.6.9.1. Use a laminate top with a vinyl edging, self-edge, or solid wood edge. Wood veneer top is appropriate for conference rooms and executive areas. Tops should not exceed 30 inches in height for sitting applications, and 36 inches in height for standing applications.

7.6.6.9.2. Tops should be a one-piece construction unless the table length is too long to fit in a doorway and must come shipped in pieces. Core material must meet or exceed strength requirements for commercial standards. Particleboard must have a minimum density of 48 lbs

per cu ft. The core must be sanded top and bottom and without any rough edges. Laminate or veneer must be glued uniformly and evenly to ensure adhesion and stability. Applied edging must be mitered to ensure perfect edging. All wood edges must be a hardwood.

7.6.6.9.3. All bases must be appropriately sized to match the top. All metal bases should be a powder coated or chrome finish. Wood bases are appropriate for all wood table tops. There tends to be more maintenance as people kick the base under the table. All bases should have leveling glides. Suggest using several smaller tables to make one large conference table to allow flexibility in table arrangement and break-up. High quality folding tables may be used for dining rooms to allow changes in table layout.

7.6.6.10. Freestanding Office Furniture, Case Goods:

7.6.6.10.1. This category of office furniture includes desks, credenzas, computer tables, and bookcases.

7.6.6.10.2. Metal units with laminate work surfaces should meet the standards and construction of systems furniture, but be floor supported and stand-alone. Wood units should be a veneer with a hardwood edge. All units should have glides for leveling.

7.6.6.10.3. All drawers should be able to receive dividers. Dovetail construction should be used on all corners. File drawers must utilize full extension; stop action progressive slides with precision ball bearing for no metal-to-metal connection for a smooth, quiet operation. File drawers must accommodate various filing options.

7.6.6.10.4. All drawers should be lockable and keyed alike with removable cylinders for re-keying.

7.6.6.10.5. All desktops should have two grommets a minimum of 2 inches diameter in size to allow for electrical cords. Location of grommets will vary depending on application.

7.6.6.11. Filing Cabinets:

7.6.6.11.1. Metal cabinets should be rolled metal seamless on 3 sides with rounded corners for a smooth look. Wood cabinets should use a veneer with a hardwood edge.

7.6.6.11.2. All cabinets require an interlock system on drawers so only one drawer may be extended at one time. Drawers should have a ball-bearing suspension system with an anti-rebound device. Drawer pulls should be recessed so they do not get knocked off or get in the way of traffic.

7.6.6.11.3. All lateral files should have front-to-back and side-to-side filing options. Options should be allowed for a fixed shelf on five high units, roll-out shelves and drawers. All units should have glides or leveling devices to ensure drawers or doors open properly.

7.6.6.11.4. Color should be electro-statically applied at the factory.

7.6.6.12. Temporary Living Facilities And Dormitories:

7.6.6.12.1. Case Goods:

7.6.6.12.1.1. This furniture includes headboards and bed frames, nightstands, wardrobes, units with drawers and open shelves, TV armoires, desks, writing tables, dressers, chests, mirrors, end tables, and cocktail tables.

7.6.6.12.2. All solid parts and wood veneers should be northern red oak or equal hardwood for durability. The finished product can be treated and stained to get the color required to match the rest of the room. All furniture should be constructed of solid wood veneers or hardwood solids of five-ply plywood with wood veneers. Particleboard and cardboard are not acceptable. Back piece must be equal to the sides in thickness or a minimum of 1/4 inch. Desktops, end tables, coffee tables and nightstands may be surfaced in a plastic laminate to match the wood grain and finish of other exposed items. Hardwood impact edges should be used.

7.6.6.12.3. Drawer fronts, doors, desktops, and other components should be removable and replaceable on site. This extends the life of a product by changing individual damaged parts rather than ordering an entire new unit.

7.6.6.12.4. Preferred method of construction is a dry construction method with metal-to-metal connections. This method creates a stronger, more durable case due to the absence of glue joints, which tend to fail. The screws, hinges, etc. should be concealed or inserted into the solid lumber. This gives a clean, high quality look. Units held together with only glue and staples are unacceptable.

7.6.6.12.5. All drawer joints should have dovetail joinery. All pulls should be flush or recessed for dormitory furniture with high use. This prevents the pulls from being pulled or knocked off. Drawer bottom should sit in a grooved area of the drawer sides and be reinforced. Use epoxy coated metal drawer slides with nylon bearing rollers and have an automatic stop feature.

7.6.6.12.6. TV armoires and shelving units should have grommet holes in the back to run electrical and telephone cords. All large units should come with leveling glides.

7.6.6.13. Systems Furniture:

7.6.6.13.1. Systems furniture is the combination of various sized panels that support individual components to create a work area or workstation. Systems furniture is typically used in an open office plan and should not be used in individual offices. It is not cost effective to purchase panels to put up against existing walls that already provide privacy. Individual hard wall offices should use conventional or modular furniture. Systems furniture components consist of work surfaces, shelving, file cabinets, storage units, lighting, counters, and drawers. Accessory items include coat hook, tackboards, paper organizers, and shelf dividers.

7.6.6.13.2. Systems furniture allows for a high degree of flexibility in open office plans and flexibility in individual workstations. It is a modular system with a wide variety of components to choose from to meet the users needs. Specialized components are available to meet the needs of office areas, libraries, medical clinics and educational systems. Most systems provide hanging slots at 1" increments, maximizing height adjustment possibilities for all components. Systems furniture offers various electrical components and raceways and options for both ambient and task lighting.

7.6.6.13.3. Open office plan is the elimination of interior hard walls while maintaining essential divisions and building support, but not an enclosed division. Semi-private spaces are developed through the use of partial height panels arranged to facilitate the workflow and functional tasks. To accommodate the dual needs of privacy and communication, work areas should provide visual privacy one direction, but personal interaction when facing another direction. For more complex tasks and team settings, private work areas surrounding common

group areas should be provided. Use panels to separate adjacent work areas only where necessary to avoid excessively compartmentalized mazes. When designing open office plans, do not forget to plan dedicated areas for coffee, vending machines, coat storage, and break areas.

7.6.6.13.4. A single type or manufacturer of systems furniture should be used throughout an entire facility. A hierarchy of spaces should be designed that range from clerk/secretary level to office worker to supervisory levels based on workstation size and additional components needed per work area. Each standard workstation layout should be standardized throughout an entire facility.

