2.1 Common Elements for Hospitals (continued)

Appendix material, intended to be advisory only, is offset and begins with the letter “A” following the corresponding requirement.

2.1-4 Patient Support Facilities

2.1-4.1 Laboratory Services

2.1-4.1.1 General

*2.1-4.1.1.1 Application

A2.1-4.1.1.1 Certain tests may be performed on-site or provided through a contractual arrangement with a laboratory service when approved by the authority having jurisdiction. When testing is performed on-site, space and facilities will be needed to accommodate these services. Testing may include hematology, clinical chemistry, urinalysis, coagulation, genetic testing, molecular diagnostics, toxicology, microbiology, anatomic pathology (including cytology and histology), and blood banking as well as tests for blood glucose, arterial blood gases, and electrolytes.

(1) Space shall be provided to accommodate equipment and activities for testing performed on-site. Determination of specific testing to be done on-site with point-of-care and other laboratory instrumentation shall be reviewed with the medical staff of the hospital or freestanding emergency facility.

(2) Provisions shall be included for specimen collection and processing.

2.1-4.1.2 Equipment requirements. Laboratory equipment requiring permanent connections to power, water, ventilation, or other utility systems shall meet the requirements in Section 1.4-1.3.1.1 (Drawings or other project documentation).

2.1-4.1.2 Laboratory Work Areas

The following laboratory work areas shall be provided:

2.1-4.1.2.1 Laboratory workstation

(1) Workstations shall be provided sized to accommodate equipment used and, at minimum, shall include the following:

   (a) Laboratory work counter

   (b) Sink

(2) Access to the following shall be provided as required:

   (a) Vacuum and gases

   (b) Tele/data service

   (c) Electrical service
2.1 Common Elements for Hospitals

2.1-4.1.2.2 Hand-washing station

(1) A hand-washing station shall be provided where staff handle specimens, test reagents, or blood products.

(2) If there is one workstation, a hand-washing station shall be provided at the workstation.

(3) If more than one workstation is provided, a hand-washing station shall be provided within 25 feet (7.62 meters) of all testing and specimen-handling areas.

(4) A hand-washing station shall be provided in each enclosed room where bio-hazardous specimens and/or hazardous chemicals are handled.

2.1-4.1.2.3 Refrigerated storage facilities

(1) A refrigerator shall be provided.

(2) Blood storage facilities shall meet the requirements of the Clinical Laboratory Improvement Amendments (CLIA) standards for blood banks.

*2.1-4.1.2.4 Storage facilities. Storage shall be provided for reagents, specimens, flammable materials, acids, bases, and other supplies used in the laboratory.

A2.1-4.1.2.4 Storage should meet the requirements of NFPA 400: Hazardous Materials Code and NFPA 30: Flammable and Combustible Liquids Code, where applicable.

*2.1-4.1.2.5 Special design elements. All work counter(s) in areas used for specimen handling, preparation of specimens or reagents, and laboratory testing shall be constructed of non-porous materials.

A2.1-4.1.2.5 Reagent water systems. Deionized or reverse osmosis reagent water systems should be designed in accordance with ASTM D1193: Standard Specification for Reagent Water.

*2.1-4.1.2.6 Safety and security provisions

A2.1-4.1.2.6 Safety and security provisions

a. Additional security information about biological, chemical, and radiation areas can be found in areas Section 02.09 Biological, Chemical and Radiation Areas of Security Guidelines for Healthcare Facilities, published by the International Association for Healthcare Security & Safety (IAHSS).

b. Eyewash and emergency showers. The number and location of eyewash and emergency showers that may be required will be based on requirements from different occupational safety organizations at local, state, and federal levels. The application of these requirements will depend on the types and volumes of chemicals used in a lab. Hospitals should consult with the local authority having jurisdiction to determine these requirements.

(1) Terminal sterilization provisions. Facilities and equipment shall be provided for terminal
sterilization of bio-hazardous waste before transport (autoclave or electric oven).

(a) Terminal sterilization is not required for waste that is incinerated on-site.

(b) If the facility includes a biosafety Level III lab, autoclave requirements shall be in conformance with Section IV of the CDC *Biosafety in Microbiological and Biomedical Laboratories* (BMBL).

(2) Radioactive material-handling provisions. If radioactive materials are employed, facilities for long-term storage and disposal of these materials shall be provided in accordance with the requirements of authorities having jurisdiction.

**2.1-4.1.3 Specimen Collection Facilities**

A2.1-4.1.3 Specimen collection facilities. When a chain of custody is required for the specimen collected, the specimen collection facility should meet the requirements of the Federal Workplace Drug Testing Program, as established in the Department Health and Human Services (HHS) Mandatory Guidelines.

### 2.1-4.1.3.1 General

(1) Space shall be provided for specimen collection.

*(2) Location of specimen collection facilities outside the laboratory work area shall be permitted.*

A2.1-4.1.3.1 (2) Specimen collection facility location. Specimen (e.g., blood, urine, feces) collection may occur in a number of locations, including exam rooms for blood draw and toilet rooms for urine and feces specimens. Where a space is dedicated to specimen collection outside of the laboratory, it is often referred to as phlebotomy.

### 2.1-4.1.3.2 Facility requirements

At minimum, specimen collection facilities shall have the following:

(1) A blood collection area with:

   (a) Work counter
   
   (b) Space for patient seating
   
   (c) Hand-washing station(s)
   
   (d) Supply storage

(2) A urine and feces collection facility equipped with a toilet and a hand-washing station

(3) Storage space for specimen collection supplies

(4) Work counter for labeling and computerized data entry

(5) Storage for specimens awaiting pickup

2.1-4.1.4 – 2.1-4.1.7 Reserved

2.1-4.1.8 Support Areas for the Laboratory
2.1 Common Elements for Hospitals

Office(s) and space for clerical work, filing, and record maintenance and storage shall be provided.

2.1-4.1.9 Support Areas for Staff

2.1-4.1.9.1 Lounge, locker, and toilet facilities shall be readily accessible for laboratory staff.

2.1-4.1.9.2 Location of these areas outside the laboratory area and sharing of these areas with other departments shall be permitted.

2.1-4.2 Pharmacy Services

2.1-4.2.1 General

*2.1-4.2.1.1 Application

A2.1-4.2.1.1 Pharmacy services. The size and type of services to be accommodated in the pharmacy depend on the type of drug distribution system used, the number of patients to be served, and the extent of shared or purchased services.

(1) Facilities shall be provided to accommodate the pharmacy services and equipment described in the functional program.

(2) Pharmacy facilities shall be designed to address risks identified in the medication safety assessment and security risk assessment portions of the safety risk assessment.

(3) Satellite pharmacy facilities shall be permitted.

2.1-4.2.1.2 Location

(1) The pharmacy room or suite shall be located to be accessible to clinical areas of the hospital.

*(2) Access to the room or suite shall be controlled. [Moved to Section 2.1-4.2.2.1]

A2.1-4.2.1.2 Controlled access to the pharmacy. Additional security information can be found in Security Design Guidelines for Healthcare Facilities, published by the International Association for Healthcare Security & Safety (IAHSS).

2.1-4.2.1.3.2 Medication safety zone design. See Section 2.1-2.8.8 (Medication Safety Zones) for general requirements for design of medication safety zones.

2.1-4.2.2 Pharmacy Areas

*2.1-4.2.2.1 Pharmacy access. Access to the pharmacy room or suite shall be controlled.

A2.1-4.2.2.1 Controlled access to the pharmacy. Additional security information can be found in Security Design Guidelines for Healthcare Facilities, published by the International Association for Healthcare Security & Safety (IAHSS).

*2.1-4.2.2.1-2 Dispensing facilities. The following shall be provided:

A2.1-4.2.2.12 Dispensing facilities. Dispensing facilities should meet all applicable requirements of:
2.1 Common Elements for Hospitals

a. USP <795>: Pharmaceutical Compounding—Nonsterile Preparations
b. USP <797>: Pharmaceutical Compounding—Sterile Preparations
c. USP <800>: Hazardous Drugs—Handling in Healthcare Settings

(1) A room or area for receiving, unpacking, and inventory control of materials used in the pharmacy
(2) Work counters and space for automated and manual dispensing activities
(3) An extemporaneous compounding area. This shall include a sink and counter space for drug preparation.
(4) An area for reviewing and recording
(5) An area for temporary storage, exchange, and restocking of carts
(6) Security provisions for drugs and personnel in the dispensing counter area

2.1-4.2.2.3 Manufacturing facilities. The following shall be provided:

(1) A bulk compounding area
(2) Provisions for packaging and labeling
(3) A quality control area

2.1-4.2.2.3.4 Storage. Cabinets, shelves, and/or separate rooms or closets shall be provided for the following:

(1) Bulk storage
(2) Active storage
(3) Refrigerated storage
(4) Storage for volatile fluids and alcohol in accordance with applicable fire safety codes for the substances involved

*(5) Secured lockable storage for narcotics and controlled drugs

A2.1-4.2.2.3.4 (5) Storage should be in accordance with Code of Federal Regulations, Title 21.

(6) Equipment and supply storage for general supplies and equipment not in use

2.1-4.2.3 Sterile Work Areas

A2.1-4.2.3.1 General. Where sterile work areas are provided, they shall meet the requirements in this section.

A2.1-4.2.3.1 General. Sterile work areas should meet the requirements of USP <797>: Pharmaceutical Compounding—Sterile Preparations and USP <800>: Hazardous Drugs—Handling in Healthcare Settings as applicable.

(1) Layout. The pharmacy shall be laid out to preclude unrelated traffic through the intravenous (IV)
and hazardous drug IV preparation rooms.

(2) Where robotic systems are used in the preparation of IV solutions in either the positive pressure IV preparation room or the negative pressure hazardous drug IV prep room, the robotics shall be separate systems and shall not pass from one room to the other.

2.1-4.2.3.2 IV preparation area. If IV solutions are prepared in the pharmacy, a sterile work area with a laminar-flow workstation designed for product protection shall be provided.

(1) The compounding area and equipment shall comply with the requirements of USP and state board of pharmacy requirements. A laminar-flow workstation shall include a nonhydroscopic filter rated at 99.97 percent (HEPA), as tested by dioctyl phthalate (DOP) tests.

(2) The laminar-flow workstation shall have a visible pressure gauge for detection of filter leaks or defects.

*2.1-4.2.3.3 Hazardous drug IV preparation room. A separate room shall be provided for preparation of hazardous drug IV admixtures under a Class II (Type A2, B1, or B2) or Class III biological safety cabinet.

A2.1-4.2.3.3 Hazardous drug IV prep room

a. Biological safety cabinets are classified according to biosafety levels established by the Centers for Disease Control and Prevention. See the CDC document “Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets.”

b. The hazardous drugs IV preparation room should meet the requirements of USP <800>: Hazardous Drugs—Handling in Healthcare Settings.

2.1-4.2.4 – 2.1-4.2.7 Reserved

2.1-4.2.8 Support Areas for the Pharmacy

*2.1-4.2.8.1 General. Access to the following types of information shall be provided:

A2.1-4.2.8.1 Access to information. Where access to patient and pharmacological information is via a computer, consideration should be given to providing backup access during a power failure or a failure of the health care organization’s electronic data system.

(1) Patient information. Provision shall be made for cross-checking medication and drug profiles of individual patients.

(2) Pharmacological information. Provision shall be made for access to poison control, reaction data, and drug information.

*2.1-4.2.8.2 Office. A separate room or area shall be provided for office functions.

A2.1-4.2.8.2 Office. When sizing this room, consider the space needed to accommodate a desk, filing capabilities, communication equipment, and reference materials.

2.1-4.2.8.3 A room for education and training. A multipurpose room shared with other departments
shall be permitted to serve this purpose.

**2.1-4.2.8.4 Outpatient medication consultation area.** If medication is dispensed to outpatients from the hospital pharmacy, an area for consultation and patient education shall be provided.

**2.1-4.2.8.5 – 2.1-4.2.8.6 Reserved**

**#2.1-4.2.8.7 Hand-washing station.**

*(1) A hand-washing station(s) shall be provided in each separate room where either in an anteroom or immediately outside the room where open medication(s) are prepared for administration, except where prohibited by USP <797> or USP <800>.

A2.1-4.2.8.7 (1) A hand-washing station(s) should be in accordance with:

a. USP <795>: Pharmaceutical Compounding—Nonsterile Preparations

b. USP <797>: Pharmaceutical Compounding—Sterile Preparations

c. USP <800>: Hazardous Drugs—Handling in Healthcare Settings

(2) Where a hand-washing station is prohibited in the compounding room, a hand-washing station shall be provided in an anteroom.

**2.1-4.2.8.8 – 2.1-4.2.8.12 Reserved**

**2.1-4.2.8.13 Additional equipment and supply storage.** If a unit dose procedure is used, additional space and equipment shall be provided to accommodate supplies, packaging, labeling, and storage, including space for carts.

**2.1-4.2.9 Support Areas for Staff**

2.1-4.2.9.1 Lounge, locker, and toilet facilities shall be readily accessible to the pharmacy.

2.1-4.2.9.2 These areas shall be permitted to be outside the pharmacy area and shared with other departments.

**2.1-4.3 Food and Nutrition Services**

**2.1-4.3.1 General**

**2.1-4.3.1.1 Application.** Facilities and equipment shall be provided to support food services provided for staff, visitors, and patients.

A2.1-4.3.1.1 Food service in a hospital may be provided in special dining areas (e.g., a physicians’ dining room, conference center, boardroom, training facilities) and in retail serving areas for staff, ambulatory patients, and visitors. In addition, snacks between scheduled meals may be provided.

**2.1-4.3.1.2 Layout.** The equipment and design layout shall provide a workflow that minimizes potential for cross-contamination of clean food and wares with contaminated trays from patients or retail customers.

A2.1-4.3.1.2 Layout of food and nutrition service facilities
2.1 Common Elements for Hospitals

a. The design should keep food service storage, production, sanitation, tray assembly, and main retail areas contiguous to each other.

b. Small retail options or minimal amounts of storage may be remote from the main food service area.

c. If the food service department is split onto two levels, there should be a dedicated elevator and an internal service stair connecting the multi-level food service operations.

d. The design should not split retail and patient food service in hospitals with fewer than 250 occupied beds.

e. Nutrition service offices should be located near the functional work centers of the food and nutrition service facilities.

2.1-4.3.1.3 Regulations. Construction, equipment, and installation of food and nutrition service facilities in a hospital shall comply with the requirements of:

(1) U.S. Food and Drug Administration (FDA)

(2) U.S. Department of Agriculture (USDA)

(3) Underwriters Laboratories, Inc. (UL)

(4) NSF International

2.1-4.3.2 Food Preparation Areas

2.1-4.3.2.1 Layout. The space shall be designed to prevent soiled trays or tray carts from passing through food preparation areas or areas with open food.

2.1-4.3.2.2 Sinks. A sink(s) shall be provided as required by local codes.

2.1-4.3.2.3 Food preparation surfaces. Food preparation surface areas shall be provided. When combined, these shall have a length equal to or greater than the length of all commercial cooking equipment.

*2.1-4.3.2.4 Equipment

A2.1-4.3.2.4 Cooking equipment should be mounted on casters with locking brakes for ease of cleaning requirements. Flexible quickdisconnects or plug connectors with restraining devices should be used to minimize damage to utility connection points during cleaning and/or service.

(1) Cooking equipment. Commercial-grade cooking equipment that meets NSF International, Underwriters Laboratories, and American Gas Association standards shall be provided.

(2) Refrigeration equipment. Commercial-grade refrigeration shall be provided to hold chilled and frozen food at temperatures in accordance with local, state, and federal requirements, including the FDA “Food Code.”

(3) Hot food holding equipment. Commercial equipment shall be provided for maintaining food at hot temperatures in accordance with local, state, and federal requirements, including the FDA “Food
2.1 Common Elements for Hospitals

2.1-4.3.2.5 Hand-washing stations. Hand-washing stations shall be provided within 20 feet (6.10 meters) of each food preparation or serving area.

*2.1-4.3.3 Assembly and Distribution Facilities

A2.1-4.3.3 The patient meal service distribution process should be described in the functional program. This process may include a conventional patient tray line, room service, pantry service, or other methodology for serving patient meals.

2.1-4.3.3.1 Space shall be provided for patient food assembly in a non-public service area.

2.1-4.3.3.2 Where dinnerware and serving utensils are retained in patient care areas and not returned to a central wing/sanitation area, the patient care unit shall be provided with an NSF-listed automatic dishwashing unit.

2.1-4.3.3.3 Space shall be provided for the following functions to support food service cart distribution:

(1) Storing carts when not in use
(2) Loading carts for distribution
(3) Distributing meals
(4) Receiving soiled carts

*(5) Sanitizing carts. A designated area shall be provided with a grated or sloped floor with floor drain and a source of water and sanitizing agents.

A2.1-4.3.3.3 (5) Cart sanitizing

a. A high-pressure water and chemical hose/spray system should be provided to facilitate cleaning.

b. A cart-drying area with floor drain should be provided where carts can air-dry.

2.1-4.3.4 Warewashing Facilities

*2.1-4.3.4.1 An NSF-listed automatic dishwashing unit shall be provided for dinnerware and utensil washing.

A2.1-4.3.4.1 Dishwashing unit. Use of a hot water sanitizing dish machine is recommended rather than a low temperature chemical washing unit.

2.1-4.3.4.2 Soak sinks. Soak sinks shall be provided.

2.1-4.3.4.3 Pot- and pan-washing facilities. A three-compartment sink with an integral sloped drainboard on both the clean and soiled sides shall be provided.

2.1-4.3.4.4 Hand-washing station. A hand-washing station(s) shall be provided.

2.1-4.3.5 Dining Areas
2.1-4.3.5.1 Dining space(s) shall be provided for ambulatory patients, staff, and visitors.

2.1-4.3.5.2 A minimum aisle spacing and chair clearance of 3 feet (91.5 centimeters) shall be provided.

2.1-4.3.5.3 The design of aisles, tables/chairs, and casework used for self-service shall accommodate wheelchair access. See Section 1.1-4.1 (Design Standards for Accessibility).

*2.1-4.3.6 Vending Machine Areas

A2.1-4.3.6 Vending machine areas. Provision of space for vending equipment near staff support areas, high-traffic areas, and public waiting areas should be considered.

a. Vending equipment may be coordinated with interior finish design concepts through use of custom or false fronts or enclosures that conceal commercial messages.

b. Space should be provided for trash collection devices in each vending equipment complex.

c. Environmental services facilities should be located near vending areas as they are high-use areas.

d. Vending rooms may also contain a seating area, microwaves, and trash-holding containers.

2.1-4.3.7 Reserved

2.1-4.3.8 Support Areas for Food and Nutrition Facilities

*2.1-4.3.8.1 Receiving area

A2.1-4.3.8.1 Design considerations for the receiving dock should include, at minimum, dock height, a dock depth of 10–12 feet, dock levelers, automatic doors, multiple truck bays, ramps from grade, and balers. Vestibules may be needed depending on climatic conditions.

(1) Location. A receiving area shall be provided at the receiving entrance to the department.

