

# Design Standards Manual: Chapter 6 – Architectural Design

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## 6.0 Architectural Design Standards

### 6.1 Introduction

The following design standards generally apply to the architectural phases of all projects. For general requirements for all project phases, see chapter 2, "General Design Standards and Procedures." For specific project requirements, see the Project Requirements Document, the design criteria, or the project scope.

### 6.2 Architectural Construction Drawings and Specifications

Architectural drawings for construction will include quantitative information. Qualitative information should be described in the accompanying project specifications and should not be duplicated on drawings.

#### 6.2.1 Architectural Construction Drawings

See chapter 2, "General Design Standards and Procedures," for information on drawing organization and arrangement of the overall construction drawings set. Architectural drawings, and organization within the construction drawings set, include, but are not limited to, those shown in Table 6-1.

**Table 6-1. Architectural Construction Drawings**

Drawing	Scale	Remarks
Code Footprint	To fit on sheets with complete legibility	If insufficient room is available to fit the Code Footprint on one sheet, it may be separated. (See subsection 6.2.2 for Code Footprint Requirements.)
Architectural Site Plan	Consistent with civil plans	Can be combined with civil and utility information, provided architectural elements are clearly defined.
Demolition and Removal Plans	1/8" = 1'-0"	
Composite Floor Plans	To fit on sheet	Provide one plan per level in a scale that shows the entire layout on one sheet.
Floor Plans		
Floor Finish Plans and Schedule		Include information about materials, colors, and manufacturers. Coordinate with SNL Architect.
Reflected Ceiling Plans		
Roof Plans		
Exterior Elevations		
Interior Elevations		Provide interior elevations when mounting heights and the coordination of wall-mounted items cannot be clarified in schedules.
Building Sections		
Wall Sections		
Enlarged Plans		Show enlarged toilet plans and toilet accessory schedules on the same sheet.
Stair and Elevator Plans		
Stair and Elevator Sections and Details		Sections can be 1/4" = 1'-0." Details must be 1-1/2" = 1'-0" or larger.

Drawing	Scale	Remarks
Exterior Details		
Interior Details		
Door and Window Drawings		Include schedules, elevations, and details.
Equipment and Furniture Layout Plans		
Floor Finishes Plans		
Room Finish Schedule		Include finish material legends.
Signage Drawings		Include plans, elevations, sections, and large-scale drawings as needed to coordinate signage.
Signage Schedules		

Present all building plans at a scale determined by the SNL Project Lead, unless noted otherwise in Table 6-1. See the *CADD Standards Manual* for additional information.

All plans must be complete with labeled column or grid lines and north arrows. Include a scaled key plan, oriented in the same direction as the floor plan, on each partial plan sheet.

Present details on separate detail system drawings sheets. Do not show details on plan or other types of system drawing sheets.

## 6.2.2 Code Footprint Requirements

Provide a code footprint for all large projects and smaller projects that deal with Health, Safety, and Welfare of the public. Existing code footprints must be updated on a project-by-project basis. Code footprint requirements for small projects must be negotiated with the SNL Building Code Official and Fire Marshal.

### Code Footprint Submittal Format

- Provide full-sized drawing sheets with code footprint information appropriate to the size of the project within the contract document set.
- Complete code footprint floor plan (including existing and new) of each floor of the facility.
- Complete site plan (including partial existing adjacent building footprints) of surrounding buildings and structures.
- All sheets must be sealed, signed, and dated per New Mexico licensing boards.
- Provide an 11" x 17" sealed reduction of the full-sized drawing.

## 6.2.3 Code Footprint Minimum Documentation Requirements

### Information Required on Code Footprint Sheets

- A graphic bar scale
- North arrow
- All permanent partitions 5'-9" or taller
- Each room numbered and labeled. (Keynoting or legends are not acceptable.)
- Occupant load under the room name

- Common path of travel liner notation with exiting count per exit
- Identification of new construction, building additions, existing to remain, remodeled areas, and areas relocated
- Stair and shaft enclosures with minimum fire-resistive openings allowed
- Ramps, landings, and railings
- The perimeter of all rated corridors with minimum fire-resistive openings allowed
- Occupancy separations or protection from hazards
- Fire-rated area separation walls
- Separation of construction types
- Required opening ratings
- All horizontal exits or smoke partitions with opening ratings
- Location of central fire alarm control panel and any remote annunciator panels
- Fire department supply connections and access roads
- Distances to property line
- Distances to adjoining buildings when within 60 feet
- Location of any anticipated future additions (dotted lines)