7.6.6.13.5. Vary the height of the panels throughout an area to add interest and match specific function. Use a lower panel plus or minus 42 inches for reception or waiting areas permitting a longer viewing distance or for panels against a window. Use a plus or minus 60-inch panel for spaces requiring visual privacy and acoustical support when at a seated position. Panels that are taller than 60 inches tend to create an undesired maze or tunnel effect. Tall panels should be used to a minimum and can be incorporated into a design at various locations to add a vertical element. Panels that exceed 69 inches in height are considered to form corridors by Uniform Building Code and must meet exiting requirements.

7.6.6.13.6. Most of the office systems furniture typical layouts rely heavily or exclusively on square component shapes and orthogonal space layouts. The introduction of curved panels, panels placed at different angles, and panel windows will provide physical and visual relief, helping to break-up the “boxy” maze of repetitive spaces. Locations appropriate for this treatment include corner panels at the beginning or end of a series of paneled spaces, at intersections of circulation corridors, and at panels near reception areas. Acrylic glazed window panels are unacceptable as they exceed flame spread and smoke development requirements.

7.6.6.13.7. Acoustical performance ratings should be based upon the workstation design. While the sound transmission class (STC) and noise reduction coefficient (NRC) rating contribute to the overall acoustical performance, the acoustical role of panels is relatively minimal in the overall environment when compared to sound absorptive properties of other finish surfaces. In addition, panel hung components greatly reduce the quantity of acoustical contributing area.

7.6.6.13.8. When designing the layout and sizing of the electric distribution system serving pre-wired systems furniture the designer needs to consider other sources of harmonics and the cumulative effect of harmonics on upstream portions of the system. Harmonics cause distorted waveforms, a concentration of currents in the neutral and consequent heating of associated conductors and equipment. Since electronic data processing (EDP) equipment generates high levels of harmonics, a full size neutral should be provided for each EDP circuit. The panel electrical system should be 4-circuit/8 wire with two oversized neutrals to reduce the harmonic imbalance. An overall review of the electrical system should be done by a qualified electrical engineer prior to the purchase of the system furniture to be sure the building can support the new furniture.

7.7. Artwork and Accessories:

7.7.1. Artwork. Artwork for a building should be purchased by the AF for public spaces and common areas. This includes waiting areas, lobbies, corridors, conference rooms, break rooms, lodging

rooms, and recreational areas. Artwork for individual offices, dormitory rooms, and workstations should be left up to the occupant.

7.7.1.1. Artwork throughout an entire facility should follow set standards for matting and framing. There should also be a consistent theme. Suggestive or controversial subjects should be avoided. A facility with more than one floor can change their scheme on each floor as long as there is some type of transition.

7.7.1.2. Consider using security locks on any artwork located in areas where it may have a tendency to be pilfered. All artwork must be attached to the wall in a manner that keeps the piece straight and aligned.

7.7.2. Artificial Plants. Artificial plants should be purchased with a flame retardant finish.

7.7.3. Bulletin Boards/Tack Boards:

7.7.3.1. Bulletin boards or tack boards should be supplied at common areas to put up notices and announcements. Do not allow this type of information to be taped to the walls or on doors--it looks unprofessional and the tape takes the finish off the surface.

7.7.3.1.1. The type and style of board should match the signage found throughout the facility. It should coordinate with the other building finishes.

CHAPTER 8

INTERIOR SIGN STANDARDS

8.1. General Information:

8.1.1. Uniformity. Interior signage is an important information source and unifying element in all of our facilities. The AFSPC standard is to have all interior signage in a facility consistent and uniform in color, style, type, and format. To the maximum degree possible, this consistency should be maintained throughout an installation. Uniform signage looks professional and contributes to the organization's credibility.

8.1.2. Maintenance. Interior signage should conform to the standards established in UFC 3-120-01 *Air Force Sign Standard*. The interior signage system selected for a facility or installation should be easily maintained and as maintenance free as possible. Assure the sign system is flexible to accommodate frequent changes in personnel and office reconfigurations or relocations.

8.1.3. Compatibility. Ensure interior signs are compatible with interior architectural color schemes. Keep interior signs to a minimum. Ask: "Is this sign necessary?" Make work area signs clear and meaningful. Ask: "How important is this message?"

8.2. Interior Sign Standards:

8.2.1. Authorized Sign Types:

8.2.1.1. Building interior signs of type AA1, AA2, AA3, BB1, BB2, BB3, BB4, BB5, BB6, BB7, CC1, CC2, DD1, DD2 and EE1, as identified in UFC 3-120-01 *Air Force Sign Standard*, are authorized and appropriate at AFSPC installations.

8.2.1.2. Service, concession and regulation symbols, as identified in UFC 3-120-01 *Air Force Sign Standard*, are authorized and recommended for interior signage system use in AFSPC facilities.

8.2.2. Colors. Colors on interior signs for AFSPC facilities should match the building interior design scheme and do not need to be white letters on standard blue background as stated in UFC 3-120-01 *Air Force Sign Standard*. Sign colors should be dark background with light letters for high contrast. The background should be a dark neutral color, such as black, dark gray, bronze, blue, etc. Corners may be rounded, if preferred.

8.2.3. Americans with Disabilities Act Requirements. Interior signs must conform to the Americans with Disabilities Act requirements for facilities accessible to the public.

8.2.4. Mounting:

8.2.4.1. All interior signage must be mounted in a frame or in a signage system designed for and consistent throughout the facility. Door mounted signage is discouraged.

8.2.4.2. All interior signs in a facility must be mounted consistently. All signs of the same type must be mounted at the same height wherever possible.

8.2.4.3. Use easels for the display of large, rigid, temporary posters and announcements of short-term events. Taping notices of special events, temporary directions, etc., on walls, windows,

and doors is not authorized in AFSPC facilities as it damages the finish, increases maintenance costs, and is unsightly.

8.2.4.4. Smaller paper rosters, notices, and other unframed items of a temporary nature should be neatly arranged on a framed bulletin board. Rosters, notices, and photographs within individual cubicles or offices should also be framed or placed on bulletin boards. They should be neatly arranged and in good taste. Do not hang items on systems furniture that may tear the fabric.

8.3. Interior Sign Recommendations:

8.3.1. Characteristics:

8.3.1.1. While there are many different types and styles of interior signage, the following interior signage characteristics have been found to work well in our facilities and satisfy the essential characteristics of flexibility, durability, low maintenance, availability, and clarity.

8.3.1.1.1. Use a layered construction of acrylic sheet providing a removable strip with die cut vinyl letters for office symbols and occupant names.

8.3.1.1.2. The design should provide for a monolithic, one-piece look when lettering strips are in place.

8.3.1.1.3. Replacement lettering should be easily accomplished by maintenance personnel without requiring removal of the sign frame.