*(2) Space requirements. Space shall be provided for vendor storage, the breakdown of boxes, and the delivery and transport equipment used, such as receiving carts/jacks, transport carts, and returnables.

A2.1-4.3.8.1 (2) In facilities with more than 250 beds, space should be allowed for a receiving desk or office at the receiving dock.

*(3) Door. The exterior door into the receiving area shall have a minimum clear width of 4 feet (1.22 meters) and a minimum clear height of 7 feet (2.14 meters).

A2.1-4.3.8.1 (3) The 4-foot (1.22-meter) wide receiving door is sized to fit a pallet/transport nominally 3 feet 4 inches (1.02 meters) wide.

2.1-4.3.8.2 – 2.1-4.3.8.3 Reserved

2.1-4.3.8.4 Office. Office space shall be provided for food service management.
2.1-4.3.8.5 – 2.1-4.3.8.12 Reserved

2.1-4.3.8.13 Food and supply storage

*(1) General

A2.1-4.3.8.13 (1) Storage in food and nutrition areas

a. Room temperature should be maintained below 72°F (22°C) and 55 percent
relative humidity to minimize food spoilage.

b. Most shelving in storage areas should be 21–24 inches (53–61 centimeters)
wide.

c. Children’s hospitals or hospitals with more than 25 pediatric/NICU beds
should have a separate storage area for formula and human milk on the patient
care unit near the patient beds.

(a) Dry storage and refrigerator/freezer space shall be provided to support both patient and non-
patient food service based on the number of deliveries available, the menu, and the method of
preparation.

*(b) Aisles with a minimum width of 36 inches shall be provided between storage units.

A2.1-4.3.8.13 (1)(b) Aisles in food and supply storage areas. In facilities
with pallet/transport traffic, aisles should be a minimum of 3 feet 6 inches (1.07
meters) wide.

*(2) Refrigeration equipment

A2.1-4.3.8.13 (2) Refrigeration equipment

a. Walk-in refrigerator and low-temperature units should be constructed with a
recessed insulated floor that is flush with the adjoining finished floor.

b. Walk-in refrigerator and low-temperature units should have a minimum
interior ceiling height of 7 feet 11 inches (2.4 meters).

c. A quick-chill refrigeration capability should be provided to meet FDA “Food
Code” requirements.

(a) Refrigerators and freezers shall be thermostatically controlled to maintain temperature settings in
increments of 2 degrees or less.

(b) Commercial-grade refrigeration shall be provided to hold chilled and frozen food at
temperatures in accordance with local, state, and federal requirements, including “HACCP
[Hazardous Analysis Critical Control Point] Principles & Application Guidelines” and the FDA
“Food Code.”

(c) Interior temperatures shall be indicated digitally on the exterior of the equipment in accordance
with FDA “Food Code” safe food handling guidelines and verification standards.

(i) Controls shall include audible and visible high- and low-temperature alarms.

(ii) The time of the alarm shall be automatically recorded.
(d) A coved base shall be provided on the interior and exterior of walk-in refrigerator and low-temperature units.

(e) All walk-in refrigerator and low-temperature units shall have a view panel in the door and safety release mechanism for exit from the inside.

(f) Shelving in walk-in refrigerator and low-temperature units shall be non-corrosive and mobile.

(g) The interior of walk-in refrigerator and low-temperature units shall be lighted when occupied.

(h) The bottom shelf shall be located no less than 10 inches (25.40 centimeters) above the finished floor.

*(3) Chemical storage. Chemical storage shall be provided.

A2.1-4.3.8.13 (3) Chemicals should be stored on non-corrosive or stainless steel shelving.

(4) Emergency storage. The following shall be provided as determined in the design phase:

(a) Storage for emergency or disaster food and water

(b) Emergency utility support for refrigerated storage and food preparation and serving areas

2.1-4.3.8.14 Environmental services room. An environmental services room shall be provided in the food and nutrition services department in accordance with Section 2.1-2.8.14 (Environmental Services Room), except as amended in this section.

(1) The environmental services room in the food and nutrition services department shall not be shared with patient care units or clinical departments.

(2) Space requirements

(a) The size of the environmental services room shall accommodate the following:

(i) A utility sink with check valves on hot and cold water supply lines

(ii) Storage for warewashing and general cleaning chemicals

(iii) A rack for air drying mops

(iv) Mobile carts with water containers and related janitorial equipment

(b) Where hot water or steam is used for general cleaning, additional space shall be provided in the room for storage of hoses and nozzles.

(3) Environmental services rooms shall not be combined with locations for trash storage.

2.1-4.3.8.15 Reserved

*2.1-4.3.8.16 Trash storage. Space for holding covered trash containers prior to removal to dock waste-handling facilities shall be provided in food preparation, serving, and sanitation areas.

A2.1-4.3.8.16 Recycling and composting. Today’s hospitals are increasingly using recycling and composting as a means of reducing waste. Providing space
for these functions should be considered.

2.1-4.3.9 Support Areas for Food and Nutrition Services Staff

2.1-4.3.9.1 Reserved

2.1-4.3.9.2 Toilet rooms

(1) Toilet rooms shall be provided in, adjacent to, or directly accessible to the food and nutrition services department.

(2) Toilet rooms in the food and nutrition services department shall not be permitted to open directly into food preparation or food storage areas.

2.1-4.3.9.3 Storage for staff

(1) Lockers shall be provided for food and nutrition services staff.

(2) If staff lockers are not readily accessible to the department, space for lockable storage for staff personal items shall be provided in the department.

2.1-5 General Support Facilities

2.1-5.1 Sterile Processing

2.1-5.1.1 General

Each hospital shall have provisions for sterile processing.

2.1-5.1.2 Facilities for On-Site Sterile Processing

2.1-5.1.2.1 General

(1) Application

   (a) Where sterile processing is provided on-site, sterile processing facilities that meet the requirements in Section 2.1-5.1.2.2 (Two-room sterile processing facility) shall be provided with the following exception:

   (b) Where sterilization equipment is limited to a table-top or similar-sized sterilizer(s), provision of a one-room sterile processing facility that complies with Section 2.1-5.1.2.3 (One-room sterile processing facility) shall be permitted.

(2) The sterile processing facility shall meet the requirements of a semi-restricted area.

*(3) Layout. Sterile processing facilities shall be designed to provide a one-way traffic pattern.

A2.1-5.1.2.1 (3) One-way traffic in sterile processing. The process for cleaning contaminated instruments and reprocessing items for patient use is: The contaminated item is transported from the point of use to the decontamination room or decontamination area, where it is cleaned. The clean item is then moved to the clean workroom or clean work area, where it is readied for sterilization, packaged, and sterilized.
2.1-5.1.2.2 Two-room sterile processing facility

(1) General

*(a) The two-room sterile processing facility shall consist of a decontamination room and a clean workroom that are physically separated by a wall containing a door or pass-through window that can be closed and secured or a built-in washer/disinfector with a pass-through door or window.

**A2.1-5.1.2.2 (1)(a) The intent of this requirement is to support a workflow in which decontaminated items are transferred directly to the clean workroom for final assembly, packaging, and sterilization. This direct flow pattern reduces the risk of environmental contamination of adjoining corridors and other spaces.

(b) A sterilizer access room for maintaining the equipment shall be provided if required by the sterilizer manufacturer.

(2) Decontamination room

*(a) The decontamination room shall be sized to meet the minimum equipment space and clearances needed for the equipment used.

**A2.1-5.1.2.2 (2)(a) Decontamination room equipment.** Equipment used in the decontamination room may include:

a. Washer/sterilizer or washer/decontaminator
b. Ultrasonic cleaner
c. Case cart washer, where carts are used
d. Case cart storage, where carts are used

(b) In addition to space for equipment, the decontamination room shall contain the following:

(i) Work counter(s)
(ii) Hand-washing station
(iii) Three-basin sink with counter
(iv) Flushing-rim clinical sink or equivalent fixture unless alternative methods for disposal of bio-waste are provided
(v) Space for waste and soiled linen receptacle(s)
(vi) Documentation area
(vii) Instrument air outlet or portable compressed air for drying instruments. See Table 2.1-3 (Station Outlets for Oxygen, Vacuum, Medical Air, and Instrument Air Systems in Hospitals).
(viii) Storage for decontamination supplies and personal protective equipment (PPE)
(ix) Eyewash station if required by the safety risk assessment
(3) Clean workroom

*(a) The clean workroom shall be sized to accommodate the space and clearances needed for the sterilization equipment used.

**A2.1-5.1.2.2 (3)(a) Clean workroom equipment.** Equipment used in the clean workroom may include:

a. Steam sterilizer (manual load, cart, or countertop)

b. Low-temperature sterilizer (may be countertop)

(b) In addition to space for equipment, the clean workroom shall contain the following:

*(i) Work counter(s)

**A2.1-5.1.2.2 (3)(b)(i) The work counter space provided should be able to accommodate the volume of equipment assembly for the procedures performed in the facility and the expected staffing levels.

(ii) Hand-washing station

(iii) Eyewash station if required by the safety risk assessment

(iv) Storage for sterilization supplies

(v) Documentation area

(vi) Instrument air outlet or portable compressed air as required by equipment used to dry instruments. See Table 2.1-3 (Station Outlets for Oxygen, Vacuum, Medical Air, and Instrument Air Systems in Hospitals).

(vii) Cooling area for sterilization cart where the sterilizer is loaded/unloaded using a rolling cart

(4) Sterile storage. A sterile storage space shall be provided for storage of sterile instruments and supplies.

(a) This space shall be permitted to be in the clean workroom or a separate storage room.

(b) Space for case cart storage shall be provided where case carts are used.

**2.1-5.1.2.3 One-room sterile processing facility**

(1) General. The one-room sterile processing facility shall consist of a decontamination area and a clean work area.

(a) Location of the clean work area in an alcove or in a clean workroom as described in Section 2.1-2.8.11 (Clean Workroom or Clean Supply Room) shall be permitted provided decontamination takes place in a readily accessible soiled workroom as described in Section 2.1-2.8.12 (Soiled Workroom or Soiled Holding Room).

*(b) One-room sterile processing facilities shall be permitted to have one entrance provided it is located approximately equidistant from the clean and decontamination sides of the room and allows for a one-way traffic flow.
2.1 Common Elements for Hospitals

A2.1-5.1.2.3 (1)(b) A one-way traffic flow may also be created by placing a door at or near the ends of both the clean and decontamination areas.

(2) Decontamination area

(a) The decontamination area shall be equipped with the following:

(i) Countertop

(ii) Two-basin sink for washing instruments

(iii) Hand-washing station separate from the instrument-washing sink

(iv) Storage for supplies

(v) Instrument air outlet or portable compressed air as required by equipment used to dry instruments. See Table 2.1-3 (Station Outlets for Oxygen, Vacuum, Medical Air, and Instrument Air Systems in Hospitals).

(b) To avoid splash, the instrument-washing sink shall be separated from the clean work area by either a 4-foot (1.22-meter) distance from the edge of the sink or a separating wall or screen. If a screen is used, it shall extend a minimum of 4 feet (1.22 meters) above the sink rim.

(3) Clean work area. The clean work area shall be equipped with the following:

(a) Countertop

(b) Sterilizer as required for the services provided

(c) Storage for supplies

(d) Instrument air outlet or portable compressed air as required by equipment used to dry instruments. See Table 2.1-3 (Station Outlets for Oxygen, Vacuum, Medical Air, and Instrument Air Systems in Hospitals) for requirements.

*2.1-5.1.2.4 Equipment and supply storage

A2.1-5.1.2.4 Space for instrument vendor (loaner set) receiving/pickup. If the facility uses an equipment consignment process, provision of space should be considered where instrument vendors can deliver, inventory, inspect, and prepare their consigned equipment for delivery into the sterile processing area. This space should be adjacent to the sterile processing area without providing direct access into it. Provision of space for vendor pickup of used equipment also should be considered; this could be a separate space or part of the vendor receiving/pickup space.

(1) Instrument and supply storage. Storage shall be provided for sterile and clean instruments and supplies.

(a) This storage shall be permitted to be a separate room or a portion of the clean workroom.

(b) Space for case cart storage shall be provided where case carts are used.

(c) Storage for clean/sterile packs shall include provisions to maintain humidity and temperature levels specified by the manufacturer(s) of the materials being stored.
*(2) Clean/sterile medical/surgical supply receiving. A room shall be provided for receiving/unpacking clean/sterile supplies received from outside the department or facility.

A2.1-5.1.2.4 (2) A receiving room is required because the exterior containers in which supplies are delivered are considered dirty and may harbor various infectious agents.

2.1-5.1.2.5 Support areas for staff. Staff changing areas shall be provided.

(1) General

(a) Separate changing areas shall be provided for male and female staff. Provision of a unisex changing area with one or more private changing rooms shall be permitted.

(b) Staff changing area(s) shall meet the requirements of an unrestricted area.

(c) Sharing of these areas with other departments or services shall be permitted.

(2) Staff changing areas shall contain the following:

(a) Lockers

(b) Toilet

(c) Hand-washing station

(d) Space for donning and doffing surgical attire

(e) Provision for separate storage of clean and soiled surgical attire

2.1-5.1.3 Support Areas for Hospitals Using Off-Site Sterile Processing

Where sterile processing services are provided off-site, the following on-site support spaces shall be provided:

2.1-5.1.3.1 A room for breakdown (receiving/unpacking) of clean/sterile supplies. See Section 2.1-5.1.2.4 (2) (Clean/sterile medical/surgical supply receiving) for requirements.

2.1-5.1.3.2 A room for on-site storage of clean and sterile supplies. See Section 2.1-5.1.2.4 (1) (Instrument and supply storage) for requirements.

2.1-5.1.3.3 A room with a flush-type device for gross decontamination and holding of instruments. The soiled workroom described in Section 2.1-2.8.12 (Soiled Workroom or Soiled Holding Room) shall be permitted to serve this purpose.

*2.1-5.2 Linen Services

A2.1-5.2 Linen services facilities provide for processing and storage of soiled and clean linen throughout the hospital.

2.1-5.2.1 General

2.1-5.2.1.1 Application. Each hospital shall have provisions for storing and processing of clean and soiled linen used for patient care and support.
2.1 Common Elements for Hospitals

2.1-5.2.1.2 Location. Linen processing shall be permitted to occur on-site or in an off-site laundry.

2.1-5.2.2 On-Site Linen Processing Facilities

Where linen is processed in the hospital or in a separate building on the hospital campus, at minimum the following shall be provided:

2.1-5.2.2.1 Soiled and clean linen-handling areas

1) Soiled linen holding room. A separate room shall be provided for soiled linen receiving and holding that meets the requirements in Section 2.1-2.8.12.3 (Soiled holding room).
   (a) A hand-washing station shall be provided in each room or area where soiled linen is processed or handled.
   (b) Discharge from soiled linen chutes shall be received in a separate room adjacent to the soiled holding room.

2) Clean linen inspection room or area
   (a) If not provided as part of the clean linen storage room, a room or area shall be provided for inspection, removal of lint, mending, folding, assembling, and packaging of clean linen.
   (b) Space for a table, shelving, and storage shall be provided.

3) Clean linen storage room. A clean linen storage and issuing room(s) shall be provided in addition to the linen storage required at individual patient units.

4) Cart storage area. Separate areas shall be provided for parking of clean and soiled linen carts out of traffic.

5) Service entrance. Where linen processing facilities are located in a separate building on the hospital campus, a service entrance protected from inclement weather shall be provided for loading and unloading of linen.

2.1-5.2.2.2 Laundry facilities

1) General
   (a) Laundry facilities to accommodate the washing and drying of laundry shall include those listed in this section.
   (b) Laundry facilities shall be designed to permit an orderly workflow and minimize cross-traffic that might mix clean and soiled operations.

2) Laundry processing room. This room shall have space for commercial or industrial washing and drying equipment that can process at least a seven-day supply of laundry during the regularly scheduled work week.

3) Hand-washing station. A hand-washing station shall be provided in the laundry processing room.

4) Storage for laundry supplies. Storage shall be provided for all supplies necessary for laundry operations.

2.1-5.2.3 – 2.1-5.2.7 Reserved
2.1-5.2.8 Support Areas for Off-Site Linen Processing

Where linen is processed off-site, the following support areas shall be provided at the hospital:

2.1-5.2.8.1 Soiled linen holding room

(1) A separate room shall be provided for soiled linen receiving and holding that meets the requirement in Section 2.1-2.8.12.3 (Soiled holding room).

(2) Discharge from soiled linen chutes shall be received in a separate room adjacent to the soiled holding room.

2.1-5.2.8.2 Clean linen storage room. A clean linen storage and issuing room(s) shall be provided in addition to the linen storage required at individual patient units.

2.1-5.2.8.3 Cart storage area. Separate areas shall be provided for parking of clean and soiled linen carts out of traffic.

2.1-5.2.8.4 Service entrance. A service entrance shall be provided for loading and unloading linen.

2.1-5.2.8.5 Control station

(1) A control station for pickup and receiving of soiled and clean linen shall be provided.

(2) This control station shall be permitted to be shared with other functions.

2.1-5.2.9 Support Areas for Staff

2.1-5.2.9.1 Toilets, lockers, and lounge facilities shall be readily accessible to the linen services area.

2.1-5.2.9.2 Location of these areas outside the linen services area and sharing of them with other departments or services shall be permitted.

*2.1-5.3 Materials Management

A2.1-5.3 Materials management services include receiving, processing, and storing general supplies for the hospital.

2.1-5.3.1 General

*2.1-5.3.1.1 Application. The facilities provided to support a hospital’s materials management services shall, at minimum, consist of the requirements in this section.

A2.1-5.3.1.1 The facilities needed to support materials management in a hospital will depend on the size and complexity of the materials management services provided.

*2.1-5.3.1.2 Location. Materials management facilities shall be separate from patient care areas.

A2.1-5.3.1.2 Acoustic considerations for materials management and other services. Activities such as loading and unloading of trucks, trash compacting and removal, and ambulance arrival and departure include potentially noisy vehicles, backup signals, and activities inside or adjacent to the building. Hours of operation are usually unlimited. Patient rooms and other sensitive rooms often overlook these areas, and limiting the transmission of sound from vehicles
and associated activities into the building should be a high priority during
design of the built environment. See Section 1.2-6.1 (Acoustic Design) for
more information.

2.1-5.3.2 Receiving Facilities

2.1-5.3.2.1 Off-street unloading area. An area separated from public streets shall be provided for
unloading materials for the hospital.

2.1-5.3.2.2 Receiving area. A receiving area shall be provided to accommodate delivery trucks and
other vehicles.

*(1) Location

A2.1-5.3.2.2 (1) The receiving area should be located to promote the safe,
secure, and efficient movement of arriving materials without compromising
patient areas. It should be immediately accessible to service elevators and other
internal corridor systems.

(a) The receiving area shall be separated from other occupied building areas and located so that
noise and odors from operation will not adversely affect building occupants.

(b) The receiving area shall be segregated from waste staging and other outgoing materials-handling
functions.

(2) Space requirements

(a) An area shall be provided for unpacking, sorting, and staging of incoming materials and
supplies.