#### **6.2.4 Minimum Information Required on Code Footprint Sheets**

- Indication of which codes the new construction work is designed to (IBC and family of codes and any additional DOE/SNL regulations specifically applicable to the building use).
- Type of construction: New, addition, renovation, changes in use
- Reason for submittal: New construction, new licensure, or plan of corrections
- Location: Street name, Technical Area, SNL site
- Customer information: Name, organization, office location, phone, facsimile number
- Date of plan edition (or revision)
- Name of local fire department (KAFB Fire Department)
- Name of local building inspection department (when available)
- Each portion of a building on each side on a compliant fire-resistive area separation
- Walls, new or existing
- Each occupancy group and type
- Construction type
- Total allowed area per floor
- Actual floor area
- Approximate grade elevation at each corner of the building and finish floor
- Allowed stories and height limitations
- Actual height
- Mixed-ratio calculations, as required
- Structural fire protection ratings
- Interior bearing walls

- Exterior bearing walls
- Exterior nonbearing walls
- Structural framing information
- Permanent partitions
- Shaft enclosures
- Floors
- Roofs
- Exterior openings
- Proposed UL, FM, or other Fire-Assembly Numbers (if available)
- Fire safety features including the following: Sprinklers, standpipes, fire alarms, and fire extinguishers
- Smoke detectors, battery emergency lighting, exit lights, emergency power generators
- Hood-Suppression Systems; any other special systems, fire lanes, disconnect switches
- Locations and fire department connections
- Accessible building and site features related to the Architectural Barriers Act
- Plumbing fixture type and count

## 6.3 Architectural Design Requirements

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The following information is general guidance. For project-specific requirements, see the design criteria.

### 6.3.1 Site Development

#### 6.3.1.1 Site Furniture

See the *Campus Design Guidelines* (CDG) for Sandia National Laboratories New Mexico (SNL/NM) and SNL Standard Specification 12930, *Site Furnishings*.

#### 6.3.1.2 Exterior Signage

See the *Campus Design Guidelines* and the *Sign Standard for Exterior and Interior Signs*.

#### 6.3.1.3 Site Lighting

See chapter 9, "Exterior Lighting Systems Design," and the *Campus Design Guidelines*.

### 6.3.2 Building Substructure

#### 6.3.2.1 Foundations

A dense concrete foundation with adequate control joints generally does not need to be waterproofed or dampproofed in locations where the groundwater level is significantly below the foundation. Grade the site to drain surface water away from the building. Protect masonry walls below grade against leakage by using suitable cement parging and bituminous coatings or membrane applications.

### 6.3.2.2 Perimeter Insulation

See SNL Standard Specification 07200, *Building Insulation*.

### 6.3.2.3 Waterproofing and Wall Vapor Retarders

See SNL Standard Specification 07200, *Building Insulation*.

## 6.3.3 Building Shell

### 6.3.3.1 Exterior Walls

Use lightweight materials for floors, walls, partitions, and other building components where consistent with programmatic or operating requirements, economic objectives, fire protection and other safety requirements, and where no overriding acoustical requirements exist.

If the wall is to act as a filler or curtain wall, the connections to the structure must be capable of allowing the structure to deflect and yet maintain structural and weather-resisting integrity.

For exposed exterior walls, consider masonry composite walls, insulated metal, or concrete panels and other prefabricated wall construction.

Where side-hill sites require use of concrete retaining walls, use these walls as building walls where practicable to achieve economy in construction.

Where the lower portion of exterior walls is subject to damage from vehicle traffic, material handling, or other activities, select a proper material and material thickness, or possibly provide a protective wainscot. Protect exposed insulation, light-metal construction, or frangible materials from activities that could cause damage.

Design story heights and bay sizes to accommodate coursing. Lay out masonry walls in even coursing to fit between beams, columns, and standard-size openings to minimize cutting of masonry units.

### Exterior Finishes

In general, exterior finishes should be kept simple. Concrete walls should be left natural and unpainted, unless economical finishing methods can be employed or where aesthetics and operating considerations require finishing. When using color treatment on exterior walls, select colors to harmonize with the environment and natural setting. Limit the number of colors used for a building or complex and carefully select them to provide a dignified public image. Contact the SNL Architect for approval of color and material selections.

### Expansion Control

Provide adequate control and expansion joints when poured concrete floors or concrete or masonry walls are used. In long walls, carefully design and locate control joints to confine the effects of total expansion and contraction. In addition, provide necessary bond beams and anchors to structural framing for masonry units, and provide flashing, bond breaks, and weep holes to minimize the potential for moisture buildup and cracking because of differential movement.