8.3.1.1.4. Interior lobby directories shall be non-illuminated and have replacement inserts. Only departments or room numbers shall be shown; individual names should not be posted. A directory with an area for a building diagram on the left and inserts on the right is the preferred AFSPC method.

CHAPTER 9

DORMITORY STANDARDS

9.1. General. The Air Force has established standards for dormitories published in the *AF Enlisted Dormitory Design Guide*. These standards apply to all AFSPC installations. AFSPC units tenant on another MAJCOM/DoD installation will adhere to AF standards and the host command's dormitory standards. Although the information contained within this guide pertains mainly to new construction, engineers, architects and programmers should attempt to implement the same types of features during major dormitory upgrades/renovations whenever possible.

9.1.1. Other Standards. In general, the standards under other chapters of this handbook are also applicable to dormitories; therefore, they are not repeated in this Chapter.

9.1.2. Perceptions. The dormitory neighborhood provides the first impression of the resident's home to visitors and new occupants. As such, it should be sited, designed, landscaped, and cared for in a manner, which allows the residents to feel they are an important part of the AF community. First impressions to visitors as well as dormitory residents are extremely important to long-term perceptions of the living conditions provided by the dormitory environment. These perceptions ultimately affect the individual's morale and work performance. The designer, program manager, and Base Civil Engineer must take these types of issues into consideration from project conception through construction completion. Thoughtful planning and creative designs can yield "homes" today's airmen so richly deserve.

9.2. Importance. Dormitory standards are required to maintain certain levels of quality in dormitories to support the mission and quality of life for personnel. The design of facility interiors directly impacts the quality of life for dormitory occupants. Interior scale, senses of place, order, and wholeness, harmony of color and texture, utility, economics, and safety must be synthesized with architectural spaces and user programs. Much can be done to enhance the appearance and perception of rooms and spaces of limited size through thoughtful configuration of plan, volume and openings, and well-scaled detailing, finishes, and furnishings selections.

CHAPTER 10

MECHANICAL SYSTEM STANDARDS

10.1. General. The purpose of this chapter is to familiarize the maintenance or design engineer with AFSPC guidance for the planning, maintenance, repair, design, tuning, and/or installation of mechanical systems in AFSPC facilities.

10.2. Applicability. AFSPC has established the following guidance for planning, designing, and operating mechanical systems throughout the Command. This guidance applies to mission critical and non-mission critical facilities at all AFSPC installations. The information contained within this guide pertains to the maintenance and repair of existing facilities and the construction of new facilities.

10.3. Standards:

10.3.1. The intent of this chapter is to provide AFSPC guidance in addition to the standing requirements to follow such as local building codes, MILSPECs, AFI's, etc.(see reference list at **Attachment 1**).

10.4. Concept. Mechanical systems vary vastly from installation to installation. Systems at the facility level are to adhere to the practices and/or directives that are prescribed by local building codes, military handbooks, AFI's, and engineering technical letters. However, to promote excellence in mechanical systems, each installation should have the following key elements to enhance base mechanical systems:

1. A design guide for mechanical systems: new and renovation
2. A master plan for the central Energy Management and Control System
3. An HVAC commissioning procedure
4. A joint Energy, Controls, HVAC working group

10.5. Design Guide. A base-specific design guide is the first step to ensuring that base mechanical equipment will be the most appropriate. Based on the base preferences, mission, climate, and other factors, it relays to the designer and contractor the basis for their design. It could prescribe preferred EMCS requirements, boiler and chiller type, condensing units, configuration requirements to ensure mission RAM, (reliability, availability, and maintainability), mechanical room requirements, location of air handling equipment, and any number of other installation preferences and standards. There are very few limitations on the breadth of the design guide. If you have a preference....this is the place to state it.

10.6. Master Plan For EMCS System. At many AF Space Command installations, the role of the Energy Management and Control System has been greatly expanded. Some EMCS systems have even changed their name to reflect this expanding role, and are known as Operation Management and Control Systems (OMCS). Every installation with a central system should have a plan for expansion and standard design instructions for new construction/renovation projects. The only practical limit to the uses of an OMCS is your imagination. There are opportunities to save energy as well as energy MONEY for example, by reducing demand charges, detecting water line leaks for immediate repair, etc. As technology advances and capabilities increase, the plan should be updated to ensure the systems' capabilities are maximized. In short, it should summarize what capabilities you currently have, how you are using them,

which do you want in the future, and how are you going to accomplish them. It should answer the question: How are you keeping up with technology?

10.7. HVAC Commissioning Policy. Critical to any buildings' proper operation are well designed, installed, and maintained heating, ventilating, air conditioning (HVAC) and supply systems. To ensure initial maximum possible efficiency, newly installed systems should be formally commissioned. This process should include the designer, installer, and shop personnel in tandem with formal classroom training on the operational scheme of the HVAC system.

10.8. Energy Conservation, Controls, HVAC, EMCS and Energy Savings Performance Contract (ESPC) Working Group. HVAC systems are typically the highest energy consumers on an installation. They also generate the most customer complaints if comfortable temperatures are not being maintained, as well as potential mission downtime. To address these issues concurrently, an installation can profit greatly by coordinating efforts on a day-to-day basis at the working level, as the areas of responsibility overlap extensively.

CHAPTER 11

CIVIL SYSTEM STANDARDS

11.1. General: The purpose of this chapter is to familiarize the maintenance or design engineer with AFSPC policy for the maintenance, repair, and/or installation of civil systems in AFSPC facilities. Civil systems, is the broad definition of those base infrastructure items such as roofing, pavements, and structures.

11.1.1. Applicability. AFSPC has established the following standards for civil systems throughout the Command. These standards apply to mission critical and non-mission critical facilities at all AFSPC installations. The information contained within this guide pertains to the maintenance and repair of existing facilities and the construction of new facilities.

11.1.2. Other Standards. The intent of this chapter is to provide some AFSPC guidance above and beyond existing codes and regulations. Also, a list of related guidelines, instructions, regulations, and other reference documents is found at the end of this chapter and you are encouraged to use this additional guidance in the design of civil systems. In addition to the reference documents, municipal, county, and state codes may provide further guidance for the engineer.

11.2. Roofs:

11.2.1. A computer system, such as Micro ROOFER, will be used for maintenance management of roofs. All roofs will be maintained to the extent that a Roofing Condition Index of 7 or better, as given the AFCESA Roofing Field Guides, is achieved.

11.2.2. As a general policy, installation of a water shedding roof system (pitched) should be considered on all critical facilities where cost effective designs are possible.