(b) If provided, balers and other devices shall be located to capture packaging for recycling or return
to manufacturer or deliverer.

(c) In facilities with centralized warehousing, space shall be provided at receiving points to permit
staging of reusable transport containers for supplies moving from central warehouses to
individual receiving sites.

(d) A workstation area shall be provided.

2.1-5.3.3 Central Storage Facilities

*2.1-5.3.3.1 General

A2.1-5.3.3.1 Supplies for emergencies. During planning for central storage
facilities, consideration for storage of emergency preparedness supplies, linens,
etc. should be included. Emergency preparation storage may be located off-site
provided a transportation plan is in place for accessing the supplies.

(1) In addition to supply storage facilities located in individual departments, a central facility for general
storage shall be provided.

(2) Location of central storage facilities in a separate building on-site shall be permitted as long as
provisions are made for protection against inclement weather during transfer of supplies to the
hospital.
2.1-5.3.3.2 **Storage room.** Central storage facilities for general storage shall consist of one or more storage rooms.

(1) Location

   (a) Location of the general storage room(s) in a separate, concentrated area(s) in the hospital, or in one or more individual storage buildings on the hospital campus, shall be permitted.

   (b) Off-site location for a portion of this storage shall also be permitted.

(2) Space requirements. General storage room(s) with a total area of no less than 20 square feet (1.86 square meters) per inpatient bed shall be provided.

2.1-5.3.3.3 **Additional storage areas for outpatient departments**

(1) Location. The location of additional storage areas for outpatient departments in the general storage room, in a central area in the outpatient department, or at an off-site location shall be permitted.

(2) Space requirements. Additional storage areas for outpatient departments shall have a total area of no less than 5 percent of the total floor area of the outpatient departments served.

*2.1-5.4 Waste Management*

**A2.1-5.4 Nuclear waste disposal.** For information about handling and disposal of nuclear materials in health care facilities, see *Code of Federal Regulations*, Title 10, Part 20 (Standards for Protection Against Radiation) and Part 35 (Medical Use of Byproduct Material).

*2.1-5.4.1 Waste Collection and Storage Facilities*

**A2.1-5.4.1 Waste collection and storage**

a. The underlying framework of waste management is composed of waste minimization and segregation. Facilities should seek both to separate different components of the total waste stream and to minimize all components of each waste stream. At minimum, considerations for regular trash, medical/infectious waste, hazardous waste, and low-level radioactive waste should be addressed during the project planning phase.

The following should also be addressed during project planning:

—Development of effective collection, transport, pest control, and storage systems

—Waste management and contingency planning

—Protection of the health and safety of workers

—Proper siting of all on-site waste treatment technologies

b. Optimizing waste management has programmatic and space impacts throughout the facility at points where waste is generated, collected, and staged for disposal. For facilities or municipalities with recycling programs in place, particular consideration should be given to sorting and staging areas. The
following elements are examples that may be considered:

— The hospital should include adequate space to accommodate bins/carts for appropriate waste segregation such as recyclables, infectious waste, sharps, etc. Corridors and materials handling systems should be designed to minimize risk to personnel while achieving efficient movement of waste from points of generation to storage or treatment.

— Dedicated storage and flow space and cleaning/sanitation facilities should be designed to facilitate reuse of items such as medical products and food service items to eliminate disposables and reduce waste.

— Space should be included for autoclaves, shredders, compactors, and other technologies for processing waste prior to its removal to landfill. Secure storage should be provided for staging/storage of environmentally hazardous materials (e.g., fluorescent lamps) for recycling.

*2.1-5.4.1.1 General

A2.1-5.4.1.1 Where possible, the path of travel for waste streams should be separate from the path of travel for food and clean supplies.

(1) Locations shall be provided for waste collection and storage as identified during project planning.

(2) Where the following are provided in a facility, their locations shall be indicated in the design documents:

(a) Compactor units (for municipal solid waste and recycling)
(b) Balers
(c) Sharps disposal containers
(d) Recycling containers
(e) Composting containers
(f) Inhalation anesthesia gas

(3) Waste collection and storage spaces for each of the following produced by the facility shall be indicated in the design documents:

(a) Municipal solid waste (MSW)
(b) Regulated medical waste (RMW)
(c) Pharmaceutical waste (RCRA and non-RCRA)
(d) Anatomical remains
(e) Hazardous wastes
(f) Chemotherapy wastes (bulk and trace)
(g) Universal wastes
2.1 Common Elements for Hospitals

(h) Radiologic wastes

(i) Anesthetic gas waste

2.1-5.4.1.2 Space requirements. Size of spaces provided for waste collection and storage shall be based on the following as identified during the project planning phase:

1. Categories and projected volume of waste
2. Methods for handling and disposing of waste
3. Length of anticipated storage

2.1-5.4.1.3 Regulated waste holding spaces

1. Secured space shall be provided for regulated medical waste and other regulated waste types.
   (a) Where provided as interior spaces, regulated medical waste or infectious waste holding spaces shall have cleanable floor and wall surfaces.
   (b) Where an exterior holding space is provided, it shall have the following:
       (i) Cleanable floor (and wall, where provided) surfaces
       (ii) Protection from weather
       (iii) Protection from animals
       (iv) Protection from vermin infestation
2. Such holding spaces shall provide:
   (a) Illumination to a minimum of 50 foot-candles
   (b) Protection from unauthorized entry
3. Refrigeration requirements for such holding facilities shall comply with local and/or state regulations.

*2.1-5.4.1.4 Refuse chutes. Refuse chutes shall meet the requirements of applicable codes and standards.

A2.1-5.4.1.4 The minimum cross-sectional dimension of gravity chutes should be as specified in NFPA 82: Standard on Incinerators and Waste and Linen Handling Systems and Equipment. For sprinkler protection information, refer to NFPA 13: Standard for the Installation of Sprinkler Systems.

2.1-5.4.2 Waste Treatment and Disposal Facilities

*2.1-5.4.2.1 Incineration

1. Where provided, on-site hospital incinerators shall comply with local, state, and federal regulatory and environmental requirements.
**A2.1-5.4.2.1 Incinerator design and construction.** The EPA has identified medical waste incineration as a significant contributor to air pollution. Health care facilities should seek to minimize incineration of medical waste, consistent with local and state regulations and public health goals. Refer to the Code of Federal Regulations, 40 CFR part 60, Standards of Performance for New Stationary Sources, regarding emission guidelines and source performance criteria for hospital, medical, or infectious waste incinerators.

Where incinerators are used, consideration should be given to the recovery of waste heat from on-site incinerators used to dispose of large amounts of waste materials. Incinerators should be designed in a manner fully consistent with protection of public and environmental health, both on-site and off-site, and in compliance with federal, state, and local statutes and regulations. Toward this end, permit applications for incinerators and modifications thereof should be supported by environmental assessments and/or environmental impact statements (EISs) and/or health risk assessments (HRAs) as may be required by regulatory agencies. Except as noted below, such assessments should utilize standard U.S. EPA methods, specifically those set forth in U.S. EPA guidelines, and should be fully consistent with U.S. EPA guidelines for health risk assessment. Under some circumstances, however, regulatory agencies having jurisdiction over a particular project may require use of alternative methods.

*2.1-5.4.2.2 Other waste treatment technologies.** Types of non-incineration technology(ies) used by the facility shall be determined by the governing body.

**A2.1-5.4.2.2 Safe access and operation of equipment by equipment operators should be a primary consideration when designing spaces for non-incineration technology.**

(1) Location

(a) The following shall be considered when locating non-incineration technology:

(i) Safe transportation routes

(ii) Distances from waste generation sources

(iii) Temporary storage spaces

(iv) Spaces required for treatment equipment

(b) The location of the technology shall not cause traffic problems as waste is brought in and out.

(c) Odor, noise, and the visual impact of medical waste operations on patients, visitors, public access, and security shall be considered.

(2) Space requirements for such technologies shall be determined by equipment requirements, including associated area(s) for opening waste entry doors; access to control panels; and space for hydraulic lifts, conveyors, and operational clearances.

**2.1-5.5 Environmental Services**

*2.1-5.5.1 General*
Each hospital shall provide environmental services rooms throughout the facility. See Section 2.1-2.8.14 (Environmental Services Room) for requirements.

A2.1-5.5.1 Environmental services rooms are provided as required in specific departments or units, with at least one environmental services room for each floor of the hospital.

2.1-5.5.2 Facilities for Cleaning and Sanitizing Carts

2.1-5.5.2.1 Facilities shall be provided to clean and sanitize carts serving the central service department, food and nutrition facilities, and linen services.

2.1-5.5.2.2 Facilities for cleaning and sanitizing carts shall be permitted to be centralized or departmentalized.

*2.1-5.6 Engineering and Maintenance Services

A2.1-5.6 Engineering and maintenance services provide the entire hospital with the necessary engineering utilities to maintain a safe and secure building environment for patient care and support. The size and complexity of engineering and maintenance services provided vary depending on the hospital.

2.1-5.6.1 Reserved

2.1-5.6.2 Mechanical and Electrical Equipment Rooms

*2.1-5.6.2.1 Space requirements. Sufficient space shall be included in all mechanical and electrical equipment rooms for proper maintenance of equipment.

A2.1-5.6.2.1 Provisions should be made to allow for removal and replacement of equipment.

2.1-5.6.2.2 Facility requirements. Room(s) or building(s) shall be provided for boilers and mechanical and electrical equipment, except for the following:

1. Rooftop air-conditioning and ventilation equipment installed in weatherproof housing

2. Emergency generators where the engine and appropriate accessories (i.e., batteries) are properly heated and enclosed in a weatherproof housing

3. Cooling towers and heat rejection equipment

4. Electrical transformers and switchgear where required to serve the facility and where installed in a weatherproof housing

5. Medical gas parks and equipment

6. Air-cooled chillers where installed in a weatherproof housing

7. Trash compactors

8. Site lighting, post indicator valves, and other equipment normally installed on the exterior of the building

9. Telecommunication signaling or tower equipment
*2.1-5.6.2.3 Security. Mechanical and electrical equipment rooms shall be secured with controlled access.

A2.1-5.6.2.3 Additional information can be found in Security Design Guidelines for Health Care Facilities, Section 02.08: Utility, Mechanical and Infrastructure Areas, published by the International Association for Healthcare Security and Safety (IAHSS).

2.1-5.6.3 Equipment and Supply Storage

2.1-5.6.3.1 Storage for building maintenance supplies

(1) A storage room shall be provided for building maintenance supplies.

(2) Storage for solvents and flammable liquids shall comply with local, state, and federal code requirements.

2.1-5.6.3.2 Outdoor equipment storage. If yard equipment and supply storage areas are provided, they shall open directly to the exterior of the facility.

2.1-5.6.4 General Maintenance Shop

If required in the functional program, a general maintenance shop(s) shall be provided to accommodate repair and maintenance requirements.

2.1-5.6.5 Medical Equipment Shop

2.1-5.6.5.1 If required in the functional program, a separate area or room shall be provided for storage, repair, and testing of electronic and other medical equipment.

2.1-5.6.5.2 The amount of space and type of utilities provided shall accommodate the type of equipment used in the hospital and the types of outside contracts used for equipment maintenance.

2.1-5.6.6 Facility Manager’s Office

2.1-5.6.6.1 If required in the functional program, a facility manager’s office shall be provided.

2.1-5.6.6.2 This office shall have file space and provisions for protected storage of facility drawings, records, manuals, etc.

*2.1-5.7 Morgue Services

A2.1-5.7 Morgue services provide facilities for the care and handling of deceased patients.

2.1-5.7.1 General

2.1-5.7.1.1 Application. Morgue services shall be provided when required in the functional program.

2.1-5.7.1.2 Location. Morgue service facilities shall be located to avoid the need for transporting a body through public areas.

2.1-5.7.1.3 Morgue service facilities shall be secured with controlled access.

2.1-5.7.2 Autopsy Facilities
If autopsies are performed in the hospital, the following elements shall be provided:

**2.1-5.7.2.1 Refrigerated facilities for body holding.** Body-holding refrigerators shall be equipped with temperature-monitoring and alarm signals that annunciate at a 24-hour staffed location.

**2.1-5.7.2.2 An autopsy room.** This shall contain the following:

1. Work counter with hand-washing station
2. A storage space for supplies, equipment, and specimens
3. An autopsy table
4. A deep sink for washing specimens
5. A combination emergency deluge shower and facewash where embalming fluid or fixatives containing formaldehyde are used

**2.1-5.7.2.3 Environmental services facilities.** A service sink or receptor shall be provided for cleanup and housekeeping.

**2.1-5.7.3 Non-Refrigerated Body-Holding Room**

If autopsies are performed outside the facility, a well-ventilated, temperature-controlled body-holding room shall be provided or individual controls of private patient rooms shall allow special ventilation to hold the body until the body is able to be transported to another facility.

**2.1-5.7.4 Ventilation Requirements**


**2.1-6 Public and Administrative Areas**

**2.1-6.1 General**

A2.1-6.1 Public and administrative areas are those non-patient care areas where the public is received into the hospital and where administrative functions in support of hospital operations take place.

These areas should be designed with consideration for security principles involving zones of protection as defined in Section 02: Buildings and the Internal Environment in the IAHSS *Security Design Guidelines for Healthcare Facilities*.

**2.1-6.1.1 Application**

Where required by the facility chapters, public and administrative areas shall be designed according to the requirements in Section 2.1-6 (Public and Administrative Areas).

**2.1-6.1.2 Location**

Public areas shall be clearly identified and located to accommodate persons with disabilities.
2.1 Common Elements for Hospitals

2.1-6.2 Public Areas

The following shall be provided:

*2.1-6.2.1 Vehicular Drop-Off and Pedestrian Entrance

A minimum of one drop-off or entrance shall be reachable from grade level.

A2.1-6.2.1 Climate, patient acuity, and community standards may influence whether a covered or canopied entrance is desired.

2.1-6.2.2 Reception Area or Lobby

2.1-6.2.2.1 This space shall include the following:

(1) Access to information
(2) Public waiting area(s)
(3) Public toilet room(s)
(4) Provisions for telephone access
(5) Provisions for drinking water

2.1-6.2.2.2 Shared lobbies shall be permitted in multi-occupancy buildings.

2.1-6.2.3 Public Waiting Rooms or Areas

A toilet room shall be readily accessible to all public waiting rooms without passing through patient care or staff work areas.

2.1-6.2.4 – 2.1-6.2.6 Reserved

2.1-6.2.7 Wheelchair Storage and Parking Space

2.1-6.2.7.1 Storage. Where a wheelchair(s) owned by the health care organization is made available for patient use, a designated area located out of the required corridor width and directly accessible to the entrance shall be provided for at least one wheelchair.

*2.1-6.2.7.2 Parking. If the facility provides services that require patients to transfer to a facility chair, wheelchair, recliner, examination table, or gurney, a designated area shall be provided for parking at least one patient-owned wheelchair in a non-public area located out of any required egress width or other required clearance.

A2.1-6.2.7.2 Wheelchair parking. Facilities that provide a significant quantity of services to aging and disabled populations that use wheelchairs (e.g., dialysis patients) should provide more than one wheelchair parking space. Other facilities may be able to address the issue with scheduling and transportation procedures. Check with the authority having jurisdiction to determine if this is an acceptable alternative.

2.1-6.2.5 Place for Meditation and Prayer
2.1 Common Elements for Hospitals

At least one dedicated quiet space accessible to the public shall be provided in the hospital to support meditation, bereavement, or prayer.

2.1-6.3 Administrative Areas

2.1-6.3.1 Admissions Area

An admissions area for initial admission of inpatients shall include:

2.1-6.3.1.1 A separate waiting area for patients and accompanying persons

2.1-6.3.1.2 A work counter or desk for staff

2.1-6.3.1.3 A storage area for wheelchairs located out of the path of egress

2.1-6.3.2 Interview Space

2.1-6.3.2.1 Space(s) for private interviews shall be separate from public and patient areas.

2.1-6.3.2.2 Shared use of an office or consultation room for this purpose shall be permitted.

2.1-6.3.3 Reserved

2.1-6.3.4 Multipurpose Room

2.1-6.3.4.1 Several services or departments shall be permitted to share one multipurpose room.

2.1-6.3.4.2 Shared use of an office or interview room for this purpose shall be permitted.

2.1-6.3.5 Medical Records Area

Provisions shall be made for securing medical records of all media types used by the facility.

2.1-6.3.5.1 Location. To maintain confidentiality of records, the medical records area shall be restricted to staff access.

2.1-6.3.5.2 Space requirements

(1) Space shall be provided for medical records management.

(2) Physical space requirements for electronic storage of forms or documents shall be coordinated with electronic medical records personnel from the facility.

2.1-6.4 Support Areas for Staff and Volunteers

2.1-6.4.1 Lockers, lounges, and toilets shall be provided for employees and volunteers.

2.1-6.4.2 Lockers, lounges, and toilets for staff shall be separate from those provided for the public.

2.1-6.4.3 Lactation Room

Lactation rooms shall be provided for use by staff and volunteers.

2.1-6.4.3.1 Lactation rooms for staff use shall be separate from those provided for the public.

2.1-6.4.3.2 Lactation rooms shall be permitted to be shared by several services and/or departments.
2.1-7 Design and Construction Requirements

2.1-7.1 Reserved

2.1-7.2 Architectural Details, Surfaces, and Furnishings

2.1-7.2.1 Reserved

2.1-7.2.2 Architectural Details

*2.1-7.2.2.1 Corridor width. Corridor widths shall meet applicable life safety and building code requirements.

A2.1-7.2.2.1 Corridor width. In areas where patient ambulation is encouraged or necessary for recovery, rest areas should be provided.

*2.1-7.2.2.2 Ceiling height. The minimum ceiling height shall be 7 feet 10 inches (2.39 meters), with the following exceptions:

A2.1-7.2.2.2 Ceiling height for food service areas. The ceiling height in food service areas should be a minimum of 10 feet (3.05 meters).

*(1) The minimum ceiling height in corridors and in normally unoccupied spaces shall be 7 feet 6 inches (2.29 meters).

A2.1-7.2.2.2 (1) Examples of normally unoccupied rooms/spaces are toilet, storage, changing, soiled holding, clean holding, environmental services, electrical, and information technology rooms and alcoves.

(2) Seclusion and secure holding rooms shall have a minimum ceiling height of 9 feet (2.74 meters).

(3) The minimum height above the floor of suspended tracks, rails, and pipes located in the traffic path for patients in beds and/or on gurneys, including those in patient care areas, shall be 7 feet 6 inches (2.29 meters).

*2.1-7.2.2.3 Doors and door hardware. Door and door hardware finishes shall be selected to withstand impact damage and cleaning with EPA-registered hospital disinfectants.

A2.1-7.2.2.3 All room doors and door hardware. See Section 2.1-2.4.2.4 (1)(b) (Doors) for airborne infection isolation room door requirements.

(1) Door type

(a) All doors between corridors, rooms, or spaces subject to occupancy shall be of the swing type or shall be sliding doors.

