Change 15
26 April 2002

CHAPTER 6
ARCHITECTURAL CRITERIA

TABLE OF CONTENTS

Change 15
26 April 2002

CHAPTER 6
ARCHITECTURAL CRITERIA

1. GENERAL DESIGN PROVISIONS.

a. Design Excellence. Excellence in design will be a primary goal for all construction projects. Reaching this goal requires a commitment by management and designers to quality that includes the relationship of architecture to the surrounding community, as well as the details of design that affect the users of buildings and facilities. Quality architectural and interior design vitally improves facility operating efficiency, attractiveness, livability, life-cycle economics, and ultimately, the productivity of the users.

(1) Considerations. Designs will consider architectural compatibility with the local environment, functional requirements, economy of construction, energy conservation, interior and exterior details, and life cycle costs. Additionally, facilities will be designed in harmony with the architectural character of existing facilities that are to remain and that are considered to be historically or architecturally significant to the environment. Design excellence does not add to project costs but does require a balanced approach to design that optimizes the functionality, aesthetics, quality, and maintainability of facilities. Managers and designers at all levels will set a standard of excellence in design.

(2) Design Management. Procedures to implement architectural design excellence, as well as to ensure compliance with established criteria, policies, and standards, will be established by the design agencies. Designs will be reviewed by the design agencies for conformance to functional requirements, criteria and standards, and this document. This review will also include careful examination of cost estimates.

b. Architectural Style and Character. Good master planning and principles of design dictate that a suitable architectural style and character be established and maintained for Army installations. This requires that design decisions about building scale, layout, materials, and use of color be in keeping with local culture and customs and appropriate for the geographical area or climate. \15\ Installation design guides should establish style and character criteria at Army installations, and new construction projects should /15/ be designed in accordance with these requirements.

c. Functional Design. Facility designs will be governed by the functional requirements of projects, will conform to existing criteria and standards, and will be consistent with applicable congressional cost limitations. Facilities will be provided at the lowest reasonable construction cost while achieving the optimum life-cycle cost. Studies will be conducted as needed for specific projects to determine the most life-cycle cost effective equipment, finishes, materials, methods of construction, services, and structure to be provided.

d. Design for Flexibility. Flexibility in architectural design facilitates the change or expansion of an existing structure to accommodate changing functional requirements with minimum expenditure of resources. The Army usually owns and operates its facilities from their time of construction until the end of their useful life. During this long tenure of use, functional requirements of buildings will change, often drastically. For this reason, flexibility is a significant design requirement for buildings, except those with highly specialized functions where adaptive reuse would be cost prohibitive.

e. Design Criteria and Standards. Designs for Army facilities should follow normal industry practices and standards for similar facilities except when specific requirements are stipulated in this document. HQUSACE will provide appropriate design criteria to supplement the criteria included in this document. In accordance with ER 1110-345-100 (reference 6-1), standard or definitive design drawings, \15\ standardized design requirements in requests for proposals, /15/ and site-adapt drawings from previous project designs should be used for projects involving repetitive-type facilities.

f. Space Allocations.

(1) Space Criteria. Space allocation studies will include a detailed analysis of the functional requirements of activities to be housed to determine actual space requirements. Design judgment and experience factors will be used to determine space allocations where space criteria are not provided in Chapter 5, other chapters, or appendices. Functional areas will be organized to obtain the most economical and efficient use of space.

(2) Story Heights. Floor-to-floor heights will be the minimum consistent with current economical practice. Spaces requiring special ceiling heights should be located on the least number of floors consistent with proper functional design. For single-story designs, spaces requiring special ceiling heights should be grouped together under a single raised roof area to the extent feasible.

g. Solar Design. All projects will conform to P.L. 97-214, Section 2857 (reference 6-2). This law requires that solar energy systems be considered for construction projects when practical and economically feasible. See Chapter 11 for specific criteria.

2. INTERIOR DESIGN.

a. General. DG 1110-3-122 (reference 6-3) will be used to guide the development of interior designs for Army buildings. Interior designs will be developed as a complete and coordinated part of the building design, expressing the users functional and aesthetic needs.

b. Interior Design Services. Interior design of Army buildings will be in accordance with ER 1110-345-122 (reference 6-4). Two basic types of interior design services are defined.