Provide joints across buildings larger than 200 feet in length and where buildings have a significant change in plan dimension. Provide joints that can accommodate thermal-, moisture-, and seismic-related movements. Structural expansion joints should extend from the roof to the foundation without offsets. Building expansion joints should not be less than 1-inch wide and should be designed to permit independent vertical and horizontal movements of the elements on either side of them.

Investigate manufacturers' research data and recommendations to realize optimum performance of various materials.

### **Joint Sealers**

See SNL Standard Specification 07900, *Joint Sealants*.

### **Painting**

See SNL Standard Specification 09900, *Painting*.

### **Waterproofing and Dampproofing**

Protect masonry walls above grade against moisture penetration by means such as the following:

- Adequately filled, compressed joints
- Cement coatings
- Lintel and sill flashing
- Flashing or weather-break offsets at spandrels
- Overlapping weather-breaks where masonry abuts columns and beams

### **Vapor Retarders and Insulation**

In general, the "U" factors for insulation should meet the requirements set forth in the 2009 IECC. Where composite walls are used, consider the compatibility of the insulating and facing materials. Vapor barriers and fibrous insulation must be noncombustible or labeled by Underwriters Laboratories® (UL) as meeting a Flame Spread Rating of 25 or less and a Smoke Developed Value of 50 or less. For cavity walls, the use of treated (water-repellent), granular fill might be appropriate. Rigid-board insulation of cellular materials generally retains its insulating values longer than fibrous materials that are more vulnerable to moisture.

Foamed-plastic insulation in exterior walls must be separated from the interior of the building by 5/8-inch, type-X, fire-rated gypsum board, or an equivalent fire barrier.

Vapor barriers might be required in buildings with high winter humidity loads. Use the barriers with insulation, and locate them to avoid condensation in the insulation.

### **Parapets**

Tops of parapet walls must be capped with metal prefabricated roof specialty components.

## Building Numbers

Provide building numbers on each major elevation as needed to be visible from approaching vehicles and pedestrians. Additional guidance for this section is in the *Sign Standard for Exterior and Interior Signs*.

### 6.3.3.2 Roof Construction

For single-sheet metal roof decking, specify a minimum thickness of 22 gauge unless otherwise required by Factory Mutual® (FM) or Class I roofs. Design the decking to limit deflection and protect the roofing from subsequent damage. Avoid using lightweight concrete over a metal deck.

### Expansion Control

Expansion joints in the roof assembly (including the roof deck) must be placed in the same location as the building's structural expansion joints. The joints must extend across the entire width of the roof and must never terminate short of the roof edge or perimeter. The joints must be designed to accommodate contraction as well as expansion. Expansion joints should always be provided at the following locations:

- Where expansion joints are provided in the structural system
- Where steel framing, structural steel, or decking change direction
- Where separate wings of L, U, T, or similar wings exist
- Where the type of decking changes (steel to concrete)
- Where additions are connected to existing buildings
- Where movement between vertical walls and the roof deck might occur

Locate expansion joints at roof high points; water should drain in opposite directions from each side of the joint. Elevate the expansion joint above the highest expected level of water flow to prevent obstruction of water flow off a roof.

### Decks, Slabs, and Sheathing

Coordinate design materials and methods with SNL Architect.

### Vapor Retarders and Insulation

As a general guide, vapor retarders should be considered when both the outside average January temperature is below 40°F, and the expected interior winter relative humidity is 45 percent or greater. The building usage must be considered in determining the need for a vapor retarder.

If vapor retarders are used, they should be constructed of materials that are compatible with the other roof system components. The designer should pay particular attention to flashing details at edge seals and at all penetrations through the vapor retarder to ensure its moisture-tight integrity.

Use only insulation approved for UL Class A and FM Class I roof construction on roofs. All roof insulation must comply with the *NRCA Roofing Manual* published by the National Roofing Contractors Association.

Roof insulation should be installed in two layers when thickness permits, with all joints offset between the upper and lower layers. Mechanical fasteners should be used over steel decks to attach the first layer

of insulation. For concrete decks, the first layer should typically be hot asphalt mopped to the concrete. The second layer should be fully adhered to the first layer and generally have the higher insulation value. The long dimension of the insulation boards should be laid perpendicular to the flow of water.

Performance type specifications should be avoided when specifying any insulation since manufacturers' data may vary considerably. The designer should list the appropriate ASTM specification, the thickness requirement, and the C or R value for any insulation board to be used in roof construction.