11.2.3. Slope conversion (flat to pitched) on rehab projects should be selected IAW AFI32-1051, *Roof Systems Management* and is aesthetically compatible with the surrounding theme.

11.2.4. Built-Up-Roof (BUR) systems will continue to be the standard bearer for low slope roofs (pitches less than 250 millimeters per meter or 3 inches per foot), however, elastometric single ply systems such as EPDM can be used if technically and economically feasible. IAW ETL 90-1, *Built up Roof Repair/Replacement Guide Spec* and ETL 90-8, *Guide Specification for Ethylene Propylene Diene monomer (EPDM) Roofing*.

11.2.5. All roof decks will be designed to provide a minimum of 1/4 inch per foot slope to ensure positive drainage. For cold climates, interior roof drains should be used at low points on low slope roofs instead of perimeter drains.

11.2.6. Roofing systems selected must consider fire resistance, loading requirements (dead, live snow/water and wind loads), and chemical pollutants.

11.2.7. Choose roofing systems appropriate to the building and weather conditions. Avoid complex roofing profiles that are difficult to waterproof, design, construct, and maintain. Minimize penetrations to roofs.

11.2.8. Structural Standing Seam Metal Roofing (SSMR) systems are excellent design choices and can be used if fully justified based on life cycle costs. In coastal areas, a minimum slope of 1/2 inch per foot should be used to lengthen the life of the panels.

11.2.9. The mounting of mechanical and electrical equipment on the roof should be kept to an absolute minimum. When unavoidable, equipment should be mounted on structural curbs or jacks using NRCA construction details.

11.2.10. All expansion joints, if required, should be placed at the high point on the roof, with drainage directed away from them. Expansion joints must allow movement in three directions.

11.2.11. In snow areas, snow guards should be designed on roof systems to preclude sudden falling of snow and ice.

11.2.12. Designers must show the relationship of the roofing system to roof decking and insulation as well as flashing materials and the building structure in the project design details. Ridges, valleys, eaves, parapet walls, transitions in slope or material, special conditions, and penetrations must be detailed by the designer on the project drawings. The NRCA Roofing and Waterproofing Manual provides excellent practical application guidance.

11.2.13. Roofing project specifications must require all parts of standing seam metal roofing systems to be of a single supplier and require that the manufacturer draw and certify the shop drawings for this system. The roofing designer must review the shop drawings to assure the intent of the project design is maintained. The specifications must require that the installer show proof of certification as a trained installer of the system provided. The specifications should require that the manufacturer's representative be on-site or readily available while the roof system is being applied to insure quality installation.

11.2.14. Generally, light colored reflective roofing systems, which are energy efficient, should be considered for use on all building roofs. Visual color compatibility and architectural continuity should be maintained. Geographic and environmental conditions, structural roof limits, life cycle cost effectiveness, and climatic circumstances should be taken into consideration for designing these roofing systems. Energy efficient roofing systems should conform to the base Facilities Excellence Plan (FEP). Energy Star™ systems should always be considered first for these roofing systems.

11.2.15. The methods of attachment of single ply roofing membranes to the roof must be carefully designed and all factors, especially weather and wind loadings, considered.

11.3. Pavement:

11.3.1. General:

11.3.1.1. The computer MicroPAVER Management system will be used to manage and maintain pavements. All pavements (airfield and road) will be maintained to the extent that they attain a Pavement Condition Index (PCI) of 70 or better.

11.3.1.2. Trenchless horizontal directional boring methods should be used to install utility lines/pipes under pavements in lieu of open trenching.

11.3.1.3. Maintenance and repair of existing pavement surfaces should conform as closely as possible to the original construction in design, material, strength, appearance, and texture.

11.3.1.4. Free draining base course under pavements and pavement edge drains should be provided to remove runoff water away from the area.

11.3.1.5. The traffic loadings must be carefully determined to safely design the thickness of the pavement structure. In addition, allowance should be made for future traffic requirements, which might increase these loadings.

11.3.2. Airfield Pavements:

11.3.2.1. Airfield pavements will consist of two general types: rigid (Portland cement concrete) and flexible (asphaltic concrete).

11.3.2.2. Rigid pavement should be used for all parking/maintenance apron areas, primary taxiways, and runway ends. While rigid pavement will remain the standard bearer, either rigid or flexible pavement may be used between both of the runway end areas.

11.3.2.3. Shoulders along taxiways and aprons subjected to jet blast, aircraft outrigger loads, and emergency vehicle loads should be paved with asphalt.

11.3.2.4. Overrun areas should be designed as flexible pavement in areas where soils there are unsatisfactory.

11.3.2.5. Jet fuel resistant joint compounds should be used in joints on aprons and holding pads.

11.3.2.6. Rigid pavement joints should be spaced not greater than 20 feet. Joint widths should be a minimum of 1/2 inch.

11.3.2.7. Slope gradients of pavements should provide positive drainage away from the pavement.

11.3.2.8. Airfield pavements will be kept clear of all snow and ice in accordance with the base snow and ice removal plan.

11.3.3. Road Pavements:

11.3.3.1. Pavement types for streets and roads should be selected on the basis of lower first cost, except where dictated by operational requirements. Flexible pavements (asphaltic concrete) will continue to be the road pavement standard bearer.

11.3.3.2. Pavement slope gradients should provide positive drainage away from the pavement.

11.3.3.3. Curbs and gutters should be Portland cement concrete and be provided for drainage and erosion control and protection of shoulders and pavement edges. Curbs and gutters should be constructed around main built-up areas of the base. Curbs and gutters should not normally be constructed along secondary perimeter roads and nonbuilt-up areas of the base.

11.3.3.4. Recycled waste materials such as rubber, plastic, and glass should be considered through prudent engineering design for application as admixtures in road pavements to improve properties and help the environment.

11.3.3.5. The recycling/reuse of old asphalt pavements should be considered with careful design for new road pavement construction applications to improve economies and the environment.

11.3.3.6. The recycling/reuse of old concrete pavements should be considered with sound design for new road base course under-pavement applications to improve economies and the environment.

11.3.3.7. The use of engineering fabrics should be considered for use in road pavements and base courses to retard reflective cracking.