*(b) Sliding doors

A2.1-7.2.2.3 (1)(b) Sliding doors. Use of sliding doors rather than swing doors is highly recommended for airborne infection isolation rooms, protective environment rooms, and other spaces for which an ICRA has identified infection control as an issue. Research has shown that swinging door motion induces up to six times more possible contaminates than sliding door motion.
and can significantly affect contaminant control.

(i) Use of manual or automatic sliding doors shall be permitted where fire and other emergency exiting requirements are not compromised.

(ii) Sliding doors with emergency breakaway features in the fully open position shall be permitted to temporarily restrict the minimum corridor width required by applicable building codes.

*(iii) Sliding doors shall not have floor tracks.

A2.1-7.2.2.3 (1)(b)(iii) Eliminating floor tracks and using breakaway door hardware minimizes the possibility of jamming.

*(2) Door openings

A2.1-7.2.2.3 (2) Door openings—general

a. The door opening dimensions given are the minimum clear width and height.

b. The clear opening width needed to accommodate access by patients and patient equipment has been taken into consideration in calculating the door opening dimensions given.

c. Door openings through which patient mobility, mobilization, and handling and mobility equipment and accompanying staff will pass should be sized for the equipment used and the number of staff required to support patient safety.

*(a) The minimum clear door opening for patient rooms and diagnostic and treatment areas such as x-ray, surgery, or physical therapy shall have these dimensions:

A2.1-7.2.2.3 (2)(a) Door openings for patient rooms and diagnostic and treatment areas. The intent for the clear dimensions given in Section 2.1-7.2.2.3 (2) (Door openings) is to accommodate door slabs that are 48 inches (1.22 meters 1219 millimeters) wide and 84 inches (2.13 meters 2134 millimeters) tall.

(i) 45.5 inches (1.16 meters 1156 millimeters) in width

(ii) 83.5 inches (2.12 meters 2124 millimeters) in height

(b) Where sliding doors are used and a swinging door is provided for personnel use, the minimum clear width for the swinging door shall be 34.5 inches (87.63 centimeters 876 millimeters).

(3) Door swing

*(a) Doors shall not be permitted to swing into corridors except doors in behavioral health units and doors to non-occupiable spaces (e.g., environmental services rooms, electrical closets) and doors with emergency breakaway hardware.

A2.1-7.2.2.3 (3)(a) The intent of this requirement is to avoid injury caused by outward swinging doors.
(b) Doors shall be permitted to swing outward into an alcove that is deeper than the width of the door.

(c) A 180-degree door swing is not exempt from this requirement.

*(4) Door hardware. Lever hardware or push/pull latch hardware shall be provided.

A2.1-7.2.2.3 (4) Door protection should be provided where a door is subject to impact.

(5) Doors for patient bathing/toilet facilities

(a) Door type. Rooms that contain bathtubs, sitz baths, showers, or toilets for patient use shall have one of the following:

*(i) Two separate doors

A2.1-7.2.2.3 (5)(a)(i) The two doors should be located so that a collapsed patient will not block both doors.

(ii) A door that swings outward

*(iii) A door equipped with emergency rescue hardware

A2.1-7.2.2.3 (5)(a)(iii) Emergency rescue hardware. Emergency rescue hardware for toilet room doors permits quick access from outside the room to prevent blockage of the door and ensure quick access from outside the room.

*(iv) A sliding door other than a pocket door

A2.1-7.2.2.3 (5)(a)(iv) Use of sliding doors. Sliding doors are permitted for toilet rooms if they do not conflict with other requirements, such as handicapped accessibility, and cannot be blocked from the inside. A pocket type of sliding door would not meet this requirement because weight pushed up against this type of door prevents the door from opening for access from outside the room.

(b) Door opening. Where the bathing area or toilet room opens onto a public area or corridor, visual privacy shall be maintained.

(c) Door hardware. Doors to patient toilet rooms in behavioral and mental health patient care units shall be permitted to have hardware that allows staff to control access.

2.1-7.2.2.4 Reserved

2.1-7.2.2.5 Windows in patient rooms

*(1) Each patient room shall be provided with natural light by means of a window to the outside.

A2.1-7.2.2.5 (1) A window in each patient room, the view from it, and the diurnal cycle of natural light afforded by it are important for the psychological well-being of all patients.

*(2) Where operable windows are provided in patient rooms or suites, their operation shall be limited—
with either stop limit/restrictor hardware or an open guard/screen—to prevent passage of a 4-inch (102-mm) diameter sphere through the opening.

**A2.1-7.2.2.5 (2)** When designed to open, a window in the patient room may be important for continued use of the area in the event of mechanical ventilation system failure. The window opening is limited to reduce the possibility of accidental falls, escape, or suicide.

(3) Window size in patient rooms

(a) The minimum net glazed area shall be no less than 8 percent of the required minimum clear floor area of the room served.

(b) In new construction, window sill height in a patient room shall be a maximum of 36 inches above the finished floor.

(c) Where renovation work is undertaken and it is impractical or impossible not possible to meet the above minimum standards, the authority having jurisdiction shall be permitted to grant approval to deviate from these requirements.

**2.1-7.2.2.6 Insect screens.** Operable exterior windows that may be left open shall have insect screens.

**2.1-7.2.2.7 Glazing materials.** In renovation projects, only glazing within 1 foot 6 inches (45.72 centimeters) of the floor must be changed to safety glass, wire glass, or plastic, break-resistant material.

*2.1-7.2.2.8 Hand-washing stations*

**A2.1-7.2.2.8** Consideration should be given to placement of electrical devices (space needed for workflow and placement away from the sink).

(1) General

(a) Hand sanitation dispensers and hand-washing stations shall be provided.

(b) The number and placement of both hand-washing stations and hand sanitation dispensers shall be determined by the ICRA.

   (i) See Section 2.1-2.2.5 (Hand-Washing Station in the Patient Room) and the facility chapters for information about locations where hand-washing stations are required.

   (ii) See Section 2.1-2.8.7.3 (Additional requirements for hand-washing stations that serve multiple patient care stations) for information the number of hand-washing stations required in certain locations.

*(c) Hand-washing stations in patient care areas shall be located so they are visible and unobstructed.

**A2.1-7.2.2.8 (1)(c)** Hand-washing stations hidden behind stowed cubicle curtains; located in an area enclosed by curtains, columns, or doors; or located in an area used for equipment/material storage may be considered not visible and/or obstructed.

(2) Sinks. For basin, fitting, and anchoring requirements, see Section 2.1-8.4.3.2 (Hand-washing station sinks).
(3) Hand-washing station countertops

(a) Hand-washing station countertops shall be made of porcelain, stainless steel, solid-surface materials, or impervious plastic laminate assembly.

*(b) For countertops that require a substrate, marine-grade plywood (or an equivalent material) with an impervious seal shall be required.

**A2.1-7.2.2.8 (3)(b) Hand-washing station countertops**

a. The presence of water around hand-washing station sinks has consistently been proven to encourage the presence of mold and bacteria in the substrate materials if the countertops are not properly sealed and maintained. Integral backsplashes eliminate intersections that need to be caulked.

b. Under-mount basins are difficult to clean, and their use is discouraged.

(4) Where a hand-washing station includes casework, it shall be designed to prevent storage beneath the sink.


(a) Hand-washing stations shall include a hand-drying device that does not require hands to contact the dispenser.

(b) These provisions shall be enclosed to protect against dust or soil and to ensure single-unit dispensing.

(c) Hot air dryers shall be permitted.

*(d) Where provided, single-use towels shall be directly accessible to sinks.

**A2.1-7.2.2.8 (5)(d) Towel dispenser location**

a. Single-use towel dispensers should be mounted in a location that will minimize dripping on the floor, especially in the path of travel when reaching for the towel.

b. Space for a disposal receptacle should be designed in such a way as to not require the receptacle to be touched or moved by washed hands.

(6) Cleansing agent. Hand-washing stations shall include liquid or foam soap dispensers.

(7) Mirror. Mirrors shall not be installed at hand scrub stations or at hand-washing stations in food preparation areas, nurseries, clean and sterile supply areas, or other areas where asepsis control would be lessened by hair combing.

**2.1-7.2.2.9 Grab bars**

**A2.1-7.2.2.9 Grab bars**

a. Grab bars should have a finish that contrasts with the adjacent wall surface and provides slip resistance.
b. Grab bars in patient toilet rooms and bathing facilities should allow patients to be as safe and independent as possible. This includes using dropdown grab bars when needed, with or without integral toilet paper holder.

Grab bars should be provided on both sides of the toilet to enable staff-assisted transfers. Wall-mounted bars that fold up are the preferred solution because they leave space to facilitate cleaning and patient transfer. Clearance on both sides of the toilet is needed for a double transfer. Floor-mounted grab bars can be used but are not preferred because of increased difficulty in cleaning and patient transfer. Seat-mounted grab bars are not recommended. Use of additional grab bars to facilitate patient mobility in the toilet room should be considered.

When the toilet room entrance is located on the same wall as the headwall of the bed in a patient room, fewer steps are needed for the patient to reach the toilet. If this arrangement is provided, continuous handrails should also be installed to assist with mobility and safety.

(1) Grab bars shall be anchored to sustain a concentrated load of 250 pounds (113.50 kilograms).

(2) Grab bars in toilet rooms used by individuals of size shall be anchored to sustain a concentrated load of 800 pounds (362.87 kilograms).

(3) Ends of grab bars shall be constructed to prevent snagging the clothes of patients, staff, and visitors.

*2.1-7.2.10 Handrails*

A2.1-7.2.10 Handrails should be provided to assist mobility-impaired persons.

(1) Handrails in patient use corridors

(a) Handrails shall be installed on both sides of patient use corridors.

(b) Where patient care units include features that preclude continuous handrails, handrails installed on one side of the corridor shall be permitted.

(2) Handrails shall comply with local, state, and federal requirements referenced in Section 1.1-4.1 (Design Standards for Accessibility) as amended in this section.

(3) Rail ends shall return to the wall or floor.

(4) Handrail gripping surfaces and fasteners shall be smooth (free of sharp or abrasive elements) with a minimum radius of 1/8 inch (3.18 millimeter).

(5) Handrails shall have eased edges and corners.

(6) Handrails shall contrast with the surface of the wall.

(7) Handrail finishes shall be cleanable and able to withstand disinfection.

2.1-7.2.11 Radiation protection. Radiation protection requirements for x-ray and gamma-ray installations shall conform with the following National Council on Radiation Protection & Measurements (NCRP) reports and local, state, and federal codes and standards:
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(2) Report No. 147: Structural Shielding Design for Medical X-Ray Imaging Facilities


*2.1-7.2.12 Noise control

**A2.1-7.2.12 Acoustic design**. For additional information on acoustic design, see Section 1.2-6.1 (Acoustic Design).

(1) Recreation rooms, exercise rooms, equipment rooms, and similar spaces where impact noises may be generated shall not be located directly over patient bed areas or delivery and operating suites, unless special provisions are made to minimize such noise.

(2) The noise reduction criteria shown in Table 1.2-6 (Design Criteria for Minimum Sound Isolation Performance Between Enclosed Rooms) shall apply to partitions, floors, and ceiling construction in patient areas.

*2.1-7.2.13 Protection from heat-producing equipment*. Rooms containing heat-producing equipment (e.g., boilers, heaters, or laundry equipment) shall be insulated to prevent the floor surface above, ceiling below, and adjacent walls of occupied areas from exceeding a temperature of 10°F (6°C) above ambient room temperature.

*2.1-7.2.14 Decorative water features

**A2.1-7.2.14 Fountains** and other open decorative water features can represent a reservoir for opportunistic human pathogens.

(1) Installation of indoor, unsealed (open) water features shall not be permitted.

(2) Covered fish tanks shall be permitted in public areas.

*2.1-7.2.3 Surfaces

**A2.1-7.2.3 Characteristics and criteria for selecting surface and furnishing materials and products**. The effect of surface materials, colors, textures, and patterns on patient, staff, and visitor safety and on maintenance and life cycle performance should be considered in the overall planning and design of the facility.

a. The ability to effectively clean and disinfect surface materials and products is critical for effective infection prevention and control. Surface and furnishing materials and products selected for hospital design and construction projects should meet local, state, and federal regulations and industry standards for infection control and assembly or construction. National testing standards should be used to verify whether a product or material provides specific characteristics.

b. A specified material, textile, surface or furnishing material or product should be evaluated for (1) surface disinfectant compatibility, (2) suitability for a particular application, (23) the intended life cycle use, and (24) quality
assurance regarding patient and staff safety. Proposed life cycle use should be based on occupancy classification and function of the space.

**Materials and products selected for use in patient care settings that operate 24 hours a day, seven days a week should meet local, state, and federal regulations and industry standards for heavy-duty commercial use.** However, in certain non-patient care and non-clinical areas of the hospital, use of products that meet all of the performance characteristics described in this section is **not** required (although it is still preferred). [moved under “Durable” head below]

**c.** The effects of repair and demolition and replacement should be considered when selecting surface and furnishing materials and products for use in occupied 24/7 hospital environments. Selected materials and products should comply with the hospital infection prevention and control protocols and use requirements and support the findings of the safety risk assessments and the requirements of the model of care as described in the functional program.

**d. b—**The following characteristics and criteria should be used in selecting and specifying surface and furnishing materials and products for hospital design and construction projects. (The characteristics included in this text are supported by quantifiable industry test methods. See the Facility Guidelines Institute website at www.fgiguidelines.org/resources for more information.)

--- **Compatible with surface disinfectants.** Selection of surface materials and products that meet the following criteria should be considered:

- **Surface materials and furnishings have been tested and shown to tolerate all categories of EPA-registered hospital grade disinfectants.**
- **Surfaces and finishes have been tested and shown to tolerate "no-touch" technologies, including UV and hydrogen peroxide vapor disinfection.**
- **Manufacturer's instructions for use (IFUs) for cleaning and maintenance (including warnings) should be carefully evaluated to ensure materials can be effectively cleaned and disinfected in compliance with infection prevention and control protocols.**

--- **Inflammable.** Surface and furnishing materials and products should meet the fire and smoke toxicity requirements of NFPA 101: *Life Safety Code.*

--- **Durable.** Surface and furnishing materials and products should be resistant to breakage, punctures/tears, stains, and as appropriate to the function of the material and product type being selected. Materials and products selected for use in patient care settings that operate 24 hours a day, seven days a week should meet local, state, and federal regulations and industry standards for heavy-duty commercial use. However, in certain non-patient care and non-clinical areas of the hospital, use of products that meet all of the performance characteristics described in this section is **not** required (although it is still preferred).

--- **Durable.**

Microbial growth can occur when surfaces and finishes become damaged.
Therefore, surface materials and textiles used for furnishings and the built environment should be resistant to:

- Delamination
- Scratches
- Stress fractures
- Cracks and fissures
- Breakage
- Punctures/tears
- Stains, damage, and wear from abrasion

—Resilient and impact-resistant. Surface and furnishing materials and products should be able to remain intact, safe, and functional in heavy weight-bearing, high-traffic, and impact-susceptible areas. The materials and products should:

- Meet pounds-per-square-inch (PSI) weight tolerances for loads.
- Meet tensile strength, flexibility, impact, and abrasion testing standards for the required use.
- Self-repair from compressions caused by repeated use.
- Resist shattering or fragmentation under abrasion or impact.

—Reduces user fatigue and musculoskeletal injury. Surface and furnishing materials and products should meet specific safety, assembly, and construction industry criteria for flexibility to address foot compression and heel strike absorption.

—Uses compatible substrate and materials in surface and furnishing assemblies

- All assembled materials used in the product should meet the characteristics listed in appendix section A2.1-7.2.3 (Characteristics and criteria for selecting surface and furnishings materials and products).

- Surface and furnishing assembly seams and joints should be smooth and fully sealed to support effective cleaning and disinfection and reduce wear and degradation and should be able to remain intact, safe, and functional during the proposed service life of the assembly.

- Water-resistant materials, sealed-seam construction methods, and moisture-impervious surface selections should be used for assemblies where water or moisture is continuously present (e.g., clinical use work surfaces with inset-in or integral sinks and seamed integral wall, flooring, and/or cove base assemblies) to reduce or eliminate the possibility of seepage in or under the assembly. Seepage around, in, and under assemblies where water is continually present has been proven to produce and encourage layer delamination and growth of mold, mildew, and bacteria, contributing to the possibility...
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**Contamination and spread** of material, staff, and patient contamination microbes in the health care facility.

—**Safe and efficient for use in occupied patient care settings.** Throughout their life cycle, surface and furnishing materials and products should minimize and/or prevent the incidence and effects of mold, mildew, bacteria, noise, odors, gas, particulates, dust, and debris that reduce air quality during product assembly, installation, and operation as well as during maintenance, repair, or demolition in an occupied hospital setting.

—**Supports the facility’s clinical needs and is appropriate for the emotional and cultural well-being of patients, staff, and visitors.** Design, layout, size, color, and pattern of surface and furnishing materials and products should create patient environments that support the model of care and functional program requirements.

—**Has acoustic properties that support clinical function and patient safety and well-being.**

- Surface and furnishing materials and products must meet the noise reduction requirements for patient care areas in sections 1.2-6.1.3 (Design Criteria for Acoustic Surfaces) and 1.2-6.1.6 (Design Guidelines for Speech Privacy) where applicable to the function of the specific material or product.
- **Room finishes should be considered collectively to maximize speech intelligibility.** See Section 1.2-6.1.3 (Design Criteria for Acoustic Surfaces), Section 1.2-6.1.6 (Design Guidelines for Speech Privacy), and Table 1.2-4 (Minimum Design Room-Average Sound Absorption Coefficients) for more information.

—**Made of non-toxic, non-allergenic materials.** A review of potential product-based allergens should be performed during the material selection process to identify products inappropriate for use with the facility’s patient acuity populations.

—**Can control and minimize reflectivity and glare.** Surface and furnishing materials and products and light fixtures and lamps that are specified should combine to meet ANSI/IES RP-29: Lighting for Hospital and Healthcare Facilities and/or USP-NF (U.S. Pharmacopeia-National Formulary) light level and glare control standards.

**c. e.** Patient safety risk assessment issues addressed by surfaces and furnishings performance characteristics and criteria

—**Reduction of surface contamination linked to health care-associated infections (HAIs).** Surfaces, materials, textiles, and furnishings selected should have clear, written manufacturer-provided IFUs or care and maintenance instruction for cleaning and disinfection protocols that will ensure the product remains durable and intact. Cleaning and disinfection protocols should can meet published guidelines for cleaning and disinfection. See the CDC’s Guidelines for Environmental Infection and Control and Guidelines for Sterilization and Disinfection for more information.
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facilities.

- Surfaces should be easy to clean and disinfect, with no surface crevices, rough textures, joints, or seams.

- Surfaces should be non-absorptive, nonporous, and smooth.

- Manufacturer-recommended cleaning and disinfection methodologies should be easy to use and materials should have been tested and shown to tolerate all chemical categories of EPA-registered hospital environmental disinfectants and tolerate exposure to “no touch” UV and hydrogen peroxide vapor disinfection, effective for meeting CDC and other clinical bacterial elimination requirements.