## **Roof Covering**

Roof membranes must be a 60-mil single-ply type of TPO or PVC depending on the roof construction and type of building. The SNL/NM Roofing Program Manager must provide guidance in deciding the type of membrane to be specified. In addition, SNL/NM construction standard specifications for each type of roof membrane must be provided and must be used in their entirety. Any modifications to the specifications must be brought to the attention of the assigned Engineering Standard Program Committee member. UL Class A ratings are required for all roof membranes.

## **Flashing**

Membrane flashing materials must exhibit some degree of flexibility, be compatible with roofing membrane material, be resistant to traffic and natural damage, and be durable and weather-resistant. In general, they should be constructed with materials similar to those used in the construction of the roof membrane. Minimum heights of base flashings should be 8 inches.

Accessory metal should be used for covers, watersheds, or fascia, but typically should not be incorporated into the roofing membrane. Minimize direct contact of dissimilar metals to avoid electrolytic action.

Surface-mounted wall reglets are to be used in lieu of embedded types. Positive attachment using screws or bolts is required.

## **Drainage**

Design and build all roofs to ensure positive, thorough drainage. The designer must make provisions for positive drainage per the NRCA guidelines. The structural framing, deck type, roof membrane, roof deflections, and building layout must all be considered in determining the necessary slope.

Locate drains at points of maximum deflection (that is, midspan) and not adjacent to columns, load-bearing walls, or any other structural member supported by the ground. If drains are required to be placed at columns or bearing walls, the slope of the roof must be increased to compensate for the minimum deflections at these locations. Roof drain spacing must not exceed 75 feet in any direction. After drain locations are selected and deflections computed, the designer must provide additional slope to ensure positive drainage. A minimum slope of 1/8 inch per foot should be added to the deflection computation. Structural decks that incorporate camber (precast concrete) must be considered in the design of the drainage slope system.

Drains should be recessed (sumped) below the roof surface with sufficient insulation placed around the drains to prevent condensation. Drainage crickets should be provided between drains and on the high side of mechanical curbs. Provide roof drains with a minimum 4 inch-diameter pipe size in lieu of gutters and downspouts. Provide a secondary drainage system (overflow scupper) on all roofs with parapets or curbs. The secondary system must not be tied to the storm sewer and should drain to a highly visible area. The weight of retained water including that attributed to deflection of the roof because of the load of water

below the bottom level of the overflow outlets must be included in the structural calculations. Roof drains, gutters, and downspouts should be equipped with metal strainers to prevent obstructions by debris. Use seamless, one-piece gutters, downspouts, and splash blocks as much as possible.

### **Mechanical Curbs and Penetrations**

Every roofing penetration is a potential source of water entry. Roof life can be maximized and roof maintenance lessened by minimizing the amount of rooftop equipment and penetrations. Wherever possible, place building equipment within a penthouse or inside the building. Where possible, combine utilities below the deck.

Where rooftop equipment installation is unavoidable, use supporting frames with round legs of sufficient height above the roof to allow easy maintenance and replacement without alterations. Follow the guidelines provided by the NRCA. Curbs are to be positively attached to the structural deck and located away from low spots in the roof.

Adequate space should be provided among mechanical units, penetrations, and walls so roofing materials can be installed correctly. Locate conduits, pipes, and other utilities at least 12 inches apart where they pass through the roof, unless placed in a properly flashed curb opening. Base flashing should extend a minimum of 8 inches above the roofline. Coordinate all mechanical and electrical penetrations with the architectural roof drawings.

All penetration details require special attention. Every penetration should be addressed and appropriate flashing details specified rather than using typical details. Pitch pans or pockets are not acceptable. Use pipe boots or single-ply membrane flashings in general. Refer to the *NRCA Roofing Manual* and the *SMACNA Architectural Sheet Metal Manual*, or appropriate flashing details.

### **Protection and Maintenance**

Provide wear-resistant roof walkways, compatible with the roof membrane material, from points of roof access to penthouse entrances and to all roof-mounted and roof-accessible equipment that requires routine inspection and servicing. Movement of heavy equipment across a roof can cause permanent structural deflections and should be avoided. Specify a crane to place equipment where possible.

### **Reroofing**

Design all reroofing projects following the principles stated above. In general, if the insulation is wet or is suspected to be wet, a complete tear-off down to the structural deck is required. Locate and note all rooftop equipment on the plan drawings. Disconnect all equipment, utilities, and curbs, and raise to the proper height. Remove abandoned equipment from the roof.

Each reroofing project is unique. Discuss the design of the reroofing in detail with the SNL/NM Roofing Program Manager prior to any design.

### **Openings**

- Skylights – Coordinate with the SNL Architect.
- Hatches – Coordinate with the SNL Architect.