11.4. Structures:

- 11.4.1. Design must consider both the life-cycle cost and maintainability features to produce reliable, energy efficient and safe facilities.
- 11.4.2. Design and construction should provide structures with present and continuing utility, durability and desirability, and will incorporate aesthetically harmonious colors, materials, and textures.
- 11.4.3. Local climatic conditions must be given serious consideration in selection, design and detailing of the structural system. Certain construction and environmental conditions can influence performance of the structure.
- 11.4.4. The siting of metal buildings at coastal locations should be avoided due to the corrosive environment. Durable, maintenance free non-metallic exterior wall systems should be used in these areas.
- 11.4.5. A structural system selection study and comparative analysis on at least three competitive structural systems should be accomplished at the concept project definition stage. A parametric cost analysis of each system should be performed for comparing alternate systems. The main structural members should be accurately sized and checked for compatibility with ceiling, duct, lighting, and other space demands.
- 11.4.6. Design loadings for service live loads, roof and floor dead loads, must be carefully determined to size structural members. Wind loads, lateral earth pressure loads, hydraulic uplift loads, seismic loadings, harmonic vibration loads, etc. must be considered in design along with those areas of the structure that may be affected by these loads. Also, allowance should be made for future requirements that might increase these loadings.
- 11.4.7. Special design considerations, such as blast, fire and shock requirements must be included.
- 11.4.8. Allowance must be made in the design process of the structure for equipment, cranes, hoists, and elevators. Also, handicapped design features must be included in the design of structures.
- 11.4.9. Where future expansion of the building is anticipated, design provisions must be carefully developed and accounted for so that projected construction may be added with minimum interference.
- 11.4.10. Protective construction features should be considered in all structural designs of buildings.
- 11.4.11. Structures should not be sited over active geological faults, unstable areas subject to landslides and soil liquefaction, or in areas subject to tsunami damage.
- 11.4.12. Exposed ferrous structural members which are located in severe corrosive environments must have protective coatings applied to them, such as inorganic zinc, epoxy, etc.
- 11.4.13. In corrosive environments, consideration should be given to the use of composites, galvanized steel, aluminized steel, etc. for structural beams and columns if structural loadings and codes will allow the reduction in strength of members.
- 11.4.14. Foundations for structures will be constructed of reinforced concrete or steel pilings of adequate strength and size to safely support all loadings applied to the soils beneath.
- 11.4.15. To obtain optimal seismic resistance and performance, a symmetrically configured structural framing system with effectively and efficiently placed lateral resisting elements (shear walls and braced frames) must be considered. Also, seismic considerations may require limits on the height of structures and design configurations.

11.4.16. Structures to be constructed in typhoon and hurricane areas will be designed so structural integrity and continuity are provided from the foundation to the roof, irrespective of the materials selected for the facility. Also, all components of the structure must be tied positively together to establish an overall integrated resistance to high wind effects.

11.4.17. New facilities and additions or extensions of existing facilities will be designed to provide the level of seismic protection required by TI 809-04, *Seismic Design for Buildings* and FEMA 302, *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* (Reference Air Force ETL 00-5, *Seismic Design for Buildings and Other Structures*).

11.4.18. Alteration, renovation, or improvement of existing facilities must include a seismic screening and evaluation as required by TI 809-05, *Seismic Evaluation and Rehabilitation for Buildings*. When found seismically deficient by evaluation, existing facilities must be upgraded to provide the level of seismic protection required by TM 5-809-10-2/AFMAN 32-1050(I), *Seismic Design Guidelines for Upgrading Existing Buildings* and FEMA 273, *NEHRP Guidelines for the Seismic Rehabilitation of Buildings* (Reference Air Force ETL 00-5).

11.4.19. Buildings will be designed with fire resistive features, within certain limits, such as structural stability to resist collapse in case of fire by protecting beams and columns, reducing surface to mass ratio of structural members, etc.; and fire containment to include such things as distance between buildings, fire resistant/treated materials, automatic fire sprinkler protection, fire walls/exits/doors, fire stops, etc.

11.4.20. Roof overload alarm monitoring systems using modern technology early remote warning methods such as laser deflection sensors, smart wireless strain monitor sensors, etc. will be considered for optional installation on structural roof trusses/girders/beams/joists for "high risk" category buildings/structures and based on sound structural engineering analysis and economic cost/benefit studies.

CHAPTER 12

ELECTRICAL SYSTEM STANDARDS

12.1. General: The purpose of this chapter is to familiarize the maintenance or design engineer with AFSPC policy for the maintenance, repair, and/or installation of electrical systems in AFSPC facilities.

12.1.1. Applicability. AFSPC has established the following standards for electrical systems throughout the Command. These standards apply to mission critical and non-mission critical facilities at all AFSPC installations. The information contained within this guide pertains to the maintenance and repair of existing facilities and the construction of new facilities.

12.1.2. Other Standards. The intent of this chapter is to provide AFSPC guidance above and beyond existing codes and regulations. For established standards it is suggested that you log onto the Air Force Departmental home page, <http://www.e-publishing.af.mil> and look in the 32 series "Civil Engineering" of the AF supplements to DOD publications. Additionally the latest addition of the National Electrical Code is an excellent source.

12.2. Interior Electrical Facilities:

12.2.1. Requirements for Conductors. All conductors shall be copper, except aluminum conductors of equivalent capacities may be used in place of copper conductors for sizes No. 4 AWG copper and larger. Use of aluminum conductors in mission critical facilities, dormitories, housing and transient livings facilities is further limited to service entrance conductors only, sizes No 4 AWG copper and larger.

12.2.1.1. Conductors No 6 AWG and larger shall have heat resistant insulation.

12.2.1.2. Conductors for power and lighting branch circuits shall be No. 12 AWG minimum.

12.2.1.3. Conductors must be properly terminated in accordance with the manufacturers recommended procedures.

12.2.2. Wiring Methods. Wiring methods and materials shall be according to the National Electric Code (NEC) with the following exceptions and limitations. Exposed wiring in all areas except for industrial areas shall use Surface Metal Raceways and Surface Nonmetallic Raceways as described in Article 352 of the NEC. This applies not only to new construction but also to remodel work.

12.2.3. Equipment Grounding Conductors. Types of equipment grounding conductors shall be as specified by the NEC and installed as required by the NEC. Additionally in mission critical facilities, dormitories, housing and transient living facilities all equipment grounding conductors shall be copper only.

12.2.4. Lighting Systems and Illuminance Values. Design interior lighting in accordance with the recommendations of the Illuminating Engineering Society (IES) Lighting Handbook, subject to the following modifications. The IES recommended minimum luminance values shall be maintained after considering all parameters that degrade light output, i. e. age, dust on reflectors etc.

12.2.5. Exterior Electrical Facilities. Wherever possible existing overhead power lines should be installed underground, this includes new and existing lines. Priority should be given to areas where safety may be enhanced, schools, housing areas, etc.

12.3. Uninterruptible Power Supplies (UPS):

12.3.1. Applicability. AFSPC has established the following standards for three phase Uninterruptible Power System (UPS) modules greater than 100 KVA. These standards apply to mission critical facilities with a Utility Reliability Requirement (URR) of .999, .9999 or .99999. The information contained in this guide pertains to maintenance and repair of existing facilities and the construction of new facilities.