—Reduction of patient falls and associated injuries. Surfaces and furnishings should be selected in accordance with the safety risk assessment (see Section 1.2-4) and sections 2.1-7.2.3.1 (Flooring and wall bases) and 2.1-7.2.4.1 (Built-in furnishings).

—Reduction in medication errors. See appendix section A2.1-2.8.8.1 (2) (Medication safety zone design requirements) for surface recommendations for medication safety zones.

—Reduction of stress and fatigue and improvement in communication and social support for patients and family members.

- The sound-mitigating properties of surfaces and furnishings should be used to reduce noise.

- Surface materials should provide options for color, pattern, and texture that are clinically and emotionally appropriate and culturally supportive to patient, staff, and visitor well-being.

- Built-in seating should meet industry resting standards for safe use by all users, including individuals of size.

- Built-in furnishing layouts should support acoustic and visual privacy for staff, patients, and visitors.

—Improvement in staff safety, effectiveness, efficiency, and communication. The sound-mitigating properties of surface and furnishing materials should be used to reduce noise in patient and staff communication areas. Built-in furnishings should be planned to facilitate the individual worker’s visibility, privacy, and ergonomic needs. Built-in furnishing layouts should enable care coordination, communication, and information-sharing.

—Improvement in facility investments (reduction in life cycle cost and increase in funds available for patient care). The following characteristics and criteria represent optimal choices for long-term health care facility investments (life cycle cost):

- Surface materials, textiles, and furnishings that are compatible with all categories of EPA-registered hospital-grade disinfectants and "no-
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**touch** disinfection technologies that reduce the need to repair or replace products damaged from surface/disinfectant incompatibility.

- Surface and furnishing materials and products that support the organizational commitment to quality care, the facility’s mission, strategic goals, and service brand

- Surfaces and furnishings that can easily be reconfigured to support a changing facility mission

- Design without projections (protuberances) that may damage walls

- Surface and furnishing materials and products from manufacturers that (1) meet appropriate industry standard safety and durability testing, (2) design products based on research into safety and patient outcome improvement in health care facilities, (3) provide easy-to-use IFUs and care and maintenance requirements, (4) provide a warranty that meets required standards and planned life cycle use, (45) effectively provide replacement parts to meet required standards and life cycle use, and (56) have representatives or local dealers who can assist with replacement, repair, and refurbishing

- Surface and furnishing materials and products that can be safely repaired in an occupied health care facility

- Surface and furnishing materials and products that environmental services staff can easily maintain using CDC support efficient and effective infection prevention and control cleaning standards for health care facilities and disinfection requirements, reducing room turnover time

- Surface and furnishing materials and products with durability that have been proven and tested to meet required life cycle and standards of use

### 2.1.7.2.3.1 Flooring and wall bases

**A2.1.7.2.3.1 Characteristics and criteria for selecting flooring materials and products**

a. The fall prevention portion of the safety risk assessment should be consulted when choosing flooring materials; see Section 1.2-4 (Fall Prevention Assessment).

—Balancing the softness (non-rigid properties) and firmness of a flooring material is a key consideration for supporting maintenance of gait, postural stability, and balance; reducing fatigue and falls; and facilitating movement of wheelchairs and other wheeled traffic.

—The subfloor, the composition of a flooring material, and the material’s ability to yield to pressure should be considered when selecting flooring that can contribute to force attenuation when a fall does occur.

b. The evidence associated with identification of single environmental variables
and their importance in preventing, attenuating, or exacerbating patient falls is still emerging. A number of studies in which multiple variables were studied have suggested an association between falls and the following flooring materials and characteristics:

—**Flooring.** Some flooring types (e.g., carpet, resilient flooring such as rubber, VCT, sheet vinyl, LVT) can be a good choice for some flooring types. Transitions for some flooring types (e.g., carpet, resilient flooring such as rubber, VCT, sheet vinyl, LVT) can be a potential tripping hazard. Transitions should include transition strips that minimize trip hazards.

—**Floor pattern.** Some studies suggest that flooring with a medium-sized pattern (1 to 6 inches, or 2.54 to 15.24 centimeters, wide) was associated with more falls than floors with no pattern or a small pattern (less than 1 inch, or 2.54 centimeters, wide), or a large pattern (wider than 6 inches).

—**Floor contrast.** High-contrast patterns with large geometric or swirling designs on floor surfaces have been associated with more patient falls. These patterns distract and confuse older persons and those with impaired vision.

—**Floor reflectivity.** Finished floors with a high gloss value cause glare that may compromise patient vision by being misinterpreted as a pool of water on the floor or hole in the floor surface, disrupting balance. The selection of non-wax flooring eliminates finish glare. Where a finish coat is required, smooth flooring surfaces should be sealed with a matte finish to reduce surface glare.

—**Wall and floor color value contrast.** Color A minimum value contrast difference of 30 points is recommended between walls and floors and walls (wall bases should match the walls) to help define the space. Similar values between different flooring materials help minimized transitions between different types of flooring and may reduce fall risk.

—**Floor acoustic properties.** Floors should be selected with consideration to acoustic properties to help preserve sleep and to protect privacy and accuracy of communication in support of HIPAA compliance and medical error reduction. See sections 1.2-6.1.3 (Design Criteria for Acoustic Surfaces) and 1.2-6.1.6 (Design Guidelines for Speech Privacy).

**c. Floor resistance.** Floor surfaces should allow quiet and easy movement of all wheeled equipment and walkers to be used in the facility. Portable lifting equipment without powered wheels may require more exertion by staff than ceiling-mounted equipment to move an elevated patient around and through a space. The exertion required by staff may increase with the use of carpet; however, different types and brands of carpet may have significantly different levels of resistance to wheeled devices. Installation of a mock-up to test flooring materials in relationship to wheeled equipment and devices used in a facility is recommended. Carpet should not be automatically discounted as inappropriate due to this challenge, as it has major advantages over hard-surface flooring in terms of noise reduction and acoustics.

(1) Flooring surfaces shall be cleanable and wear-resistant for the location.

(2) The use of carpeting in patient care areas and clinical support areas (e.g., labs and pharmacies) shall be permitted when approved as part of the ICRA process.
*(3) Smooth transitions shall be provided between different flooring materials.

**A2.1-7.2.3.1 (3)** Flush thresholds should be used to reduce tripping hazards. *Transition strips should be the same value as adjacent flooring materials.*

(4) Flooring surfaces, including those on stairways, shall be stable, firm, and slip resistant.

*(a) The slip-resistance ratings of flooring surfaces shall be appropriate for the area of use—for dry or wet conditions and for use on ramps and slopes.

**A2.1-7.2.3.1 (4)(a)** Wet conditions are common in areas such as kitchens and bathing areas, entries from exterior to interior space, and areas where water is used for patient services. Slip resistance is also an important consideration for ramps and stairways. In dry areas, soft flooring (e.g., carpet, cushioned flooring, etc.) can be used to reduce the risk of falls and the impact of associated injuries.

(b) Where carpeting *with or without padding* will be installed, it shall *so it provides* a stable and firm surface.

(5) The floors and wall bases of kitchens, soiled workrooms, toilet rooms, and other areas subject to frequent wet cleaning shall be constructed of materials that are not physically affected by germicidal or other types of cleaning solutions.

(6) Food and nutrition areas. Flooring and wall bases in food preparation, sanitation/warewashing, and serving areas shall be non-absorbent, smooth, and easily cleaned.

(7) Floor and wall base assemblies

(a) The room types listed in this section shall have floor and wall base assemblies that are monolithic and have an integral coved wall base that is carried up the wall a minimum of 6 inches (115.24 centimeters) and is tightly sealed to the wall.

(i) Operating room

(ii) Class 2 and Class 3 imaging rooms

(iii) Cesarean delivery room

(iv) Procedure rooms where cystoscopy, urology, and endoscopy procedures are performed

(v) Endoscope processing room

(vi) IV and chemotherapy preparation room

(vii) Airborne infection isolation (AII) room

(viii) Protective environment (PE) room

(ix) Combination AII/PE room

(x) Anteroom to AII and PE rooms, where provided

(xi) Sterile processing facility
(xii) Soiled workroom and soiled holding room
(xiii) Pharmacy clean room and anteroom
(xiv) Emergency department trauma room

*(b) Equipment shall be permitted to penetrate these monolithic floors provided joints are sealed and do not represent a tripping hazard.

**A2.1-7.2.3.1 (7)(b)** Equipment that is fastened to the monolithic floor requires sealed joints at the fastening points to prevent fluids from penetrating the subfloor. Where infrastructure items such as floor ducts to accommodate electrical cabling are installed, the duct cover needs to be sealed to prevent fluids from entering the floor duct.

(8) Floor openings for pipes, ducts, and conduits as well as joints at structural elements shall be tightly sealed.

*2.1-7.2.3.2 Walls and wall protection

**A2.1-7.2.3.2** Sharp, protruding corners should be avoided.

(1) Wall finishes

(a) Wall finishes shall be washable.

(b) Wall finishes near plumbing fixtures shall be:

(i) Smooth

(ii) Scrubbable

(iii) Water-resistant

(c) Wall finishes in the room types listed shall be free of fissures, open joints, or crevices that may retain or permit passage of dirt particles:

(i) Operating and procedure rooms

(ii) Class 2 and Class 3 imaging rooms

(iii) Cesarean delivery room

(iv) Endoscopy procedure room

(v) Endoscope processing room

(vi) IV and chemotherapy preparation room

(vii) Airborne infection isolation (AII) room

(viii) Protective environment (PE) room

(ix) Combination AII/PE room

(x) Anteroom to AII and PE rooms, where provided
(xi) Sterile processing facility

(2) Wall surfaces in areas routinely subjected to wet spray or splatter (e.g., kitchens, environmental services rooms) shall be monolithic or have sealed seams that are tight and smooth.

*(3) Food and nutrition areas. In these areas, wall construction, finish, and trim, including joints between the walls and the floors, shall be free of insect- and rodent-harboring spaces.

A2.1-7.2.3.2 (3) Walls in food and nutrition areas

a. Sound-absorbing materials should be considered in accordance with infection prevention practices in food preparation and sanitation areas.

b. Fiber-reinforced panels may be used for walls in food preparation, sanitation/warewashing, or other wet areas.

c. Painted surfaces should not be used in wet areas.

d. In food preparation areas, wall surfaces should not be painted below 4 feet (1.22 meters) above the finished floor.

e. Painted walls should only be considered for offices, storage areas, and corridors.

(a) Walls in food preparation, sanitation/warewashing, and serving areas

(i) Walls shall be non-absorbent, smooth, easily cleaned, and light in color.

(ii) Walls adjacent to cooking equipment shall have sealed surfaces that are cleanable and made of non-combustible materials.

(b) Walls behind cooking equipment

(i) Fire-rated, non-combustible materials with a surface that facilitates cleaning shall be used.

(ii) Walls of these materials shall match or exceed the width of the exhaust hood.

(c) Walls in non-food preparation or sanitation areas (e.g., storage rooms, corridors, offices, and dining or vending areas) shall have a surface finish that facilitates cleaning.

(4) Wall openings for pipes, ducts, and conduits as well as joints at structural elements shall be tightly sealed.

(5) Wall protection devices and corner guards shall be durable and scrubbable.

2.1-7.2.3.3 Ceilings

(1) Ceilings shall be provided in all areas except as noted in Section 2.1-7.2.3.3 (5).

(a) Ceilings shall be cleanable with routine housekeeping equipment.

(b) Acoustic and lay-in ceilings, where used, shall not create ledges or crevices.

*(2) Semi-restricted areas

A2.1-7.2.3.3 (2) Semi-restricted areas. These include areas such as procedure
rooms, Class 2 imaging rooms, All rooms, trauma rooms, endoscope processing rooms, decontamination rooms, clean corridors, and central sterile supply.

(a) Ceiling finishes in semi-restricted areas shall be:

(i) Smooth and without crevices
(ii) Scrubbable
(iii) Non-absorptive
(iv) Non-perforated
(v) Capable of withstanding cleaning with chemicals

(b) Where a lay-in ceiling is provided, it shall be gasketed or each ceiling tile shall weigh at least one pound per square foot.

(c) Use of perforated, tegular, serrated, or highly textured tiles shall not be permitted in semi-restricted areas.

*(3) Restricted areas

A2.1-7.2.3.3 (3) Restricted areas. These include areas such as operating rooms, Class 3 imaging rooms, PE rooms, and sterile compounding and hazardous drug compounding pharmacies.

(a) Ceilings in restricted areas shall be of monolithic construction.

(i) Cracks or perforations in these ceilings shall not be permitted.

*(ii) The central diffuser array shall not be considered part of a monolithic ceiling.

A2.1-7.2.3.3 (3)(a)(ii) Central diffuser array. A central diffuser array consisting of unidirectional flow diffusers and/or architectural fill-in panels should form a single assembly in the ceiling. The array should be gasketed between the diffuser array system and the ceiling and also between the system framing and the individual diffusers. Where booms and other equipment are located in the central diffuser array, the array should be provided with fill-in panels cut to accommodate the booms or other equipment. Fill-in panels are to be gasketed at the framing and at the perimeter of any cuts made to accommodate the equipment.

*(b) Use of a modular or prefabricated laminar (or controlled) flow ceiling system shall be permitted in operating rooms and Class 3 imaging rooms/hybrid operating rooms in place of monolithic ceiling construction where the following conditions are provided:

A2.1-7.2.3.3 (3)(b) Modular laminar flow ceiling systems. These systems are constructed in a factory setting, providing a higher level of quality control for these complex assemblies. Trades such as ductwork and other air delivery systems, sprinklers, lighting, boom mounts, and ceilings are engineered and fabricated off-site minimizing late changes (and related design inadequacies) due to field conditions and miscoordination. Benefits include concurrent
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construction, less risk, less waste, faster installation, control of quality, and support structure that are integral to the design of the assembly.

(i) Seams and access doors shall be continuously gasketed.

(ii) Assembly shall be constructed with a structural frame engineered and rated for the systems supported and equipped with seismic bracing, as required.

(iii) Accommodations shall be made to provide access for testing, maintenance, and replacement items.

(iv) Diffuser arrangement and airflow design shall be compliant with ANSI/ASHRAE/ASHE Standard 170: Ventilation of Health Care Facilities.

(v) Devices and related controls shall be UL/ETL labeled, as applicable.

(bc) Ceiling finishes shall be scrubbable and capable of withstanding cleaning and/or disinfecting chemicals.

(ed) All access openings in these ceilings shall be gasketed.

(4) Food and nutrition service and laundry areas

(a) Either a sealed monolithic and scrubbable gypsum board ceiling or a lay-in ceiling shall be provided.

*(b) Where a lay-in ceiling is provided, it shall include the following:

(i) A non-corrosive grid

(ii) Ceiling tiles that weigh at least one pound per square foot and are smooth, scrubbable, nonabsorptive, nonperforated, and capable of withstanding cleaning with chemicals

A2.1-7.2.3.3 (4)(b) Ceilings in food service areas. Ceiling tile with a noise reduction coefficient (NRC) of 0.80 or higher is recommended.

(5) Mechanical, electrical, and communications equipment rooms. Omission of suspended ceilings in these rooms or spaces shall be permitted unless required for fire safety purposes.

2.1-7.2.4 Penetrations. To minimize entry of rodents and insects, joints where floors and walls are penetrated by pipes, ducts, and conduits shall be tightly sealed. Joints of structural elements shall be similarly sealed.

*2.1-7.2.4 Furnishings

A2.1-7.2.4 Furnishings

a. Characteristics and criteria for selecting furnishing materials and products. The effect of furnishing material colors, textures, values and related value contrast; and patterns on patient, staff, and visitor safety and on maintenance and life cycle performance should be considered in the overall planning and design of the facility. See appendix section A2.1-7.2.3 (Characteristics and criteria for selecting surface and furnishing materials and products) for general information about surface characteristics and criteria and appendix section
A2.1-7.2.4.1 (Built-in furnishing safety features) for information about selecting surfaces and materials for built-in furnishings.

b. Work areas. Where a workspace, work area, work counter, or work surface is provided, it should have a minimum of 4 square feet (.37 square meter) of contiguous clear surface for each person programmed to work in the space at the same time.

**2.1-7.2.4.1 Built-in furnishings.** In patient treatment areas with risks of exposure and contamination from bodily fluids and/or other fluids, built-in furnishings shall be upholstered with impervious materials where required by an infection control risk assessment (ICRA).

**A2.1-7.2.4.1 Built-in furnishing safety features.** Following are furniture safety characteristics that should be considered in designing built-in furnishings for hospitals. These same considerations can apply to freestanding furniture when stakeholders wish to specify performance features.

a. General furnishing characteristics

— **Built-in F Furnishings** should have eased or rounded edges and corners of no less than 3/8-inch (9.5-mm) radius to avoid patient injuries.

— **Built-in F Furnishings** should have non-abrasive surfaces to minimize patient injuries, such as abrasions, and skin shear, and/or tears.

b. Seating. Evidence identifying single environmental variables coupled with education and care practices suggests an association between falls and the design of seating. Their importance in patient falls is still emerging. A number of studies have suggested an association between falls and the design of chairs, whether built-in or freestanding.

— **Built-in seating used by patients** should be adaptable to characteristics of the patient population, including appropriate or adaptability of the seating to the patient height, weight, and physical limitations of the patient population.

— Seated patients should be able to place their feet flat on the floor with level thighs to facilitate successful ergonomic sit-to-stand movements.

— Space beneath a seat front should allow a user to pull back his or her heels far enough under the seat to assist with rising from a seated position.

— The seat front edge should not compromise blood flow to the legs.

— **Built-in furnishings seating used by patients and visitors** should have arms or armrests of a length and height appropriate to that facilitate standing from a seated position for the patient population.

— The angle-depth of the seat and the angle of the seat back should not hinder sitting or rising nor cause shoulder-forward or hip-forward slumping or sliding out of the seat.

— **Chair seating legs** should not extend laterally or forward beyond the chair seat to avoid creating a trip hazard.
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--- Seating should have a minimum value difference of 30 reflectance value points between the floor and the seat.

*2.1-7.2.4.2 Window treatments in patient rooms and other patient care areas

A2.1-7.2.4.2 Window shades should be a neutral color to maintain true rendition of patient skin.

(1) Blinds, sheers, or other patient-controlled window treatments shall be provided to allow for patient privacy and to control light levels and glare.

(2) Window treatments shall not compromise patient safety and shall be easy for patients, visitors, and staff to operate.

(3) Window treatments shall be selected for ease of cleaning, disinfection, or sanitization.

(4) Use of fabric drapes and curtains for window treatments shall be permitted if the fabric is washable.

*2.1-7.2.4.3 Privacy curtains in patient rooms and other patient care areas. Use of fabric privacy curtains shall be permitted if the fabric is washable.

A2.1-7.2.4.3 Use of a wipeable fabric with a smooth surface is preferable.

2.1-8 Building Systems

2.1-8.1 General

2.1-8.1.1 Behavioral and Mental Health Patient Locations

In behavioral and mental health patient rooms, toilet rooms, and seclusion rooms, ceiling and air distribution devices, lighting fixtures, sprinkler heads, and other appurtenances shall be of a tamper- and ligature-resistant type.