## Fall Protection

See the requirements in chapter 2 of this manual.

## Canopies

Coordinate the design and requirements with the SNL Architect.

### 6.3.3.3 Exterior Openings

The design of external openings must respond to the internal functional needs of the building owners and users and also must respond to the guidelines of the SNL campus. The *Campus Design Guidelines* and the *Long-Range Development Plan* (LRDP) describe high-level principles to consider during design development. Circulation and Interaction, Parking, Safety, Security, Sustainability, Entrances and Approaches, Renovation and Historic Preservation are chapters in the CDG that provide guidance. Internal Destinations and Connections, Safety and Security, Surety (Architectural Surety<sup>®</sup>), and sustainability are guiding principles in the LRDP that guide the Project Manager and the design team. The location of entrances must relate to pedestrian corridors, public spaces, and parking access. Service entrances must relate to service corridors identified in the Master Plans for zone of the campus. Windows should be oriented toward view corridors, landscape areas, and pedestrian malls when possible. Windows should be oriented to respond to sun and shade, and to promote natural lighting into the building. The selection of materials to be used on all exterior openings must have sustainable characteristics and be energy-efficient.

Exterior entrances and exit ways must provide accessibility, must be designed to be safe, and must follow applicable building codes and life safety codes.

Exterior openings must provide appropriate security depending upon the needs of owners and users. Protect openings in exterior walls and roofs of buildings that are designated as a security area boundary or that are the boundary to an interior vault or vault-type room. Exterior openings larger than 96 square inches in area, larger than 6 inches in the smallest dimension (greater than 11 inches in diameter) require protection. Openings include, but are not limited to, roof hatches, skylights, doors, windows, ducts, crawlways, tunnels and sewers. (See chapter 11 for additional requirements.)

Exterior openings, specifically windows, in older buildings should be replaced with energy-efficient products that retain the aesthetic intent of the original design. Brick buildings built in the 1950s are not on the registry of the State Historical Preservation Office (SHPO), but have historical significance to the campus, and it is desirable to preserve the design intent of exterior features when possible.

## Windows

Design windows to respond to the *High-Performance and Sustainable Buildings Guiding Principles*. The selection of glazing must respond to the energy efficiency of the building in regard to orientation for solar gain and insulation to reduce energy consumption. Design windows to be of stock sizes and competitive design. Use the more economical industrial and energy-efficient types when practical. Select windows to fit masonry coursing and the specified building module.

All windows must be at a minimum double-pane insulating windows.

For windows without security grills that are larger than 96 square inches and below 18 feet above ground level, use burglar-resistant glass as one of the two window panes, and put all glazing stops on the inside of the building.

**NOTE** Vaults must be constructed without windows. Closed areas (formerly called vault-type rooms or VTRs) and security area boundaries must be constructed without windows unless absolutely necessary. Security requirements for windows and openings in vaults, closed areas, and security area boundaries are described in chapter 11 of this manual.

## Doors

Aluminum and glass storefront doors (medium- or wide-stile) may be used for main entrances. Other exterior doors are usually flush, hollow metal, minimum 16 gauge in 14-gauge metal frames. Interior doors are usually flush, hollow metal, minimum 18 gauge in 16- or 14-gauge metal frames. Provide vision panels in doors in high-traffic areas and at all doors that swing into common hallways, corridors, or circulation areas. Specify properly labeled UL doors for all fire doors. Solid-core wood doors in hollow metal frames may be used in some administrative areas.

Use heavy-duty steel, roll-up, sectional, and other vertical doors in shops, warehouses, and industrial buildings for equipment and vehicular access. These doors should be weather-stripped in the best manner possible. Give special attention to the attachment and bracing of tracks and guides to ensure proper operation and minimize maintenance. Bolt, rather than weld, all track attachments to the structure to allow for maintenance adjustment. Support doorframes rigidly to prevent cracking of adjacent finishes during normal use. For Security applications, see chapter 11, "Security Design Standards."

## Hardware

Ensure that all builder's hardware is utilitarian, economically competitive, and suitable for the required functions. Builder's hardware must also meet handicapped accessibility requirements. Hardware must be of durable grade and consistent with all appropriate SNL/NM standard specifications and the *International Building Code*.<sup>®</sup> Location of hardware must also meet handicapped accessibility requirements. Avoid using concealed door closers when possible.