12.4. Configuration:

12.4.1. Uninterruptible Power System. It is necessary for redundancy, that mission critical facilities with a URR of .99999 use a parallel redundant UPS configuration. This configuration electrically ties two or more UPS modules in parallel. Should one of the UPS modules in this configuration fail the remaining module(s) are capable of supporting the *full* rated load without interruption to the mission. Mission critical facilities with a URR of .9999 shall also use the parallel redundant configuration when practical or a parallel non-redundant configuration where the system will support the *typical* load if one of the UPS module(s) should fail. A reverse transfer (single UPS) configuration is suitable for other mission critical facilities.

12.4.2. UPS Battery Strings. To eliminate single point failures in facilities with a URR of .99999 or .9999 parallel battery strings must be used. The capacity of each string must support the full rated load for the amount of time necessary to prevent interruption to the mission. If it is necessary that the mission be provided power in excess of 15 minutes, emergency back-up generation should be incorporated into the system.

12.4.3. Ancillary Equipment

12.4.3.1. Battery Management/Monitoring Systems. Battery management/monitoring systems will greatly increase the life of a battery and reduce man-hours associated with the maintenance of the battery strings. Along with monitoring performance data during discharge the battery monitoring system should, at a minimum also monitor, float voltage, individual cell voltage, ambient temperature, cell to cell/connection resistance, and internal impedance (valve regulated batteries only). A battery management/monitoring system is recommended in all UPS battery configurations.

12.4.3.2. Remote Monitors. Whenever UPS modules cannot be directly monitored a remote monitor system must be installed to provide operators immediate information on the condition of the UPS. The remote monitoring system shall provide the same information monitored by the battery management /monitoring system.

12.4.3.3. Maintenance Bypass Switch Gear. It is necessary to install Maintenance Bypass Switchgear to facilitate maintenance and repair and reduce requiring extended mission downtime. The installation of this switch allows a technician to electrically remove the UPS from the load for preventative maintenance and trouble shooting thereby avoiding frequent and extended breaks in power. When practical the Maintenance Bypass Switchgear should be of the Make-Before-Break type to further prevent interruptions in power. Maintenance Bypass Switchgear is recommended for all UPS configurations.

12.4.3.4. Load Banks. To complete annual maintenance on UPS modules a load bank must be made available to the technician performing the maintenance. The load bank must be rated a minimum of 105% of the rated load of the largest UPS module in the system if the system UPS mod-

ules can not isolate for testing than the load bank must be sized for the system's load. It is recommended that facilities with a URR requirement have a load bank dedicated to the UPS system, preferably permanently installed. If a load bank is not permanently installed provisions must be made to have a portable load bank available as needed for maintenance and trouble shooting purposes.

12.4.4. Maintenance Practices. Maintenance for UPS systems including the batteries is categorized into two levels: Operator and Technician. The operator level is responsible for proper operating procedures, immediate corrective actions, and all preventive maintenance inspections not provided for by the technician. The Technician level is responsible for annual, semi-annual, and quarterly (where appropriate) maintenance and inspection. The Technician level is also responsible for any other action beyond the operator level responsibilities as described in the appropriate manufactures' operators and service manual. The using organization is responsible for ensuring that operators receive initial and reoccurring training and that technical support is available. The using organization is also responsible for having in place a scheduled maintenance program that includes all levels of maintenance IAW appropriate manufactures' manuals and Technical Orders.

12.4.5. Records. Historical records shall include all documents associated with installation and activation of the UPS system i.e. Base-line performance data, initial settings of equipment etc. Also include historical records of past maintenance and corrective actions. A journal of summary information describing action taken, when, and by whom should be kept with the equipment. This information must be posted near each control panel and include a summary-of-alarms check sheet that describes what alarms were indicated before system was last reset. Accurate record keeping will greatly enhance a technician's ability to restore equipment to operating condition in the event of a failure.

12.4.6. Lightning Protection. Certification is now required for technical engineers and others who work on Lightning Protection Systems (LPS) that protect mission critical facilities. Certification requirements may be obtained by contacting AFSPC/CEFO.

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The Civil Engineer

ATTACHMENT 1

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ATTACHMENT 2

DESIGN MATERIAL SELECTION CHARTS

Table A2.1. Residential Interior Design Materials Selection Chart.

HEAVY-USE		
MATERIALS	High traffic areas, entrance foyers, kitchens, bathrooms, stairwells, laundry, vending areas	
	DORMITORY	FAMILY HOUSING
FLOOR	Ceramic tile, quarry tile, vinyl composition tile	Ceramic tile, commercial grade sheet vinyl, wood, carpet (looped)
BASE	Ceramic tile, quarry tile, rubber base	Ceramic tile, wood, rubber base
WALLS	Ceramic tile, paint, wallcovering (type II vinyl)	Paint, vinyl wallcovering (type II)
CHAIR RAIL	Molded plastic, wood	Wood
CEILING	Acoustical tile, gypsum board	Gypsum board
LIGHTING	Fluorescent, incandescent	Fluorescent, incandescent
WINDOW COVERING	Vertical blinds, horizontal blinds	Shades, lined draperies, horizontal blinds
UPHOLSTERY	Vinyl, fabric (50,000+ DR)	NA
MEDIUM-USE		
MATERIALS	Corridors, hallways, dayrooms, family room, dining rooms, TV rooms, offices	
	DORMITORY	FAMILY HOUSING
FLOOR	Carpet (level loop or cut & loop)	Carpet (cut), wood
BASE	Rubber base, wood	Rubber base, wood

WALLS	Vinyl wallcovering (type II), paint	Paint, vinyl wallcovering, wallpaper
CHAIR RAIL	Wood	Wood
CEILING	Acoustical tile, gypsum board	Gypsum board
LIGHTING	Fluorescent, incandescent	Fluorescent, incandescent
WINDOW COVERING	Vertical blinds, horizontal blinds, drapery	Shades, lined draperies, horizontal blinds, vertical blinds, sheer
UPHOLSTERY	Heavy wear fabric (45,000+ DR)	NA
LIGHT-USE		
MATERIALS	Bedrooms, dressing area, sleeping areas	
	DORMITORY	FAMILY HOUSING
FLOOR	N/A	Carpet (cut)
BASE	Rubber base, wood	Rubber base, wood
WALLS	Paint	Paint, vinyl wallcovering, wallpaper
CHAIR RAIL	Wood	Wood
CEILING	Gypsum board	Gypsum board
LIGHTING	Incandescent	Incandescent
WINDOW COVERING	Horizontal blinds, black-out draperies	Shades, lined draperies, vertical blinds, horizontal blinds, sheers
UPHOLSTERY	Fabric (45,000+ DR)	NA

Table A2.2. Hospitality/Lodging Interior Design Material Selection Chart.