2.1-8.2 Heating, Ventilation, and Air-Conditioning (HVAC) Systems

HVAC system requirements shall comply with are defined in Part 3 (ANSI/ASHRAE/ASHE Standard 170: Ventilation of Health Care Facilities).

2.1-8.3 Electrical Systems

2.1-8.3.1 General

2.1-8.3.1.1 Applicable standards

(1) All electrical material and equipment, including conductors, controls, and signaling devices, shall be installed in compliance with applicable sections of:

   (a) NFPA 70: National Electrical Code

   (b) NFPA 99: Health Care Facilities Code

(2) All electrical material and equipment shall be listed as complying with available standards of listing agencies or other similar established standards where such standards are required.
2.1-8.3.1.2 Testing and documentation

(1) Electrical installations, including alarm, nurse call, staff emergency signal, and communications systems, shall be tested to demonstrate that equipment installation and operation is appropriate and functional.

(2) A written record of performance tests on special electrical systems and equipment shall show compliance with applicable codes and standards.

2.1-8.3.2 Electrical Distribution and Transmission

2.1-8.3.2.1 Switchboards, Switchgear, and Automatic Transfer Switches

(1) Location. Switchboards, switchgear, and automatic transfer switches shall be:

   (a) Located in a room or space that meets the requirements of NFPA 70: National Electrical Code
   (b) Accessible to authorized persons only
   (c) Located in a dry, ventilated space free of corrosive or explosive fumes, gases, or any flammable material

(2) Overload Overcurrent protective devices shall be listed for the ambient room temperature for the space in which they are installed.

2.1-8.3.2.2 Panelboards

(1) Panelboards serving life safety branch circuits shall be permitted to serve the floors on which they are located and the floors immediately above and below the level where the panel is located.

(2) Panelboard critical branch circuits shall serve the floors on which they are located.

(3) New panelboards shall not be located in exit enclosures or exit passageways.

2.1-8.3.2.3 Ground-fault circuit interrupters

(1) Ground-fault circuit interrupters (GFCIs) shall comply with NFPA 70: National Electrical Code.

*(2) Where GFCIs are used in critical care areas, each receptacle shall be individually protected by a single GFCI device.

A2.1-8.3.2.3 (2) Use of a GFCI device for each single, duplex, or quad receptacle location prevents more than one outlet location from tripping during a fault-to-ground condition. A GFCI circuit breaker may be installed as long as only one receptacle location is connected.

2.1-8.3.3 Power-Generating and -Storing Equipment

2.1-8.3.3.1 Essential electrical system

(1) Essential power shall be provided for in accordance with the following:

   (a) NFPA 70: National Electrical Code
   (b) NFPA 99: Health Care Facilities Code
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(c) NFPA 101: Life Safety Code

(d) NFPA 110: Standard for Emergency and Standby Power Systems

(e) NFPA 111: Standard on Stored Electrical Energy Emergency and Standby Power Systems

*(2) Where stored fuel is required, storage capacity shall permit continuous operation for at least 24 hours.

\[ \text{A2.1-8.3.3.1 (2)} \text{ Storage of fuel for at least 96 hours should be considered for facilities in locations likely to experience an extended power outage.} \]

(3) Acoustic considerations for generators

*(a) Generator system designs shall assure the maximum noise levels in Table 1.2-5 (Maximum Design Criteria for Noise in Interior Spaces Caused by Building Systems) are not exceeded.

\[ \text{A2.1-8.3.3.1 (3)(a)} \text{ Meeting the applicable community noise code often translates into an emergency generator enclosure rated to provide a 30 to 35 dBA noise reduction.} \]

(b) An engine exhaust muffler shall be provided for the generator.

*2.1-8.3.4 Lighting

\[ \text{A2.1-8.3.4} \text{ Required levels for artificial illumination in health care facilities should comply with the horizontal illuminance targets for visual observers where at least half are between the ages of 25 and 65, as found in Table 2 of Illuminating Engineering Society (IES) publication ANSI/IES RP-29: Recommended Practices for Lighting for Hospitals and Health Care Facilities. Light intensity for staff and patient needs should generally comply with these IES guidelines. Consideration should be given to controlling intensity and/or wavelength to prevent harm to the patient’s eyes (i.e., retina damage to premature infants and cataracts due to ultraviolet light).} \]

Many procedures are available to satisfy lighting requirements, but the design should consider light quality as well as quantity for effectiveness and efficiency. While light levels in the IES publications are referenced herein, those publications include other useful guidance and recommendations which the designer is encouraged to follow.

*2.1-8.3.4.1 Where special lighting needs for the elderly are required, they shall be incorporated into the lighting design.

\[ \text{A2.1-8.3.4.1} \text{ Refer to IES publication ANSI/IES RP-28: Recommended Practices for Lighting and the Visual Environment for Seniors and the Low Vision Population.} \]

2.1-8.3.4.2 Luminaires. Luminaires in wet-patient areas (e.g., kitchens, showers) shall have smooth, cleanable, shatter-resistant lenses and no exposed lamps concealing the light source. Luminaires shall properly dissipate heat such that touchable surfaces will not burn occupants or ignite materials.

2.1-8.3.4.3 Lighting for specific locations in the hospital
(1) Patient rooms

(a) Patient rooms shall have provide general and examination levels of illumination, lighting and night lighting.

(b) Examination illumination shall be permitted to be:

   (i) Dimmable

   (ii) Limited to the patient care station

(c) General lighting shall be permitted to be zoned by task area.

   (ai) Lighting Illumination for reading shall be provided for each patient bed.

   (ii) Reading light controls shall be accessible to the patient(s) shall be able to adjust illumination without the patient having to get out of bed.

   (id) Incandescent and halogen light sources that produce heat shall not be used be placed or shielded to protect the patient from injury.

   (iii) Unless the light source is specifically designed to protect the space below, the light source shall be covered by a diffuser or lens.

   (iv) Flexible light arms, if used, shall be mechanically controlled to prevent the lamp from contacting the bed linen.

(e) Light sources shall be either encapsulated or covered by a diffuser or lens or shall use fixtures designed to contain fragments.

*(b)* At least one locally switched night-light fixture shall be located in each patient room. This requirement does not apply to critical care patient rooms where view panels are provided to the corridor.

A2.1-8.3.4.3 (1)(b) Night-lighting

a. Night-lights may be switched by an integral photocell where facilities desire night-light operation whenever the room is dark. Alternatively, operation of night-lights may be controlled by a passive infrared sensor or equivalent technology. Sensors in patient rooms should not allow viewing angles of the bed surface to prevent activation when the patient turns over in bed. Some patients prefer dark rooms and are disturbed by night-lights. Facilities may determine if room occupants should be given the opportunity to switch off night-lights, with lamps that have a warm-up time or a delay in reaching the intended light level should be avoided.

b. The night-light should be mounted on the wall near the floor to avoid disturbing the patient. Night-lights used by staff that illuminate the path from the entry to bedside should be switched at the room entrance.

*(i)* Central control of night-lights such as a common switch at the nurse station or time-clock shall be prohibited.

A2.1-8.3.4.3 (1)(b)(i) The night-light should be controlled at the room entrance.
Night-long use of night-lights is typically patient dependent. Some patients prefer dark rooms and are disturbed by night-lights. Patient control of the night-light may also be provided via three-way switching or low-voltage controls.

(ii) The night-light fixture shall be located at or below 18 inches (45.72 centimeters) from the finished floor, illuminating the pathway from the bed to the toilet room for staff and patient use to illuminate both the path from the room entrance to the bedside and the path between the bed and the toilet room.

A2.1-8.3.4.3 (1)(b)(ii) Indirect lighting should be provided to reduce glare on surfaces to accommodate vision issues for patient comfort.

(ii) Night-light color temperature shall be 2,700K or warmer.

(c) Lighting for critical care bed areas shall permit staff observation of the patient while minimizing glare.

(2) Patient care unit corridors.

(a) Corridors in patient care units shall have general illumination with provisions for reducing light levels at night.

(b) Use of a central controller or time clock shall be permitted to control night-lighting for patient corridors by lowering the density or changing the color temperature of the lighting.

(3) Exam/treatment/trauma rooms. A portable or fixed examination light shall be provided for examination, treatment, and trauma rooms.

(4) Operating and delivery rooms

(a) Operating and delivery rooms shall have general lighting in addition to special lighting units provided at surgical and obstetrical tables.

(b) General lighting and special lighting shall be on separate circuits.

(5) Medication safety zone work areas and pharmacy areas. See Section 2.1-8.8.1 (2)(d) (Medication safety zones: Design requirements—Lighting) for lighting requirements for medication safety zones and pharmacy areas.

*(6) Food and nutrition areas. Light sources in kitchen and serving areas shall be either encapsulated or covered by a diffuser or lens or use fixtures designed to contain fragments. Lighting shall have a shatterproof or protective cover.

A2.1-8.3.4.3.2 (6) Lighting in food and nutrition areas

a. Vertical and horizontal conduits should be concealed in counters and walls.

b. Occupancy lighting sensors should be provided for all offices, staff restrooms, and storage areas, including walk-in coolers and freezers.

c. Natural daylighting should be considered to provide opportunities for energy savings and to enhance access to daylight and views, for food preparation and serving areas where temperatures can be maintained to reduce lighting requirements and enhance staff productivity.
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*(7) Patient care areas. Uplight fixtures installed in patient care areas shall be covered.

A2.1-8.3.4.3-2 (7) Using a translucent cover, such as a lens, prevents dust from getting into the fixture and facilitates cleaning of the top of the fixture. It is best to minimize ledges that require staff cleaning.

(8) Offices, staff restrooms, and storage areas. These spaces shall have occupancy sensors to control lights.

2.1-8.3.5 Electrically Powered Equipment

*2.1-8.3.5.1 Hand-washing station sinks and scrub sinks. Any required hand-washing station or scrub sink that depends on the building electrical service for operation shall be connected to the essential electrical system.

A2.1-8.3.5.1 Refer to NFPA 99: Health Care Facilities Code for a description of the essential electrical system.

*2.1-8.3.5.2 Electronic health record system servers and centralized storage. This equipment shall be provided with an uninterruptible power supply.

A2.1-8.3.5.2 EHR system servers and storage. Such systems may include electronic health record (EHR), order entry, and computerized provider order entry (CPOE) systems. The uninterruptible power supply is needed to prevent data loss during transition between normal and emergency power.

2.1-8.3.6 Electrical Receptacles

2.1-8.3.6.1 Receptacles in corridors

(1) Duplex-grounded receptacles for general use shall be installed approximately 50 feet (15.24 meters) apart in all corridors and within 25 feet (7.62 meters) of corridor ends.

(2) Receptacles in pediatric and behavioral and mental health unit corridors shall be of the tamper-resistant type.

*2.1-8.3.6.2 Receptacles in patient care areas. Receptacles shall be provided according to Table 2.1-1 (Electrical Receptacles for Patient Care Areas in Hospitals).

A2.1-8.3.6.2 Height of electrical receptacles. Consideration should be given for the above finished floor (AFF) height to the center of the electrical receptacles to minimize the need for staff to bend over to reach them. Potential high-use receptacles (e.g., those proximal to beds, gurneys, and exam tables) should be positioned at a minimum AFF height of 30 inches to the center of the electrical outlet.

2.1-8.3.6.3 Essential electrical system receptacles

(1) Electrical receptacle cover plates or electrical receptacles supplied from the essential electrical system shall be distinctively colored or marked for identification.

(2) If color is used for identification purposes, the same color shall be used throughout the facility.

2.1-8.4 Plumbing Systems
2.1-8.4.1 General

In the absence of local and state plumbing codes, all plumbing systems shall be designed and installed in accordance with the *International Plumbing Code*.

2.1-8.4.2 Plumbing and Other Piping Systems

2.1-8.4.2.1 General piping and valves

(1) All piping, except control-line tubing, shall be identified.

(2) All valves shall be tagged, and a valve schedule shall be provided to the facility owner for permanent record and reference.

(3) No plumbing piping shall be exposed overhead or on walls where possible accumulation of dust or soil may create a cleaning problem or where leaks would create a potential for food contamination.

2.1-8.4.2.2 Hemodialysis/hemoperfusion water distribution

*(1) General

(a) In new construction and renovation in any hospital where hemodialysis or hemoperfusion is routinely performed, the following shall be provided:

(i) Separate treated water distribution system

(ii) Drainage system independent from the tap water

(b) If the dialysis equipment used includes sufficient water treatment provisions, use of domestic cold water without special piping (rather than a separate treated water system) shall be permitted.

A2.1-8.4.2.2 Separate treated water distribution system. Use of portable water treatment equipment or integrated hemodialysis machines (with water treatment as part of the machine) does not require a separate treated water distribution system. However, the water purification requirements (i.e., chemical and microbial quality of product water) are the same, whether portable units or a separate treated water system supplying multiple dialysis stations/machines is used.

(2) Treated water distribution system. Where provided, a separate treated water distribution system shall meet the following requirements:

(a) The treated water system shall be in accordance with ANSI/AAMI/ISO 26722: *Water Treatment Equipment for Hemodialysis Applications and Related Therapies*.

(b) Treated water distribution outlets shall be provided for these areas:

(i) Each individual hemodialysis treatment bay

(ii) Hemodialysis equipment repair area

(iii) Dialysate preparation area

(c) Treated water systems for hemodialysis and related therapies shall meet the current requirements...
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(3) Dialysis equipment or water system components shall meet FDA 510 (k) approval and the requirements of class 2 medical device(s).

(4) The liquid waste and disposal system for the hemodialysis treatment area shall be designed to minimize odor and prevent backflow.

(5) All hemodialysis distribution piping shall be readily accessible for inspection and maintenance.

2.1-8.4.2.3 Potable water supply systems

(1) Capacity

(a) Systems shall be designed to supply water at sufficient pressure to operate all fixtures and equipment during maximum demand.

(b) Supply capacity for hot- and cold-water piping shall be determined on the basis of fixture units, using recognized engineering standards.

(c) Where the ratio of plumbing fixtures to occupants is proportionally more than required by the building occupancy and is in excess of 1,000 plumbing fixture units, use of a diversity factor to calculate capacity shall be permitted.

*(2) Valves. Each water service main, branch main, riser, and branch to a group of fixtures shall have valves.

(a) Stop valves shall be provided for each fixture.

(b) Access shall be provided for all valve locations.

A2.1-8.4.2.3 (2) Reduced pressure zone (RPZ). Where connected to a patient care device such as the AER (automated endoscope reprocessor), the reduced pressure zone after the RPZ valve should have a design feature that allows for automatic flushing of chlorinated water.

(3) Backflow prevention

(a) Systems shall be protected against cross-connection in accordance with American Water Works Association (AWWA) Backflow Prevention and Cross-Connection Control: Recommended Practices.

(b) Vacuum breakers or backflow prevention devices shall be installed on hose bibs and supply nozzles used for connection of hoses or tubing in laboratories, housekeeping sinks, bedpan-rinsing attachments, autopsy tables, etc.

(4) Potable water storage. Potable water storage vessels (hot and cold) not intended for constant use shall not be installed, except as required for disaster preparedness or similar emergency supply use.

*(5) Provisions shall be made to provide potable water to the facility in the event of a utility failure or a disaster.

A2.1-8.4.2.3 (5) Services to be provided in the event of a utility failure or disaster should be defined in the owner’s facility operations plan (e.g., cooling
2.1 Common Elements for Hospitals

tower or boiler makeup water, minimal clinical uses).

(a) A well, storage tank, or building system piping connection shall be permitted to serve this purpose.

(b) Any equipment required to provide potable water in the event of a utility failure or disaster shall be served by the essential electrical system (i.e., emergency power).

*2.1-8.4.2.4 Non-potable water supply systems. Any non-potable water system piping shall be clearly marked “non-potable.”

**A2.1-8.4.2.4 Non-potable water supply systems.** Non-potable water supply systems are defined as rainwater supply, recaptured condensate water, gray water, and municipal reclaimed water systems.

a. Captured rainwater systems may be used for irrigation or closed-loop process applications where permitted by the authority having jurisdiction (AHJ).

b. Municipal recycled, recaptured condensate, or reclaimed water systems may be used for drip irrigation or closed-loop process applications where required or permitted by the AHJ.

c. Closed-loop process applications include cooling tower makeup, ground source heat pump loops, and cooling of heat-rejection equipment (e.g., vacuum pumps, refrigeration equipment).

*2.1-8.4.2.5 Heated potable water distribution systems

**A2.1-8.4.2.5 Heated potable water distribution systems**

a. **Legionella response.** There are several ways to treat potable water systems to kill *Legionella* and other opportunistic waterborne pathogens. Complete removal of these organisms is not feasible, but methods to reduce the amount include hyperchlorination (free chlorine, chlorine dioxide, monochloramine), elevated hot water temperature, ozone injection, silver/copper ions, and ultraviolet light. Each of these options has advantages and disadvantages. Although increasing the hot water supply temperature to 140°F (60°C) is typically considered the easiest option, the risk of scalding, especially to youth and the elderly, is significant. Additional consideration should be given to domestic water used in bone marrow transplant units. See the CDC *Guidelines for Environmental Infection Control in Health-Care Facilities*, ANSI/ASHRAE Standard 188: *Legionellosis: Risk Management for Building Water Systems*, and ASHRAE Guideline 12: *Minimizing the Risk of Legionellosis Associated with Building Water Systems* for additional information. Another reference on this topic is “*Legionella Control in Health Care Facilities,*” available from the American Society of Plumbing Engineers.

b. **Design for efficient heated potable water distribution.** Hot water distribution systems should be designed to deliver hot or tempered water in a “reasonable” time. Low-flow faucets, longer pipe runouts between a recirculated main and the fixture, and larger diameter pipes increase the time it takes to achieve desired temperatures. Given the water conservation benefits of low-flow faucets, designers should consider reducing the length of uncirculated runouts,
reducing the pipe size, providing heat tracing for the runout, or using point-of-use water heaters. Following is a guide that may be used in designing a system based on delivery time.

—Design method. Hot and tempered water distribution systems should be designed using either the maximum pipe length or maximum pipe volume limits provided in this appendix section and appendix table A2.1-a (Maximum Length of Hot Water System Pipe or Tube). For purposes of this discussion, references to pipe should also apply to tubing and the source of hot or tempered water is considered to be a water heater, boiler, circulation loop piping, or electrically heat-traced piping.

- Maximum allowable pipe length method. The maximum allowable pipe length from the source of hot or tempered water to the termination of the fixture supply pipe should be in accordance with the maximum pipe length columns in appendix table A2.1-b. Where the length contains piping of more than one size, the largest pipe size should be used to determine the maximum allowable pipe length in the table.

- Maximum allowable pipe volume method. The maximum volume of hot or tempered water in hot water distribution piping should be calculated in accordance with the guidance just below. The maximum volume in piping to public hand-washing stations, metering or non-metering, should be 2 ounces (0.06 L). For fixtures other than those at public hand-washing stations, the maximum volume should be 64 ounces (1.89 L) for hot or tempered water from a water heater or boiler and 24 ounces (0.7 L) for hot or tempered water from a circulation loop pipe or an electrically heat-traced pipe.