Provide an automatic door operator or other form of handicapped accessible assistance at main entrances to new buildings. Exterior door hinges must be either nonremovable or fast-pin. Use fire-rated hardware at all fire-rated door assemblies. Do not use fusible link arms on fire door closers except when permitted by the fire protection engineer. Occasionally fire doors need to be held open, use electromagnetic hold-open devices actuated by the building fire alarm system.

To be compatible with Sandia National Laboratories/New Mexico (SNL/NM) master keying system, all locksets must use Sargent zero or 1-bitted, 6-pin cylinders. Levels of security are assigned to hardware by the SNL Security Lock and Key Program. Once the levels of security have been assigned to the hardware, keyways must be selected by the SNL/NM locksmith. Pushbutton combination locks must be used for administrative locks only and must include a Best small-format interchangeable core. See SNL Standard Specification 08710, *Door Hardware*, for hardware requirements.

## Security Type Locks

The design of door and hardware systems in security areas must follow guidelines established by SNL Physical Security (see chapter 11). Involve SNL Security Lock and Key service during the early design

phase to determine whether any existing door hardware might be considered a security lock. Common applications that require security locks include Closed Areas (CA), Vault-Type Rooms (VTRs), High-Security Buildings (HSB), limited area boundaries, exterior doors, gates, and Internal Distribution Rooms (IDR). Other not-so-common applications that might be considered security locks exist. All security locks and keys must be accounted for at all times by Physical Security and must **not** be removed by any personnel except the Physical Security Locksmith. The hardware designer must provide notes within the construction documents instructing the contractor to contact SNL Security Lock and Key services before removing any doors that contain security hardware. The importance of proper accountability of security locks and cylinders must be conveyed to the general contractor. Refer to SNL Standard Specification 08710, *Door Hardware*, for information about contractor accountability and the "preliminary hardware submittal conference."

The standard hardware to be used on Closed Areas, VTRs, and other high-security applications is the LKM-7003 series by Lockmasters; it is the approved lockset that meets security requirements. This lockset is used with a spin-dial lock. There are three options for the design of doors within these spaces:

Option 1: On outward-swinging doors, provide the LKM 7003 series lockset.

Option 2: On inward-swinging doors, provide the LKM 7003 series lockset and one additional exit with standard door hardware on inside and blank face on exterior side.

Option 3: Provide alternative design approach, and request approval from the Site Fire Marshal if Option 1 or 2 is not feasible.

### 6.3.4 Interiors

#### 6.3.4.1 Partitions

Provide fire-separation walls (occupancy separation type and area separation type) as required by the IBC and the National Fire Protection Association (NFPA) for separation of dissimilar occupancies or hazards, equipment rooms, stairwells, occupancy values, and as required to limit maximum floor areas.

Interior walls and partitions may be composed of materials similar to those used for exterior walls. Interior walls may also be prefabricated and either fire-resistant or noncombustible. Materials used for fire-separation walls must have the required UL-listed fire rating. On the floor plans, identify all walls (rated and nonrated) with a keyed note or a legend. Materials used for vault, closed area, and security area walls must meet the requirements in chapter 11.

Specify that temporary interior construction barriers be covered with Type-X gypsum wallboard and painted to match existing wall surfaces when the barriers are intended to be in place for a significant amount of time, when the barriers are located in a highly visible area, or both.

Observe the following limitations:

- Restrict the use of plaster to areas where the specific operation requires its use.
- Paint masonry walls where required by occupancy; otherwise, leave unfinished. Paint or seal masonry walls in equipment rooms and utility chases.
- Use 5/8-inch-thick Type-X gypsum wallboard throughout, with taped joints. For project-specific requirements, see the Design Criteria or contact the Sandia Designated Representative (SDR).

- Use cementations backer board at all wet service areas.
- To protect the more brittle or destructible wall finishes, provide noncombustible wainscot, corner guards, or both, in areas subject to excessive wear. Attach guards at 6 feet 0 inches off center maximum spacing.
- If acoustic materials are required on the walls, specify those that have a Flame Spread Rating of 25 or less and Smoke Developed Value of 50 or less.
- Where tile finish is required by operations, limit the extent of application as practical. Where tile is used in toilet rooms, wainscot height must be coordinated with the height of wall-mounted fixtures. Tile wainscot in showers must be a minimum of 6 feet 0 inches from the finished floor.
- Take full advantage of modular bay arrangements for movable partition layouts. SNL-furnished movable partitions are usually specified for areas of buildings where periodic rearrangement of space is likely. Movable parts are not normally used as fixed partitions around permanently assigned space except where the quantity of fixed partitions is small compared to the total number of partitions. When movable partitions are used, apply continuous floor and ceiling finishes before partitions are erected.
- Do not use foam plastic materials or foam-filled panels.
- Isolate the mechanical/equipment room from the remainder of the building with sound batts or double layers of gypsum board.