(1) Building-Related Interior Design. This type of service provides for **\15\ the selection of exterior and interior materials and finishes for an integrated visual design theme provided as part of the building construction, e.g. floor and wall coverings, ceiling finishes, paint, trim items, signage, cabinetry and built-in furniture**. /15/ This type of service will be provided from project design funds as an integral part of the building design services.

(2) Furniture-Related Interior Design. This type of service provides for the placement and selection of furniture and furnishings **\15\ e.g. loose furniture, draperies and bedspreads, wall hangings/artwork, plants and other accessories** /15/ that will be provided or procured using operations and maintenance funds. These items are not generally provided as part of the building construction contract but are significant in providing the user a complete and usable facility. This type of service, including design reviews, will be provided in accordance with ER 1110-345-122 (reference 6-4).

c. Facilities Requiring Interior Designs. Building-Related Interior Design will be provided for all facility types. Furniture-Related Interior Design may be provided for any facility type and should be provided when supported by the using agency. Furniture-Related Interior Design services should be provided during project development when requested by the user in accordance with ER 1110-345-122 (reference 6-4). The following list highlights facilities where Furniture-Related Interior Design is strongly recommended:

(1) Administrative \15\ and Operational /15/ Facilities.

(2) Auditoriums.

(3) Training Facilities (Category Code 171).

(4) Dining Facilities.

(5) Educational Facilities.

(6) Unaccompanied Personnel Housing and Guest Housing Facilities.

(7) Libraries and Information Facilities.

(8) Research, Development, and Test Facilities (Category Code 310).

(9) Hospital and Medical Facilities.

(10) Museums and Memorials.

(11) Personnel Support Facilities, e.g., Banking Facilities, Child Development Centers, Fire Stations, Clubs, Police Facilities, and Religious Facilities.

(12) Transportation Terminals.

(13) Morale, Welfare, and Recreational Facilities (Category Code 740).

3. COLOR SELECTION. Color selection is an important element of the building interior and exterior design. A range of exterior and interior paint colors used in military construction projects will be limited to a practical number to facilitate maintenance. Color selections should be coordinated with the installation design guide. Color selection will be included as part of each project design and incorporated into the contract drawings and specifications.

4. INTERIOR FINISHES. **\15** Interior materials and finishes will be appropriate for the design function of the building and building spaces. Low maintenance materials will be used. Selection will be based on the anticipated use, fire and other safety requirements, life cycle cost, maintainability, and suitability for the environment being created. **The carpet assembly (carpet and cushion, or modular tile) will comply with the flammability requirements of Chapter 9 and UFGS 09680A.(reference 6-5).** /15/

\15\ TABLE 6-1 is Deleted /15/

5. AIR INFILTRATION. All buildings of new construction or substantially altered building envelopes will be designed to minimize air infiltration at locations separating the outdoors from the interior conditioned spaces. The building design should provide doors and windows that are weather-stripped. Exterior joints, cracks, and holes in building envelopes should be designed to be caulked, gasketed, weather-stripped, or otherwise sealed. All buildings having two or more stories, constructed or substantially altered, must have airlock vestibules or revolving doors at all primary entrances and exits to reduce infiltration due to a stack draft effect. Additionally, the use of vestibules (or storm doors as appropriate) is mandatory in all buildings heated to 18.3 °C (65 °F) in those areas where the winter design temperature is -9.4 °C (15 °F) or less.

6. \15\ BUILDING ENVELOPE. /15/

a. Product Selection. Appearance, function, heat gain and loss, air infiltration, safety, structural requirements, suitability for the environment, maintenance and operation experience, life-cycle cost, and quality of the facility in which the products will be installed will be considered when selecting windows, doors, and skylights. Stock sizes will be used to the maximum extent practicable.

b. Use of Glass. All buildings heated to a minimum of 15.6 °C (60 °F) and located in climates having more than 2,222 heating degree days, base 18 °C (4,000 heating degree days, base 65 °F) annually, will be designed with not more than 10 percent of the wall area as glazed openings facing north and in the direction of the prevailing winter winds. For example, assuming a prevailing west wind, not over 10 percent of the north wall may

be glazed and not over 10 percent of the west wall may be glazed. For all facilities located where the winter design temperature is -6.6 °C (20 °F) or less, or where the summer design temperature exceeds 32.2 °C (90 °F), the total glass area, including doors, will not exceed 15 percent of the wall area. However, special passive solar designs (e.g., windows designed to admit only low angle winter sun and that result in a net decrease in energy requirements) are encouraged and should be used where the life-cycle cost is effective. In any climatic zone, fully glazed doors, large windows, and window walls are energy intensive and will be held to the minimum. The use of glass must be carefully studied in relation to energy conservation goals and building function.