—Water volume determination. The volume should be the sum of the internal volumes of pipe, fittings, valves, meters, and manifolds between the source of the hot water and the termination of the fixture supply pipe. The volume should be determined from the liquid ounces per foot column of appendix table A2.1-b. The volume contained in fixture shutoff valves, flexible water supply connectors to a fixture fitting, or a fixture fitting should not be included in the water volume determination. Where hot or tempered water is supplied by a circulation loop pipe or an electrically heat-traced pipe, the volume should include the portion of the fitting on the source pipe that supplies water to the fixture.

—Maximum flow rate. The maximum flow rate of fixtures should be limited to 0.5 gpm when connected to 1/4-inch piping, 1 gpm when connected to 5/16-inch piping, and 1.5 gpm when connected to 3/8-inch piping.

(1) Provisions based on a risk management plan shall be included in the heated potable water system to limit the amount of Legionella bacteria and other opportunistic waterborne pathogens.

(2) Heated potable water distribution systems serving patient care areas shall be under constant recirculation to provide continuous hot water at each hot water outlet. Non-recirculated fixture branch piping shall not exceed 25-10 feet (7.623.02 meters) in length.

(3) Elimination of dead-end piping
2.1 Common Elements for Hospitals

(a) Installation of dead-end piping (i.e., risers with no flow and branches with no fixture) shall not be permitted.

(b) In renovation projects, dead-end piping shall be removed.

(c) Installation of empty risers, mains, and branches for future use shall be permitted.

*(4) Water temperature

A2.1-8.4.2.5 (4) Water temperature is measured at the point of use or inlet to the equipment.

*(a) The water-heating system shall supply water at the temperatures and amounts indicated in Table 2.1-4 (Hot Water Use—General Hospital). Storage of water at higher temperatures shall be permitted.

A2.1-8.4.2.5 (4)(a) To prevent scalding, it is recommended that water temperature at hand-washing stations and showers be limited by an ASSE 1070: Performance Requirements for Water Temperature Limiting Devices or equivalent device.

*(b) For hand-washing stations, water shall be permitted to be supplied at a constant temperature between 70°F and 80°F using a single-pipe supply. For showers or other end-use devices requiring heated water, water shall be permitted to be supplied by this low-temperature circulation system and provided with point-of-use heaters.

A2.1-8.4.2.5 (4)(b) One way to limit the potential growth of Legionella in a heated potable water system is to distribute water at a temperature lower than 80°F (26.6°C) for hand-washing use. Water at this temperature may be warm enough to encourage good hand-washing practice but cooler than the ideal growth conditions for Legionella.

2.1-8.4.2.6 Drainage systems

(1) Piping

*(a) Where drainage piping is installed above the ceiling of, or exposed in, operating and delivery rooms, procedure rooms, trauma rooms, nurseries, central kitchens, sterile processing facilities, pharmacies, Class 2 and 3 imaging rooms, electronic mainframe rooms (TSERs-EPs and TECs TERs), main switchgear and electrical rooms, electronic data processing areas, or electric closets, the piping shall have special provisions (e.g., double wall containment piping or oversized drip pans) to protect the space below from leakage and condensation.

A2.1-8.4.2.6 (1)(a) Kitchenettes and nutrition rooms are not considered central kitchens.

(b) Where a drip pan is used to meet this requirement, it shall be accessible and have an overflow drain with an outlet located in a normally occupied room or area that is not open to a restricted area.

(c) Where the sterile processing facility is configured as two rooms, special drainage provisions above a separated decontamination portion of the facility need not comply.

(2) Floor drains
2.1 Common Elements for Hospitals

(a) Floor drains shall not be installed in procedure, operating, Class 2 and Class 3 imaging, and delivery rooms.

(b) Where a floor drain is installed in a dedicated cystoscopy procedure room, it shall contain a small recessed floor sink with a drain plate flush with the floor that empties into a non-flushing drain with automatic trap primer.

(c) Floor drains and/or floor sinks in food and nutrition services areas
   
   (i) These shall be of a type that can be easily cleaned by removing the cover.

   (ii) Removable stainless steel mesh shall be provided in addition to grilled drain covers to prevent entry of large particles of waste that might cause stoppages.

   (iii) Where steam-jacketed kettles and tilt frying pans are used, a floor trough shall be installed for cleaning purposes.

(3) Kitchen grease traps

   (a) Grease traps shall be located and arranged to permit easy access without the need to enter food preparation or storage areas.

   (b) Grease traps shall be accessible from outside the building without need to interrupt any services.

(4) Plaster traps

   (a) Where a sink is used for disposal of plaster of paris, a plaster trap shall be provided.

   (b) Where plaster traps are used, provisions shall be made for access and cleaning.

2.1-8.4.2.7 Condensate drains

(1) Condensate drains for cooling coils shall be a type that may be cleaned as needed without disassembly.

(2) An air gap shall be provided where condensate drains empty into building drains.

(3) Heater elements shall be provided for condensate lines in freezers or other areas where freezing may be a problem.

2.1-8.4.3 Plumbing Fixtures

2.1-8.4.3.1 General

(1) Materials. The material used for plumbing fixtures shall be non-absorptive and acid-resistant.

(2) Clearances. Water spouts used in sinks shall have clearances adequate to avoid contaminating utensils and the contents of carafes, etc.

*2.1-8.4.3.2 Hand-washing station sinks

   A2.1-8.4.3.2 Design of hand-washing station sinks

   a. Design of sinks should accommodate ADA requirements for clearance under the sink basin. Plumbing lines under hand-washing stations should be protected
from damage caused by wheelchairs. See sections 2.1-7.2.2.8 (Architectural Details—Hand-washing stations) and 2.1-8.3.5.1 (Electrical Equipment—Hand-washing station sinks and scrub sinks) for further information.

b. Hand-washing station sinks should not be closer than 36 inches (91.44 centimeters) to a toilet.

*(1) Sinks in hand-washing stations shall be designed with basins and faucets that will reduce the risk of splashing to areas where direct patient care is provided, sterile procedures are performed, and medications are prepared, or food is prepared.

A2.1-8.4.3.2 (1) Splashing should be prevented on surfaces where patient procedures are performed, medications are prepared, or sterile supplies are located. Recommendations for minimizing splashing through hand-washing station design and sink style include the following:

a. Faucets should not discharge directly above the drain as this causes splashing (i.e., water should be angled away from the drain).

b. Sink size and depth should follow ANSI standards for sink design.

c. Water pressure should be adjusted to reduce forceful discharge into the sink at maximum flow.

d. Spout reach of faucets should be at least 6 inches (15.24 centimeters) long to accommodate the size of two adult hands and to avoid pooling of water at the sink backsplash.

*(2) The sink basin shall have a nominal size of no less than 1 square foot (.09 square meter), with a minimum dimension of 9 inches (22.86 centimeters) in width or length.

A2.1-8.4.3.2 (2) The specified minimum dimensions will permit standard oval designs and designs with rounded corners (both of which could have an actual bowl size of slightly less than 144 square inches) as well as bowls with curved bottoms to be considered compliant with the Guidelines. The intent of this requirement is to provide a hand-washing station sink that is large enough for clinical staff and visitors to wash their hands without touching the sides or bottom of the bowl and to prevent splashing of potentially infectious material on surrounding surfaces.

(3) Hand-washing station sink basins shall be made of porcelain, stainless steel, or solid-surface materials.

(4) Sink basins shall be installed so they fit tightly against the wall or countertop and sealed to prevent water leaks.

(5) The water discharge point of hand-washing sink faucets shall be at least 10 inches (25.4 centimeters) above the bottom of the basin.

(6) The water pressure at the fixture shall be regulated.

*(7) Anchoring. For hand-washing station sinks, allowable stresses shall not be exceeded at any point on the sink where a vertical or horizontal force of 250 pounds (1112N) is applied.
2.1 Common Elements for Hospitals


(8) Fittings. Hand-washing station sinks used by medical and nursing staff, patients, the public, and food handlers shall have fittings that can be operated without using hands.

(a) Single-lever or wrist blade devices. Use of these devices shall be permitted.

(i) Blade handles used for this purpose shall be at least 4 inches (10.16 centimeters) in length.

(ii) The location and arrangement of fittings shall provide the clearance required for operation of blade-type handles.

*(b) Sensor-regulated water fixtures

A2.1-8.4.3.2 (8)(b) Sensor-regulated water fixtures. Some studies have indicated a higher risk of biofilm formation in sensor-regulated faucets. Therefore, use of sensor-regulated faucets in patient care areas should be considered when conducting the infection control risk assessment.

(i) These fixtures shall meet user need for temperature and length of time the water flows.

(ii) Electronic faucets shall be capable of functioning during loss of normal power.

(iii) Use of sensor-regulated faucets with manual temperature control shall be permitted.

2.1-8.4.3.3 Showers and tubs

(1) Showers and tubs shall have nonslip surfaces.

(2) Where provided, surfaces for personal effects (e.g., shampoo, soap) dishes shall be recessed.

2.1-8.4.3.4 Ice-making equipment. Copper tubing shall be provided for supply connections to ice-making equipment.

*2.1-8.4.3.5 Clinical sinks

A2.1-8.4.3.5 Instrument washing sinks. Instrument washing sinks and faucets should be designed to reduce the risk of splashing outside of the sink rim. Sink designs should conform to the recommendations in ANSI/AAMI ST79: Comprehensive Guide to Steam Sterilization and Sterility Assurance in Health Care Facilities.

(1) Clinical sinks shall be trimmed with valves that can be operated without hands.

(a) Single-lever or wrist blade devices shall be permitted.

(b) Handles on clinical sinks shall be at least 6 inches (15.24 centimeters) long.

(2) Clinical sinks shall have an integral trap wherein the upper portion of the water trap provides a visible seal.

2.1-8.4.3.6 Scrub sinks

(1) Freestanding scrub sinks shall be trimmed with foot, knee, or electronic sensor controls.
2.1 Common Elements for Hospitals

(2) Single-lever wrist blades shall not be permitted except for the temperature pre-set valve.

**2.1-8.4.3.7 Bedpan-rinsing devices.** Human waste disposal systems. Provisions for bedpan management shall be provided. Options for waste management include:

**A2.1-8.4.3.7 Human waste disposal systems.** The health care organization may choose an alternate method for management of waste from bedpans and commodes. Use of bedpan-rinsing devices may result in body fluid exposure to health care personnel and contamination of the entire bathroom with toilet plume during flushing. An infection control risk assessment can help in evaluating the best choice for human waste disposal for each facility.

(1) **A bedpan-rinsing device.** Where a bedpan-rinsing device is used:

(a) Bedpan-rinsing devices shall be provided in each inpatient toilet room; however, installation is optional in behavioral and mental and alcohol-abuse units where patients are ambulatory.

(2b) Bedpan-rinsing devices shall be permitted to use cold water only.

(3c) Unless located in a toilet room, bedpan-rinsing devices shall be installed in dedicated rooms, separate from patient care areas. See a soiled workroom that meets the requirements in Section 2.1-2.8.12 (Soiled Workroom or Soiled Holding Room) for requirements.

*(2) A bedpan washer-disinfector system.** Where a bedpan-washer system is used:

**A2.1-8.4.3.7 (2) Bedpan washer-disinfector system.** The location of this equipment and the transport route from patient care area to the equipment location should be considered.

(a) Electrical and plumbing connections that meet manufacturer requirements shall be provided.

(b) Installation of bedpan washer-disinfector systems shall be permitted in an inpatient toilet room or a soiled workroom.

*(3) A disposable bedpan and macerator system.** Where a disposable bedpan and macerator system is used:

**A2.1-8.4.3.7 (3) Disposable bedpan and macerator system.** This system requires the use of a degradable-type bedpan and does not require emptying of the contents prior to disposal into the system. The risks associated with carrying a full bedpan to the soiled workroom should be considered. Bedpans must be covered, and spills prevented.

(a) Electrical and plumbing connections that meet manufacturer requirements shall be provided.

(b) Disposable bedpan and macerator systems shall be installed in a soiled workroom.

2.1-8.4.3.8 Emergency first-aid equipment. Quick-drench emergency deluge shower and face/eyewash devices shall be provided where required by the following:

*(1) OSHA 29 CFR 1910: *Occupational Safety and Health Standards*

**A2.1-8.4.3.8 (1) OSHA standards**
2.1 Common Elements for Hospitals

a. OSHA 29 CFR 1910.151(c) (Medical Services and First Aid)
b. OSHA 29 CFR 1910.1048 (i)(2) and (i)(3) (Formaldehyde)

(2) ANSI/ISEA Z358.1: *American National Standard for Emergency Eyewash and Shower Equipment*

2.1-8.4.3.9 Hydrotherapy facilities

(1) A dedicated drain shall be provided where portable hydrotherapy units are used.

(2) Hand-washing sinks shall not be used as drains for hydrotherapy units.

2.1-8.4.4 Medical Gas and Vacuum Systems

Station outlets shall be provided as indicated in Table 2.1-3 (Station Outlets for Oxygen, Vacuum, Medical Air, and Instrument Air Systems in Hospitals).

2.1-8.4.4.1 Medical gas systems. The installation, testing, and certification of nonflammable medical gas and air systems shall comply with the requirements of NFPA 99: *Health Care Facilities Code*.

2.1-8.4.4.2 Vacuum systems. Clinical vacuum system design and installations shall be in accordance with NFPA 99.

*2.1-8.5 Communications Call Systems*

*Communications systems.* Technology and medical communication rooms typically include space for data and voice communication, patient monitoring and alarm, nurse call, hospital information, digital imaging (PACS), security, building automation, fire and life safety, telemedicine/teleconferencing systems equipment, and personal mobile (wireless) devices. Today’s health care facilities rely on data, voice, and other medical communication technologies and depend on these systems to provide patient care. These systems are an essential, “life critical” utility for hospitals. The convergence of these communication systems continues to increase the demand and need for well-designed systems and adequate space to accommodate them. The small communication “closets” of the past no longer support the systems and equipment.

*2.1-8.5.1 Call Systems*

A2.1-8.5.1 Call station *functions.* Health care facilities require the ability to enable the following kinds of communication:

a. Patient-to-caregiver from a patient room or similar location. This may be a notice of need only or two-way voice communication.
b. Patient-to-caregiver from a patient toilet in case of fall.
c. Caregiver-to-caregiver communication. This may be a notice of need only or two-way voice communication.
d. Caregiver-to-caregiver communication of emergency need. This is similar to general caregiver-to-caregiver communication but with a higher degree of urgency.
2.1 Common Elements for Hospitals

2.1-8.5.1.1 General

(1) **Nurse Call stations** shall be provided as required in Table 2.1-2 (Locations for **Nurse Call Devices-Functions** in Hospitals).

(2) **Nurse Call systems, where permanently installed**, shall report to an attended location with electronically supervised visual and audible annunciation as indicated in Table 2.1-2 (Locations for **Nurse Call Devices-Functions** in Hospitals).

(3) The call system shall include a priority hierarchy to account for the needs of specific patients (e.g., non-verbalizing patients or patients with a high risk of falling).

(4) In addition to these guidelines, permanently installed nurse call systems shall meet the requirements of UL 1069: *Standard for Hospital Signaling and Nurse Call Equipment* and state and local requirements.

*(5) Use of alternate technologies that meet the requirements of UL 1069, including radiofrequency systems, shall be permitted for call systems. Where such systems rely on wireless communication (e.g., Bluetooth, Wi-Fi, cellular), they shall be tested and listed to comply with IEEE 802.11x: *Wireless LANs.*

A2.1-8.5.1.1 (5) Nurse and emergency call systems should be tested and listed by a laboratory recognized by OSHA’s Nationally Recognized Testing Laboratory (NRTL) Program in accordance with a standard applicable to health care environments. Consideration should also be given to coordinating radio call systems with existing hospital radio systems.

(6) Alternate technologies, including radiofrequency systems, shall not interfere with wireless medical telemetry service as defined by 47 CFR Part 95.

*(67) Acoustic considerations. Patient safety and comfort as well as staff comfort and productivity shall be considered in the configuration of these systems:

A2.1-8.5.1.1 (67) **Acoustic considerations.** Electro-acoustic systems can affect the acoustic environment of health care facilities, and the acoustic environment can affect the perception of these systems.

a. NFPA 72: *National Fire Alarm Code* provides a method for calculating the effective masked threshold of narrow band tonal alarms using the techniques in ISO 7731: *Danger signals for work places—Auditory danger signals.* These techniques use the favorable audibility of tonal sounds versus broadband sounds in the midst of competing noise, based on staff training.

b. Where possible, clinical alarms should be assessed to confirm whether sound levels can be reduced for patient comfort.

c. Clinical alarms should comply with the masked threshold requirements of ISO 7731: *Ergonomics—Danger signals for public and work areas—Auditory danger signals.*

*(a) Paging and call systems

A2.1-8.5.1.1 (67)(a) Paging and call systems
2.1 Common Elements for Hospitals

a. Wireless communication devices such as internet protocol (IP) phones, wearable communication badges, and vibrating beepers should be considered options to communicate with clinical staff to reduce the use of overhead paging systems.

b. Wireless asset tracking Real-time locating system (RTLS) technologies such as RFID and infrared should be considered options for staff, patient, and equipment location to reduce the use of overhead paging systems.

c. Integration of call systems with these wireless communication and location devices should also be considered.

(i) Voice paging and call systems shall be designed to achieve a minimum Speech Transmission Index (STI) of 0.50 or a Common Intelligibility Scale (CIS) rating of 0.70 at representative points in the area of coverage to provide acceptable intelligibility from the system.

(ii) Performance of emergency notification systems shall achieve the following:
- 70 dBA minimum sound level or 10 dBA above background noise levels (whichever is higher)
- Coverage within +/- 4 dB at the 2000 Hz octave band throughout corridors, open treatment areas, and public spaces

(b) Sound masking systems

(i) Sound masking systems shall be designed for levels that do not exceed 48 dBA.

(ii) Loudspeaker coverage shall provide for spatial uniformity of +/- 2 dBA.

*(iii) Sound masking system spectra shall be designed to comply with Table 1.2-7 (Design Criteria for Speech Privacy for Enclosed Rooms and Open-Plan Spaces).

A2.1-8.5.1.1 (67)(b)(iii) Speech-masking spectra. For information about designing spectra to effectively mask speech, see the following publications:


2.1-8.5.1.2 Patient call stations devices. A patient call station device shall be provided to allow each patient to summon assistance from the nursing staff.

(1) Each patient sleeping bed, except nursery beds, shall be provided with a patient call station device equipped for two-way voice communication. Use of a permanently installed dual call station shall be permitted when beds are located adjacent to each other.

(2) The patient call station device shall be equipped with the following:

(a) A visible signal once it has been activated.
(i) An indicator light or call assurance lamp that remains lighted as long as the voice circuit is operating shall be provided.

(ii) In rooms containing two or more patient stations, call devices, call assurance lamps shall be provided at each station device.

(b) A reset switch for canceling a call

(3) The patient call station shall activate signals as follows:

(a) A visible signal in the corridor at the patient’s door. In multi-corridor patient care units or patient care areas, additional visible signals shall be installed at corridor intersections.