HEAVY-USE	
MATERIALS	Registration desks, lobby, foyers, stairwells, elevators, corridors, laundry rooms, snack areas, vending and restrooms
	HOSPITALITY/LODGING
FLOOR	Carpet (loop, cut, or cut and loop), vinyl composition tile, ceramic tile, quarry tile, stained concrete
BASE	Rubber base, wood, ceramic tile, quarry tile
WALLS	Paint, ceramic tile, vinyl wallcovering (Type II), fabric wallcovering (heavy duty), brick (if carried in from the exterior)
CHAIR RAIL	Molded plastic, wood
CEILING	Gypsum board, acoustical tile
LIGHTING	Fluorescent, incandescent
WINDOW COVERING	Lined draperies, horizontal blinds, vertical blinds
UPHOLSTERY	Fabric (50,000+ DR)
MEDIUM-USE	
MATERIALS	Management and administrative area
	HOSPITALITY/LODGING
FLOOR	Carpet (loop, cut & loop)
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering (type II), fabric wallcovering (heavy duty)
CHAIR RAIL	Not normally used
CEILING	Gypsum board, acoustical tile
LIGHTING	Fluorescent, incandescent
WINDOW COVERING	Lined draperies, horizontal blinds, vertical blinds
UPHOLSTERY	Fabric (25,000+ DR)

LIGHT-USE	
MATERIALS	Bedrooms, dressing area
	HOSPITALITY/LODGING
FLOOR	Carpet (loop, cut, or cut & loop)
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering (type II), fabric wallcovering (heavy duty)
CHAIR RAIL	Not normally used
CEILING	Gypsum board
LIGHTING	Incandescent
WINDOW COVERING	Black-out draperies
UPHOLSTERY	Fabric (45000+ DR)

Table A2.3. Food Service Area Interior Design Material Selection Chart.

HEAVY-USE	
MATERIALS	High traffic areas, lobby, wet areas, restrooms, corridors, and serving lines
	FOOD SERVICE
FLOOR	Carpet (loop, cut and loop), vinyl composition tile, ceramic tile, quarry tile, stained concrete
BASE	Rubber base, ceramic tile, quarry tile
WALLS	Paint, ceramic tile, vinyl wallcovering (Type II)
CHAIR RAIL	Molded plastic, wood
CEILING	Gypsum board (water resistant)
LIGHTING	Fluorescent, incandescent
WINDOW COVERING	Horizontal blinds, vertical blinds
UPHOLSTERY	Fabric (50,000+ DR), vinyl
MEDIUM-USE	
MATERIALS	Management and administrative areas
	FOOD SERVICE
FLOOR	Carpet (loop), vinyl composition tile
BASE	Rubber base
WALLS	Paint, vinyl wallcovering (Type II)
CHAIR RAIL	Not normally used
CEILING	Gypsum board, acoustical tile
LIGHTING	Fluorescent, incandescent
WINDOW COVERING	Horizontal blinds, vertical blinds
UPHOLSTERY	Fabric (35,000+ DR)

LIGHT-USE	
MATERIALS	Special or private dining areas
	FOOD SERVICE
FLOOR	Carpet (loop, cut and loop)
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering (type II)
CHAIR RAIL	Wood
CEILING	Gypsum board
LIGHTING	Incandescent
WINDOW COVERING	Lined drapes, sheers
UPHOLSTERY	Fabric (35,000+ DR)

Table A2.4. Office/Administrative Interior Design Materials Selection Chart.

HEAVY-USE	
MATERIALS	Entrances, foyers, lobbies, main circulation corridors, stairwells, elevators, rest rooms, large conference or meeting rooms, snack bars, coffee areas, loading dock and media production areas
	OFFICE/ADMINISTRATIVE
FLOOR	Carpet (loop), quarry tile, ceramic tile
BASE	Rubber base, wood, quarry tile, ceramic tile
WALLS	Paint, vinyl wallcovering (Type II), ceramic tile
CHAIR RAIL	Wood, molded plastic
CEILING	Gypsum board, acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (50,000+ DR), vinyl
MEDIUM-USE	
MATERIALS	Internal circulation, staff office areas and small conference rooms
	OFFICE/ADMINISTRATIVE
FLOOR	Carpet (loop)
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering (type II), fabric wallcovering (heavy duty)
CHAIR RAIL	Wood, molded plastic
CEILING	Acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (45,000+ DR)

LIGHT-USE	
MATERIALS	Commander's suite and private office areas
	OFFICE/ADMINISTRATIVE
FLOOR	Carpet (loop, cut and loop, cut)
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering (Type I or II), fabric wallcovering , wood (wainscot)
CHAIR RAIL	Wood
CEILING	Gypsum board, acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, lined drapes, sheers
UPHOLSTERY	Fabric (35,000+ DR), leather

Table A2.5. Recreation Interior Design Materials Selection Chart.

HEAVY-USE	
MATERIALS	Most areas because of the high volume of customers. Includes entrances, foyers, lobbies, main circulation corridors, stairwells, elevators, rest rooms, locker rooms, weight rooms, meeting rooms, snack bars, coffee areas, kitchen and eating areas
	RECREATION
FLOOR	Carpet (loop), quarry tile, ceramic tile, vinyl composition tile, wood, stained concrete
BASE	Rubber base, quarry tile, ceramic tile
WALLS	Paint, vinyl wallcovering (type III or II), ceramic tile, acoustical wallcovering (heavy duty)
CHAIR RAIL	Wood, molded plastic
CEILING	Gypsum board (water resistant), acoustical tile, exposed structure
LIGHTING	Incandescent, fluorescent, HID
WINDOW COVERING	Horizontal blinds, vertical blinds
UPHOLSTERY	Fabric (50,000+ DR), vinyl
MEDIUM-USE	
MATERIALS	Internal circulation, staff offices and administration areas
	RECREATION
FLOOR	Carpet (loop)
BASE	Rubber base
WALLS	Paint, vinyl wallcovering (type II), fabric wallcovering (heavy duty), acoustical wall treatment (heavy duty)
CHAIR RAIL	Wood, molded plastic
CEILING	Gypsum board, acoustical tile
LIGHTING	Incandescent, fluorescent

WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (50,000+ DR), vinyl
LIGHT-USE	
MATERIALS	Commander's suite
	RECREATION
FLOOR	Carpet (loop, cut and loop, cut)
BASE	Rubber base
WALLS	Paint, vinyl wallcovering (type II), fabric wallcovering (heavy duty), acoustical wall treatment (heavy duty)
CHAIR RAIL	Wood
CEILING	Gypsum board, acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (35,000+ DR)

Table A2.6. Maintenance /Warehouse Interior Design Materials Selection Chart.