#### 6.3.4.2 Fittings

- **Visual Display Boards:** See SNL Standard Specification 12700, *Systems Furniture*.
- **Wall and Corner Guards:** See SNL Standard Specification 09250, *Gypsum Drywall*.
- **Identifying Devices:** See *Sign Standard for Exterior and Interior Signs* for requirements.
- **Directories:** See *Sign Standard for Exterior and Interior Signs* for requirements.
- **Interior Signage:** *Sign Standard for Exterior and Interior Signs* for requirements.
- **Toilet Accessories:** See SNL Standard Specification 10800, *Toilet Accessories*.
- **Expansion Joint Cover Assemblies:** Coordinate with the SNL Architect.

#### 6.3.4.3 Interior Finishes

Provide finishes that are consistent with the character of the building. Paint or seal masonry walls in equipment rooms and utility chases. Consult with the SNL Architect when coordinating a color scheme for the interior colors.

#### 6.3.4.4 Walls

- **Standard:** See *SNL Standard Specification 09250*.
- **Security:** See chapter 11 of this manual.
- **Acoustical:** See *SNL Standard Specifications 07200 and 09250*

Use qualified design professionals for acoustic design, particularly in areas with high-sound-pressure levels and areas such as large conference rooms, data processing centers, word processing centers, auditoriums, audio/video studios, program control centers, and secure rooms.

In general, for industrial facilities or other high-sound-level facilities, the principal objectives are to achieve an acoustic environment that is not injurious to the occupants and conducive to work performance and safety in operations. For nonindustrial facilities with lower sound levels, the principal objective is to achieve a balanced acoustic environment for the occupants and the functions to be performed.

Do not provide acoustical treatment in storage areas or other service and support areas.

Give special consideration to utility rooms (mechanical/electrical equipment rooms) or other rooms where operating equipment is located. While such areas might not normally be occupied, high sound levels often exist that can be injurious to operating and maintenance personnel, even with short-duration exposure. Where acoustic treatment is not feasible or would not be adequate, anticipated noise levels and requirements for personal protective equipment (or the need for administrative control to limit employee exposure to safe duration periods) must be identified in advance of equipment operation. For reference, see 29 CFR 1910, *Occupational Safety and Health Standards*, Subpart G, 1910.95, "Occupational Noise Exposure."

#### **6.3.4.5 Floors**

Generally, interior floor finishes must be as follows:

- Sealed concrete slabs in shops, equipment rooms, utility chases, warehouses, and other industrial areas
- Vinyl composition tile in laboratories and some office areas
- Carpet tile in office areas where specified
- Raised-access flooring in computer rooms to accommodate cabling flexibility

#### **6.3.4.6 Ceilings**

Keep ceiling heights in all buildings to the minimum consistent with operating requirements. Where the use of suspended ceilings is justified, keep floor-to-floor heights, and space above suspended ceilings to the minimum required to accommodate mechanical and other systems. Ceilings are generally 10 feet high in normal laboratory and administrative areas.

Interior ceiling finishes must comply with IBC requirements for Class A finishes, except in special instances.

In shops, warehouses, and other industrial buildings, leave the basic structure exposed without a ceiling finish, except to isolate contaminated areas or where justified to facilitate heating, ventilation, sanitation, or reduction of excessive noise levels in specialized areas. Provide economically competitive, suspended ceiling systems with mineral fiber tiles in administrative and laboratory buildings.

## 6.3.5 Vertical Circulation, Stairs and Ramps Conveying Systems

### 6.3.5.1 Elevators

Ensure elevators conform to the latest version of ASME/ANSI A17.1, *Safety Code for Elevators, Dumbwaiters, Escalators, and Wheelchair Lifts*. All elevators with automatic doors and having a travel distance of more than 25 feet must have firefighter service. Use a qualified elevator consultant to determine the number of passenger elevators, size and capacity, location, types of machinery, and control. Consider the building population, building layout, and traffic patterns. Locate freight or service elevators in proximity to loading docks, shipping and receiving areas, and storage areas. Combination service-passenger elevators for both the movement of equipment, furniture, and limited personnel use may be appropriate for buildings of less than three stories. All elevator controllers must be nonproprietary. Elevator shafts must be of fire-rated construction, rated in accordance with the IBC for construction of the building. For buildings taller than two floors, select at least one elevator whose cab size is compatible with a medical gurney and two emergency medical technicians with hand-carried equipment. The SNL Architect advises whether this requirement is needed on a given project.