c. Operable Windows. All UEPH, UOPH, and military family housing will be provided with operable windows in the exterior walls of living and sleeping areas. The sash, when fully opened, will allow for emergency egress. Fixed windows may be used in fully air-conditioned building areas, except UEPH, UOPH, and military family housing, provided the proper means of emergency egress is furnished. However, operable windows will be considered for buildings where climatic conditions offer the potential for significant energy savings by using natural ventilation and when natural ventilation can be compatible with the heating, ventilation, and air-conditioning system design.

d. Storm Sash. Operable storm sash will not be used in the design of Army facilities.

e. Energy Performance. Windows, doors, and skylights will have energy performance rating factors as evaluated in accordance with the National Fenestration Rating Council procedures to minimize air infiltration. \15\ Building envelope components will meet the requirements of ANSI Std. 90.1-2001 (reference 6-6). /15/

f. Solar Shading or Rejection. For buildings eligible for air-conditioning, glazed openings exposed to the sun will be completely shaded on the exterior not less than 80 percent of the time between 0730 and 1630 daily from 1 June through 30 September. Partial shading all of the time is an acceptable alternative provided the total solar gain does not exceed that achieved by compliance with criteria noted above, based on actual solar studies. Shading may be achieved by various architectural solutions, e.g., horizontal and vertical building projections, deep reveals, or external solar screens which completely shade the glass area and have a solar heat rejection of not less than 70 percent. The use of fully reflective glass in accordance with \15\ UFGS 08810A (reference 6-7) /15/ is also acceptable for external solar shading. The use of heat-absorbing tinted glass and partial exterior shading is acceptable provided the total heat gain, based on specific studies, does not exceed that permitted under the criteria in this subparagraph. Sheet-applied films added to existing buildings are acceptable only if applied in accordance with the manufacturer's directions, with an edge sealer and a decal on each window identifying the maintenance requirements. The shading coefficient (SC) for glazed areas must be obtained from the chapter titled "Fenestration" of the ASHRAE Handbook of Fundamentals (reference 6-8) or from manufacturers' test data. The shading coefficient used for louvered shade screens will be determined using a profile angle of 30 degrees, as found in reference 6-7.

g. Glazing. Glazing for windows, doors, glazed panels, and skylights will be in accordance with the guide specification \15\ UFGS 08810A (reference 6-7) /15/. Acrylic glazing will be in accordance with guide specification \15\ UFGS 08840A (reference 6-9). /15/ Single, double, or triple-pane glazing (in doors, fixed and operable windows, and skylights) will be provided in accordance with Table 11-4B in Chapter 11 of this document. Low-emissivity (Low-E) insulating glass will be used unless other glazing types are shown to be more life-cycle cost effective. Care will be taken in the economic evaluation of such window treatment to analyze each elevation of the building individually. Glass size and thickness will be based on the security requirements of the facility and the wind loading and thermal conditions of the specific geographic area where the facility is located.

(1) Insulating Glass Units. Where insulating glass units are used in locations requiring safety glazing, both panes shall be safety glass.

(2) Tempered Glass. Tempered glass should be used where safety glazing is required for entrance doors, glazed panels, sliding glass doors, fully glazed doors, and storm doors, as well as for enclosures at bathtubs and showers.

(3) Wire Glass. Wire glass should be used for fire-rated assemblies and may also be used in security applications, skylights, and overhead glazing in atriums.

(4) Laminated Glass. Laminated glass may be used for security purposes, psychiatric areas, skylights, and overhead glazing in atriums.

(5) Heat-strengthened. Heat-strengthened glass may be used for facilities with spandrels, atriums, solariums, skylights, and where climates and/or shading may require the glass to be heat-strengthened. Heat-strengthened glass is not a safety glazing material and should not be used where human impact is a concern or where codes require safety glazing.