HEAVY-USE	
MATERIALS	Areas constantly subject to traffic, cleaning, abrasion, weather, or other deterrents to building finishes
	MAINTENANCE/WAREHOUSE
FLOOR	Concrete (sealed), quarry tile, ceramic tile
BASE	Rubber base, quarry tile, ceramic tile
WALLS	Paint
CHAIR RAIL	NA
CEILING	Exposed gypsum board (water resistant)
LIGHTING	HID, fluorescent
WINDOW COVERING	Horizontal blinds
UPHOLSTERY	NA
MEDIUM-USE	
MATERIALS	Administrative areas that are located separately from the heavy-use areas
	MAINTENANCE/WAREHOUSE
FLOOR	Carpet (loop), vinyl composition tile
BASE	Rubber base
WALLS	Paint, vinyl wallcovering (Type II)
CHAIR RAIL	Molded plastic
CEILING	Acoustical tile
LIGHTING	Fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds
UPHOLSTERY	Fabric (45,000+ DR), vinyl

LIGHT-USE	
MATERIALS	Commander's suite if separate from high-use areas
	MAINTENANCE/WAREHOUSE
FLOOR	Carpet (loop, cut and loop, cut)
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering, fabric wallcovering
CHAIR RAIL	Wood
CEILING	Gypsum board, acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (35,000+ DR), leather

Table A2.7. Medical Interior Design Materials Selection Chart.

HEAVY-USE	
MATERIALS	Clean areas, patient rooms, wet areas, loading docks, selected corridors, restrooms, locker rooms, and areas where chemicals are used
	MEDICAL
FLOOR	Vinyl composition tile, sheet vinyl, quarry tile , ceramic tile
BASE	Rubber base, sheet vinyl (wrapped cove base), quarry tile, ceramic tile
WALLS	Paint, vinyl wallcovering (type II), ceramic tile
CHAIR RAIL	Molded plastic
CEILING	Gypsum board (water resistant), acoustical tile, exposed structure
LIGHTING	Fluorescent, HID
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (50,000+ DR), vinyl
MEDIUM-USE	
MATERIALS	Patient waiting areas, administrative and doctor's offices, and selected corridors
	MEDICAL
FLOOR	Carpet (loop), vinyl composition tile
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering (type II), acoustical wall treatment (heavy duty)
CHAIR RAIL	Molded plastic
CEILING	Gypsum board, acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes

UPHOLSTERY	Fabric (50,000+ DR), vinyl
LIGHT-USE	
MATERIALS	Commander's suite and conference rooms
	MEDICAL
FLOOR	Carpet (loop, cut and loop, cut)
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering, fabric wallcovering, acoustical wall treatment
CHAIR RAIL	Wood
CEILING	Gypsum board, acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (35,000+ DR), vinyl

Table A2.8. Educational Interior Design Materials Selection Chart.

HEAVY-USE	
MATERIALS	Entrances, foyers, snack bar and cafeteria service areas, restrooms, fitness areas, simulator rooms and technical classrooms
	EDUCATIONAL
FLOOR	Carpet (loop), quarry tile , ceramic tile, vinyl composition tile
BASE	Rubber base, wood, quarry tile, ceramic tile
WALLS	Paint, vinyl wallcovering (type II), ceramic tile
CHAIR RAIL	Molded plastic
CEILING	Gypsum board, acoustical tile
LIGHTING	HID, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds
UPHOLSTERY	Molded plastic, vinyl
MEDIUM-USE	
MATERIALS	Administrative offices, conference and briefing rooms, classrooms and corridors
	EDUCATIONAL
FLOOR	Carpet (loop)
BASE	Rubber base
WALLS	Paint, vinyl wallcovering (type II), acoustical wall treatment (heavy duty)
CHAIR RAIL	Wood, molded plastic
CEILING	Acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (35,000+ DR), vinyl, molded plastic, wood

LIGHT-USE	
MATERIALS	Principal's offices and commander's suite
	EDUCATIONAL
FLOOR	Carpet (loop, cut and loop, cut)
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering, fabric wallcovering
CHAIR RAIL	Wood, molded plastic
CEILING	Gypsum board, acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (35,000+ DR), vinyl, wood

Table A2.9. Religious Activities Facilities Design Materials Selection Chart.

HEAVY-USE	
MATERIALS	Worship area, sanctuary, narthex, choir room, cry room, blessed sacrament and reconciliation room, entrance foyer, kitchen, cafeteria/assembly room, activities center, restrooms
	RELIGIOUS ACTIVITIES
FLOOR	Carpet (loop or cut and loop), quarry tile, ceramic tile , vinyl composition tile, vinyl sheet flooring
BASE	Rubber base, wood, quarry tile, ceramic tile
WALLS	Paint, vinyl wallcovering (type II), ceramic tile
CHAIR RAIL	Molded plastic, wood
CEILING	Gypsum board, acoustical tile (not appropriate for sanctuary)
LIGHTING	Fluorescent, incandescent
WINDOW COVERING	Horizontal blinds, vertical blinds
UPHOLSTERY	Fabric (50,000+ DR), molded plastic, vinyl, wool

MEDIUM-USE	
MATERIALS	Administrative offices, conference and briefing rooms, classrooms and corridors
	RELIGIOUS ACTIVITIES
FLOOR	Carpet (loop), vinyl composition tile
BASE	Rubber base
WALLS	Paint, vinyl wallcovering (type II), acoustical wall treatment (heavy duty)
CHAIR RAIL	Wood, molded plastic
CEILING	Acoustical tile, gypsum board
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (45,000+ DR), vinyl, molded plastic, wood
LIGHT-USE	
MATERIALS	Chaplain's office and commander's suite
	RELIGIOUS ACTIVITIES
FLOOR	Carpet (loop, cut and loop, cut)
BASE	Rubber base, wood
WALLS	Paint, vinyl wallcovering, fabric wallcovering
CHAIR RAIL	Wood
CEILING	Gypsum board, acoustical tile
LIGHTING	Incandescent, fluorescent
WINDOW COVERING	Horizontal blinds, vertical blinds, lined drapes
UPHOLSTERY	Fabric (35,000+ DR), wood