*(b) A visible and audible signal at nurse call duty stations in the locations listed below:

(i) Clean workroom
(ii) Soiled workroom
(iii) Medication preparation room
(iv) Documentation area or other charting facilities
(v) Nourishment area
(vi) Nurse master station of the patient care unit or patient care area

A2.1-8.5.1.2 (3)(b) The audible signal may be temporarily silenced provided subsequent calls automatically reactivate the audible signal.

(4) Diagnostic and treatment areas. A nurse-call system shall be provided in each diagnostic and treatment area as required in Table 2.1-2 (Locations for Nurse-Call Devices Functions in Hospitals).

2.1-8.5.1.3 Bath calls stations. A bath station that can be activated by a patient lying on the floor call system shall be provided at each patient toilet, bathtub, sitz bath, or shower stall to permit a patient lying on the floor to call for help manually or automatically.

(1) An alarm in these areas shall be able to be turned off only at the bath station location where it was initiated.

(2) Bath Permanently installed bath calls stations in shower stalls and tubs shall be located 3 to 4 feet (.914 to 1.219 meters) above the floor, within normal view of the user and within reach of staff without the need to step into the shower or tub.

(3) Bath Permanently installed bath calls stations shall be located to the side of toilets, within 12 inches (30.48 centimeters) of the front of the toilet bowl and 3 to 4 feet (.91 meter to 1.22 meters) above the floor.

(4) A bath Permanently installed bath stations shall be permitted to serve a toilet and a shower or other fixture if it is accessible to each.

2.1-8.5.1.4 Staff assistance stations calls. A call system shall be provided in each patient location to permit S staff assistance stations for summoning additional local staff assistance for non-life-threatening situations shall be provided in each patient care location.
2.1 Common Elements for Hospitals

*2.1-8.5.1.5 Emergency call stations. A call system shall be provided in spaces listed in Table 2.1-2 Locations for Call Functions in Hospitals to permit staff to summon additional staff assistance for emergency situations. The emergency call station device shall be equipped with a continuous audible or visual confirmation to the person who initiated the code call.

A2.1-8.5.1.5 Commonly referred to as a “Code Blue,” emergency call stations devices are meant for use during a life-threatening situation to summon assistance from outside the unit or department.

2.1-8.5.1.6 Alarm in behavioral and mental health patient care units. A permanently installed nurse call system is not required in behavioral and mental health units, but if one is included installed the following shall apply:

(1) Provisions shall be made for easy removal or for covering of call button outlets.

(2) All hardware shall have tamper-resistant fasteners.

2.1-8.5.2 Telecommunications Systems

2.1-8.5.2.1 Telecommunications service entrance room Entrance facility (TSER). The TSER entrance facility (EF) houses the point at which outside carrier data and voice circuits and services enter the facility and outdoor cabling interfaces with the building’s internal cabling infrastructure.

(1) Number. Each hospital shall have at least one TSER EF that is dedicated to the telecommunications function and related support facilities and meets all of the requirements of this section.

*(2) Location and access requirements

A2.1-8.5.2.1 (2) TSER Entrance facility location. The TSER EF should be located in a dry area not subject to flooding, as close as practicable to the building entrance point, and next to the electrical service room to reduce the length of bonding conductor to the electrical grounding system. Where the TSER EF and technology equipment center room (TEC) are combined in one room, location next to the electrical service room should be balanced with minimizing electromagnetic interference.

(a) Access to the TSER EF shall be restricted.

(b) Combination of the TSER EF and the technology equipment room center shall be permitted.

(3) Building system requirements

(a) An HVAC system shall be provided to meet the environmental requirements of the equipment in the TSER EF.

(b) HVAC systems serving the TSER EF shall be connected to the hospital’s emergency power essential electrical systems.

*2.1-8.5.2.2 Technology equipment center room (TEC)

A2.1-8.5.2.2 Technology equipment center room. The TEC-TER houses the main networking equipment and the application servers and data storage devices that serve the building. It is the heart of the information technology and communications systems for the hospital. Sometimes referred to as a main
distribution frame (MDF), the **TEC** must be a sufficiently sized, environmentally controlled, power-conditioned, fire-protected, secure space with limited access that is located strategically to avoid any floodplain or other known hazard.

*(1) Number. Each hospital shall have at least one **TEC** technology equipment room (TER) space that is not used for any purposes other than data storage, processing, and networking and that meets the minimum requirements of this section.

**A2.1-8.5.2.2 (1)** Provision of a redundant electronic medical record data storage facility should be considered.

*(2) Size. The **TEC** shall be a size adequate to provide proper space to meet service requirements for the equipment that will be housed there.

**A2.1-8.5.2.2 (2) ** **TEC** size. The actual size requirements for a **TEC** space can be difficult to determine, particularly if the contents of the rooms have not been clearly defined, but may be dramatically larger than such spaces have been in the past. A growth factor appropriate to the needs of the facility as recommended by industry organizations such as BICSI (Building Industry Consulting Services International) or the Telecommunications Industry Association (TIA) should be factored into the size of the **TEC**.

*(3) Location and access requirements

**A2.1-8.5.2.2 (3) ** **TEC** location and access requirements

a. The **TEC** should be located a safe distance from any transformers, motors, x-ray equipment, induction heaters, arc welders, radio and radar systems, or other sources of electromagnetic interference.

b. The **TEC** should be located or designed to avoid vibration from mechanical equipment or other sources.

c. Locations that are restricted by building components that limit future expansion (e.g., elevators, building structural elements, kitchens, central energy plants, outside walls, or other fixed building walls) should be avoided.

d. Accessibility should be provided for the delivery of supplies and equipment to the space.

*(a) In the absence of local requirements, the **TEC** shall be located above any floodways or flood hazard areas as described by the National Flood Insurance Program (NFIP).

**A2.1-8.5.2.2 (3)(a)** In multi-story buildings, roof exposure and the risk of leaks should be avoided.

b. The **TEC** shall not be located adjacent to exterior curtain walls to prevent wind and water damage.

c. The **TEC** shall be located a minimum of 12 feet (3.66 meters) from any transformer.

d. Access to the **TEC** shall be restricted.
(e) Combination of the TEC TER and the telecommunications service entrance room shall be permitted.

(4) Building system requirements

(a) Mechanical and electrical equipment or fixtures that are not directly related to the support of the TEC TER shall not be installed in or pass through the TEC TER.

(b) All computer and networking equipment in the TEC TER shall be served by UPS power.

(c) All circuits serving the TEC TER and the equipment in it shall be dedicated to serving the TEC TER.

(d) Cooling and heating shall be provided. Cooling systems serving the TEC TER shall be supplied by the essential electrical system.

(e) Temperature control systems in the TEC TER shall be designed to maintain environmental conditions recommended in ASHRAE’s *Thermal Guidelines for Data Processing Environments* or the requirements for the specific equipment installed.

*2.1-8.5.2.3 Technology distribution Telecommunications room (TDR)*

A2.1-8.5.2.3 Technology distribution Telecommunications rooms. TDRs provide a secure, flexible, and easily managed location for the structured cabling systems, network electronics, clinical systems, nurse call systems, and other technology and communications equipment throughout the building. TDRs house a variety of technology systems and system components and may house individual and departmental servers, which can affect the spatial and support needs of the room. Typical systems and equipment located in technology distribution rooms (TDRs) include the following:

a. Data network and voice communication equipment and cabling

b. Fire alarm system components

c. Building automation system (BAS) components and equipment

d. Security components and associated equipment/closed-circuit television (CCTV)

e. Nurse call system components and equipment

f. Distributed antenna system (DAS) components and equipment

g. Music and video entertainment components and equipment

h. Paging equipment

i. Medical gas monitoring equipment

j. Lighting control panels

k. Cable access television (CATV) components and equipment

l. Patient and equipment tracking systems equipment and components
2.1 Common Elements for Hospitals

m. Smart OR/IT and video switching equipment
n. Physiological monitoring and medical telemetry components and equipment
o. Audiovisual systems and components
p. Telemedicine
q. Picture archiving and communications systems (PACS)
r. Cellular amplification systems
s. Digital signage system components
t. Emergency responder radio coverage (ERRC)

(1) Number

(a) There shall be a minimum of one *TDR-telecommunications room (TR)* on each floor of the facility.

(b) *TDR*TRs shall be provided throughout the facility as necessary to meet the 292-foot (90-meter) maximum cable distance required for Ethernet cables from the termination point in the *TDRTR* to each wall outlet.

*(2) Size. All *TDR*TRs shall provide a minimum of three-foot clearance on all sides of the equipment rack(s) requiring access.*

A2.1-8.5.2.3 (2) An inside dimension of 12 by 16 feet (3.66 by 4.88 meters) is recommended for *TDR*TRs. A *TDR* of this size will allow for future growth and the potential for an additional row of equipment racks.

*(3) Location and access requirements

A2.1-8.5.2.3 (3) *TDR*TR location

a. *TDR*TRs should be located to avoid large ducts, beams, and other building elements that may interfere with proper cable routing and may limit future access to the cable tray and cabling.

b. *TDR*TRs should be located as close as practicable to the center of the area served and preferably in the core area.

c. In a multi-story facility, *TDR*TRs should be stacked vertically so the entire footprint of each *TDR* is directly above or below the *TDR*TRs on other floors.

d. The *TDR* should be located away from transformers, motors, x-ray equipment, induction heaters, arc welders, radio or radar systems, and other sources of electromagnetic interference.

e. Redundant pathways should be provided for connections from each *TDR* to *TEC*TER.
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(a) The TDR TR shall be located in an accessible area on each floor. The TDR TR shall not be located in a semi-restricted or restricted area.

(b) Access to the TDR TR shall be directly off a corridor and not through another space, such as an electrical room or mechanical room.

(c) Access to a TDR TR shall be controlled.

(d) Suspended ceilings shall not be installed in the TR.

(4) Building system requirements

(a) Mechanical and electrical equipment, utilities and fixtures not directly related to the support of the TDR TR shall be permitted to pass through the TDR TR room, providing they do not pass over the top of any equipment in the room.

(b) All circuits serving the TDR TR and the equipment in the TR shall be dedicated to serving the TDR TR.

(c) Temperature control systems in the TDR TR shall be designed to maintain environmental conditions recommended in ASHRAE’s *Thermal Guidelines for Data Processing Environments* or the requirements for the specific equipment installed.

(d) Electrical power for cooling systems serving the TDR TR shall be supplied by the essential electrical system.

2.1-8.5.2.4 Grounding for telecommunication spaces

(1) Grounding, bonding, and electrical protection shall meet the requirements of NFPA 70 and TIA 607: *Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises*.

(2) TGB (Telecommunications grounding bus) bar

   (a) The ground bar shall be drilled with holes according to NEMA standard to accommodate bolted compression fittings.

   (b) All racks, cabinets, sections of cable tray, and metal components of the technology system that do not carry electrical current shall be grounded to this bus bar.

   (c) TGB bars shall be connected by a backbone of insulated, #6 (minimum) to 3/0 AWG stranded copper cable between all technology rooms.

(3) TMGB (Telecommunications main grounding bus) bar. TGB bars shall be connected back to the TMGB bar in the telecommunications service entrance room. The main grounding bar shall then be connected back to the building main electrical service ground.

   (a) The TMGB shall not be bonded to anything other than the building’s main electrical service ground.

   (b) Bonding conductor cabling shall be colored green or labeled appropriately.

*2.1-8.5.2.5 Cabling pathways and raceway requirements.* Outside plant infrastructure consists of the conduits, vaults, and other pathways and cabling used to connect buildings on a campus and to provide services from off-campus service providers.
A2.1-8.5.2.5 Support for system redundancy. Given the requirements for a highly available medical grade network and communication systems, dual, redundant, and geographically diverse outside pathways should be provided to meet the reliability requirements for medical information systems. It is also recommended that these redundant outside services be provided from diverse central offices.

*2.1-8.5.3 Emergency Communication System

An emergency-radio communication system shall be provided in each facility.

A2.1-8.5.3 Emergency communication system. The portable battery-powered radio, ham radio, or other communication systems to be used independently of the building’s service and emergency power systems during emergencies should be determined in the planning phase.

Additional communication capabilities may be required of facilities that contain a formal community emergency/trauma service or other specialty services (e.g., regional pediatric critical care units) that use staffed patient transport units.

2.1-8.5.3.1 This system shall operate independently of the building’s service and emergency power systems during emergencies.

2.1-8.5.3.2 The system shall have frequency capabilities to communicate with state emergency communication networks.

2.1-8.6 Electronic Safety and Security Systems

*2.1-8.6.1 Fire Alarm System

All health care facilities shall be provided with a fire alarm system in accordance with the following:

A2.1-8.6.1 Acoustic considerations. See appendix section A2.1-8.5.1.1 (6) (Acoustic considerations) for information.


2.1-8.6.1.2 NFPA 72: National Fire Alarm and Signaling Code

*2.1-8.6.2 Electronic Surveillance Systems

A2.1-8.6.2 Electronic surveillance systems. Electronic surveillance systems include but are not limited to patient elopement systems, door access/control systems, duress/panic alarms, video/audio monitoring systems, patient location systems, and infant abduction prevention systems.

2.1-8.6.2.1 Electronic Where electronic surveillance systems are not required, but if provided for the safety of the patients, any devices in patient areas shall be mounted in a tamper-resistant enclosure that is unobtrusive.

2.1-8.6.2.2 Electronic surveillance system monitoring devices shall be located so they are not readily observable by the general public or patients.

2.1-8.6.2.3 Where installed, electronic surveillance systems shall receive power from the essential
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2.1-8.7 Special Systems

2.1-8.7.1 General

* **A2.1-8.7.1 Testing and documentation for special systems**

a. **Testing**

(1) Prior to acceptance of the facility, all special systems shall be tested and operated to demonstrate to the owner or the owner’s designated representative that the installation and performance of these systems conform to design intent.

(2) Test results shall be documented for maintenance files.

b. **2.1-8.7.1.2 Documentation**

(1) Upon completion of the special systems equipment installation contract, the owner shall be furnished with a complete set of manufacturers’ operating, maintenance, and preventive maintenance instructions, a parts lists, and complete procurement information including equipment numbers and descriptions.

(2) Operations staff shall also be provided with written instructions for proper operation of systems and equipment. Required information shall include all safety or code ratings as needed.

2.1-8.7.1.3 Insulation.

Insulation surrounding special systems equipment shall be provided to conserve energy, protect personnel, and reduce noise.

2.1-8.7.2 Elevators

* **2.1-8.7.2.1 General.** Hospitals with patient facilities (e.g., patient rooms, dining rooms, recreation areas) or critical services (e.g., operating, delivery, diagnostic, therapeutic areas) located on floors other than the grade-level entrance floor shall have elevators.

**A2.1-8.7.2.1 Consideration should be given to dedicating and separating elevator types by function, such as those for the public, patients, staff, and materials (e.g., clean vs. soiled flows), as the diverse uses affect both operational efficiency and cross-contamination and infection control issues.**

2.1-8.7.2.2 Number

(1) At least two hospital-type elevators shall be installed where 1 to 59 patient beds are located on any floor other than the main entrance floor.

(2) At least two hospital-type elevators shall be installed where 60 to 200 patient beds are located on floors other than the main entrance floor, or where the major inpatient services are located on a floor other than those containing patient beds. (Reduction in elevator service shall be permitted for those floors providing only partial inpatient services.)

(3) At least three hospital-type elevators shall be installed where 201 to 350 patient beds are located on floors other than the main entrance floor, or where the major inpatient services are located on a floor...
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other than those containing patient beds. (Reduction in elevator service shall be permitted for those floors providing only partial inpatient services.)

*(4) For hospitals with more than 350 beds, the number of elevators shall be determined from a study of the hospital plan and the expected vertical transportation requirements.

A2.1-8.7.2.2 (4) Methods for conducting a traffic study are described in George R. Strakosch and Robert S. Caporale, _Vertical Transportation Handbook._

2.1-8.7.2.3 Dimensions and clearances

*(1) Elevator cars shall have minimum inside clear dimensions of 5 feet 8 inches (1.73 meters) wide by 9 feet (2.74 meters) deep.

A2.1-8.7.2.3 (1) **Elevator sizing considerations.** The elevator car is sized to accommodate a patient bed with attendants and equipment. Critical care patients and individuals of size often have additional attendants and/or equipment as well as larger beds and equipment during a transport and may need larger elevators. Larger elevator cars may also be needed for specialized hospitals or services (e.g., heart hospital, trauma service, bariatric surgery service, orthopedic service). Where elevator transport is required to move the critically ill and individuals of size, the elevator and associated hoistway should be designed to meet the specialized needs of the patients.

*(2) Elevator car door openings shall have a minimum clear width of \(54.48\) inches \((137.2\) millimeters\) and a minimum height of 84 inches \((2.14\) meters\).

A2.1-8.7.2.3 (2) Larger elevator door openings may be needed for specialized hospitals or services; see appendix section A2.1-8.7.2.3 (1) (Elevator sizing considerations).

(3) In renovations, an increase in the size of existing elevators shall not be required if the elevators can accommodate patient beds used in the facility.

(4) Additional elevators installed for visitors and material handling shall be permitted to be smaller than noted above.

2.1-8.7.2.4 Leveling device. Elevators shall be equipped with a two-way automatic level-maintaining device with an accuracy of ± 1/4 inch \((± 6.35\) millimeters\).

2.1-8.7.2.5 Elevator controls

(1) Elevator call buttons and controls shall not be activated by heat or smoke.

*(2) Light beams, if used for operating door reopening devices without touch, shall be used in combination with door-edge safety devices and shall be interconnected with a system of smoke detectors.

A2.1-8.7.2.5 (2) Use of light beams requires door-edge safety devices and smoke detectors so the light control feature will be overridden or disengaged should it encounter smoke at any landing.

(3) Each elevator, except those for material handling, shall be equipped with an independent keyed switch for staff use for bypassing all landing button calls and responding to car button calls only.
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**2.1-8.7.2.6 Elevator Installation and Testing**

(2) **A2.1-8.7.2.6 Documentation for elevator installation.** Field inspections and tests shall be made and the owner shall be furnished with written certification stating that the installation meets the requirements set forth in this section as well as all applicable safety regulations and codes.

**††† Standards †††**

(1a) **Installation and testing of elevator installation** shall comply with the following:

   (ai) ANSI/ASME A17.1: *Safety Code for Elevators and Escalators* for new construction

   (bii) ANSI/ASME A17.3: *Safety Code for Existing Elevators and Escalators* for existing facilities

(2b) See ASCE/SEI 7: *Minimum Design Loads for Buildings and Other Structures* for seismic design and control system requirements for elevators.

**2.1-8.7.3 Building Envelope Protection**

Where hospitals employ building envelope protection (e.g., window shutters, mechanized window protection, impact protection screens) due to hostile area weather conditions, those systems shall comply with requirements in Section 2.1-8.7.1 (Special Systems—General).

**A2.1-8.7.3** In the event mechanized building opening protection is deployed using electrical motors or actuators, it is recommended that this equipment be fed from an emergency equipment power source.