(6) One-way Vision Glass. One-way vision glass may be used for psychiatric and security observation windows. Where safety glazing is required for these applications, the one-way vision glass should be fabricated from either laminated glass or tempered glass.

(7) Acrylic Sheet. Acrylic sheet may be used for security purposes, psychiatric areas, skylights, and overhead glazing in atriums. Acrylic sheet should not be considered where fire protection is a consideration. It should also be noted that acrylic glazing will cloud and become opaque if cleaned by wiping.

h. Glazed Interior and Exterior Doors. Glazed interior and exterior doors, including storm doors and combination doors, shall be glazed with safety glass when the glazed opening is sized to allow a 76.2 mm (3-inch) diameter sphere to pass through.

i. Glazed Panels. Glazed panels will be provided with safety glazing when:

(1) Glazed panels of any size are located adjacent to doorways where the nearest vertical edge of a panel is located within 1219 mm (48 inches) of a doorway and the bottom edge of the panel is below the top of the door. Safety glazing is not required for glazed panels separated from a doorway by an intervening interior permanent wall.

(2) Glazed panels have a surface area greater than .836 m^2 (9 ft^2) with a walking surface on either side of panel and the walking surface is within 914 mm (36 inches) of the panel. Safety glazing is not required if the lowest edge of the glazing material is 457 mm (18 inches) or more above the walking surface or the panels have a horizontal member, such as a mullion or permanent railing not less than 38 mm (1-1/2 inches) in width, located between 588 mm and 882 mm (24 and 36 inches) above the walking surface.

j. Entrance Doors to Heater/boiler and Mechanical Equipment Rooms. Outside only entrance doors shall be provided to heater/boiler rooms and to main mechanical equipment rooms of buildings. By having only outside entrance doors, maintenance personnel will have direct access to service and maintain mechanical equipment without going through occupied space of the building. This will also help reduce unauthorized entrance into the rooms and tampering of mechanical equipment. Exceptions to this requirement are afforded to large buildings/complexes that have permanent mechanical - maintenance staff and to facilities located in extremely cold climates. Existing buildings with interior doors to these rooms are not required to be modified unless mandated by other criteria, e.g., NFPA code requirements.

7. MOISTURE MIGRATION. Buildings of new construction and substantially altered building envelopes will be designed to prevent moisture migration and condensation of water vapor within the envelope assembly. Moisture decreases insulation performance and/or contributes to structural deterioration. Designs must incorporate the principles of the chapter titled "Moisture In Building Construction" of the ASHRAE Handbook of Fundamentals (reference 6-8).

8. VENDING FACILITY PROGRAM FOR THE BLIND. When vending sites are planned in Army acquired (constructed, leased purchase, or rented) or substantially altered or renovated buildings, priority will be given to blind licensees for operation in accordance with DoD Directive 1125.3 (reference 6-10). Sites for blind operated vending will be considered for operation when a facility will have 100 or more federal employees located or working therein, and the facility is over 1,394 m^2 (15,000 ft^2) in gross area. Satisfactory sites for operation by the blind are generally defined as 23.2 m^2 (250 ft^2) or larger; however, the DoD directive should be reviewed before developing designs for any building that might be affected.

9. REFERENCES.

6-1ER 1110-345-100, Design Policy for Military Construction, 15 February 1994 or latest edition

6-2Public Law 97-214, Section 2857, Use of Solar Energy Systems

6-3DG 1110-3-122, Design Guide for Interiors, September 1997 (available on the USACE Publication Internet Site *http://www.usace.army.mil/inet/usace-docs/design-guides/all.htm*)

\15\ 6-4 ER 1110-345-122, Interior Design, 22 March 1999

6-5 Unified Federal Guide Specification (UFGS) 09680A, Carpet, latest edition

6-6 ANSI/ASHRAE/IESNA Standard 90.1-2001, Energy Standard for Buildings Except Low Rise Residential Buildings, 2001 or later edition

6-7 UFGS 08810A, Glass and Glazing, latest edition

6-8 ASHRAE Handbook of Fundamentals, American Society of Heating, Refrigerating and Air Conditioning Engineers

6-9 UFGS 08840A, Plastic Glazing, latest edition

6-10 DoD Directive 1125.3, Vending Facility Program for the Blind on Federal Property, 7 April 1978 as implemented by AR 210-25, Vending Program for the Blind on Federal Property, 1 January 1979 /15/