## 6.3.6 Equipment and Furniture

### 6.3.6.1 Vending Equipment

Coordinate vending machine locations with the SNL Architect.

### 6.3.6.2 Recycling

Coordinate recycling center locations with the SNL Architect.

### 6.3.6.3 Mail Services and Computer Media Drop-Offs

If the building is to be regularly occupied and have its own mail service, provide an administrative area near the building entrance for mail stop drop boxes (used by Mail Services), an outgoing mail drop, and a cabinet for disposal of excess computer media. These are free-standing furniture items, but are secured to wall or floor to prevent tipping over or removal. This area can be combined with another administrative service area, such as a copy room, but should be close to the normal entrance of the building. The area should not be in plain view of casual visitors to the building entry.

### 6.3.6.4 Janitorial

Coordinate equipment and supply space locations with the SNL Architect.

### 6.3.6.5 Furniture

See *SNL Standard Specification 12700*.

### 6.3.6.6 Fixed Casework

See *SNL Standard Specification 06400*.

### 6.3.6.7 Window Treatments

See *SNL Standard Specification 12501*.

### 6.3.6.8 Fixed Floor Grilles and Mats

Provide walk-off mats at building entrances to meet Leadership in Energy and Environmental Design (LEED®) requirements.

### 6.3.6.9 Fixed Multiple Seating

Coordinate with SNL Architect.

### 6.3.6.10 Movable Furniture and Accessories

See *SNL Standard Specifications 12700* and *12701*.

## 6.3.7 Special Construction

### 6.3.7.1 Preengineered Structures

Coordinate design with SNL Architect.

### 6.3.7.2 Selective Demolition

Coordinate with SNL Architect.

## 6.3.8 Room Numbers

The A/E must develop an initial room number scheme as the floor plan is substantially developed. The room number scheme must be finalized during design development. All spaces, including vestibules, alcoves, and secondary hallways or corridors, must receive a separate room number. The room number scheme must be used for construction coordination and adopted to provide the final way finding and room numbering scheme for the facility. Separate room numbering schemes for construction and final room identification for interior signage are not acceptable. The A/E must meet with the SNL Architect to review the logic of the proposed room numbering scheme. The room numbering scheme must be used to coordinate final identification of building support and maintenance features, such as panel schedules, communication drops, and mechanical piping, as well as room numbers on interior signage. See *Sign Standard for Exterior and Interior Signs* for standard signage requirements.

## 6.4 Architectural Calculation Requirements

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Required design calculations include, but are not limited to, the following:

- Parking analysis. See the *SNL/NM Campus Design/Development Guidelines* for additional information.
- Code footprint per this manual
- Fixture count per the *2009 International Building Code*, chapter 2, and the exception to table 1004.1 for intended use and actual number of occupants.

- Perimeter envelope R and U values per IECC-2009 and ASHRAE 90.1-2004

## 6.5 Safety

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Design all safety-related building and site conditions to meet the requirements in section 2.16, "Safety Requirements" of this manual. Arrange all building and site egress components including, but not limited to, doors, stairs, corridors, partitions, gates, and fences to facilitate direct and prompt evacuation through and away from the building in an emergency. All egress components must conform to the applicable requirements of the *2009 International Building Code*, the *2009 International Existing Building Code*,<sup>®</sup> and the 2010 Americans with Disabilities Act and Architectural Barriers Act *Accessibility Guidelines* (ADA and ABAAG).

## 6.6 Accessibility Requirements

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Design all new buildings, and all additions and renovations to existing facilities, to be safe and readily accessible to, and usable by, individuals with disabilities. Elements that require consideration include parking (refer to the *Campus Design and Development Guidelines* for quantity requirements), access routes or path of travel, signage, entrances and vestibules, ramps, landings, stairs, doors, restrooms, assembly spaces, water fountains, access control, telephones, elevators, and common-use spaces. The Americans with Disabilities Act and Architectural Barrier Act *Accessibility Guidelines for Buildings and Facilities* (ADA and ABAAG) have published guidance for design of these facilities. Buildings and sites at Sandia National Laboratories will follow "Part II: ABA Application and Scope," as stated in the preamble: *The ABA covers facilities that are designed, built, altered, or leased with federal funds.* The Architectural Accessibility Review Board (AARB) at SNL provides guidance on accessibility issues that require resolution because of interpretations or conflict of the Guidelines. The building design must also allow for safe egress of individuals with disabilities in an emergency. Provide Areas of Rescue Assistance as required by codes, accessibility guidelines, or as designated by the AARB.

- End of Chapter -