

American Railway Engineering and Maintenance of Way Association

Letter Ballot

1. Committee & Subcommittee: 6
2. Letter Ballot Number: 06-22-01
3. Assignment: Committee 6
4. Ballot Item: Part 2 – Design Criteria for Railway Office Buildings
5. Rationale:

This part was last updated in 1991. There were several design considerations that were out of date and needed to be updated to current best design practices.

Draft Not Yet Approved

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**Part 2**

**Design Criteria for  
 Railway Office Buildings<sup>1</sup>**

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— 2023 —

**FOREWORD**

The material presented herein is intended to be used as a guide by the designer for office planning of leased property and for designing railway buildings.

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<sup>1</sup> References, Vol. 72, 1971, p. 120; Vol. 76, 1975, p. 167; Vol. 92, 1991, p. 58. Revised 1991, 2023.

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## SECTION 2.1 SITE CONSIDERATIONS

### 2.1.1 LOCATION (2023)

The location, availability of space, environmental conditions and property value will have an influence on the design of the structure. Other considerations include emergency vehicle access, available utilities, site drainage, underground obstructions, employee access and track clearances.

### 2.1.2 CODE REQUIREMENTS (2023)

Governing building, energy, mechanical, fire, life safety, and plumbing and sanitary code requirements should be considered in the design of the structure and its location on the site.

### 2.1.3 PARKING (2023)

- a. Provision for parking is recommended where space is available.
- b. Parking spaces for employees and visitors are required per code in some communities including accessible parking and accessible path to the building.
- c. Some communities and codes require considerations for electric vehicles, permeable paving, bike racks and other alternative transportation requirements such as proximity to public transportation.

### 2.1.4 LANDSCAPING (2023)

- a. The designer should determine from local ordinances if landscaping or other green space is required and what percent of the site must be landscaped. If there are no landscaping requirements by law, it is considered good practice to provide some planting around the building and parking areas. Landscape areas and green space can also be incorporated into a comprehensive stormwater control plan, coordinated with proper civil engineering.
- b. Vegetation used in landscaping should be easy to grow in the climate involved with little or no maintenance. Check with local jurisdictions for requirements.

### 2.1.5 EXPANSION (1991)

Future building expansion should be considered when evaluating the site and the location of the building relative to the site.

## SECTION 2.2 FUNCTIONAL REQUIREMENTS

### 2.2.1 GENERAL CONSIDERATIONS (2023)

- a. The functional requirements are those design criteria which are directly related to the purpose, duties, and characteristic operational patterns of a particular office situation. As work is processed by the office, there is a characteristic interaction between individual workstations in conjunction with the flow of work. Providing for continuity and efficiency of these flow patterns is the major concern of functional planning.
- b. Before commencing an immediate design problem, the designer should research interoffice and interdepartmental relationships to better coordinate an entire sphere of operations. He should investigate existing flow patterns and develop possible variations for improved efficiency. New flow patterns should not be initiated without thorough analysis, but neither should old practices be retained without reevaluation.

The designer should consider the possibility and probability of expansion of activity and/or revision of existing or proposed flow patterns, especially as new technology makes various activities obsolete. Final spatial design should provide adequate expansion space which could be occupied with minimum disruption of office activity. Retention of desirable flow patterns after expansion is necessary for continued efficient operation. Open planning with spaces free of restrictions is desirable to allow simple rearrangement of workstations as activity, volume and flow patterns change. The versatility of open planning should be considered when evaluating the need for private offices.

- c. The designer should include handicapped accessibility in the design for site work as well as the office structure. Minimum guidelines and requirements for handicapped accessibility are available through the American National Standards Institute (A.N.S.I.) manual titled "Architectural and Transportation Barrier Compliance Board", the requirements put forth in the Americans with Disabilities Act (ADA), Accessible Canada Act (if applicable) and local and state requirements.

### 2.2.2 WORK SEQUENCE CONSIDERATIONS (2023)

- a. The location of interrelated offices should be such that any workflow between offices can be accomplished speedily and with a minimum of travel distances or congestion involved. Adjacent locations reduce employee transit time and intercommunication equipment overloads. Vertical as well as horizontal spatial relationships should be investigated.
- b. Cubicles and/or modular work stations within an office should be spatially arranged according to the most efficient flow pattern of operations. Continuity of flow through the office should be accomplished with a minimum of congestion, backtracking, or excessive distance involved in the transfer of work.
- c. Work centers used commonly by several individuals should be centrally located with respect to their users while satisfying the overall flow pattern continuity. Minimal distances to the centralized work centers encourage more efficient operation and better use of the specialized facilities.

### 2.2.3 EMPLOYEE CIRCULATION CONSIDERATIONS (2023)

- a. Frequent inter-office traffic is best accommodated by direct passageways rather than by use of the common building corridor.
- b. Office spaces should be so designed as to allow unrestricted circulation between work centers, allowing sufficient space to eliminate congestion. Circulation ways should be designed with maximum flexibility to accommodate varied flow pattern developments.
- c. Employees require interaction among themselves and their supervisors, necessitating office designs which allow easy communications. Generous, spatial layouts cause inefficient communications and loss of time, but provides cost effective space for future expansion.
- d. Where the office has frequent visitors, suitable reception and waiting areas should be provided adjacent to the public entrance or the area to be visited. The visitor's area should be located on the periphery of the office to reduce distraction and interruption to other functions. Considerations for security to keep visitors separated from the general building inhabitants should be used.
- e. Provision should be made for employee circulation to drinking fountains, toilet rooms and breakrooms. Fountains should be dispersed throughout the work area to reduce circulation time and congestion. Some host railroads provide drinking water and do not require drinking fountains. Toilet rooms and breakrooms, where required, can be centralized, allowing use by several adjacent offices. Overall circulations, especially in complex office structures, should be designed to accommodate rush periods as well as the normal interoffice circulation patterns.
- f. Federal Laws require a Mother's Room or Nursing Rooms in certain circumstances, these should be adjacent to a female restroom / locker room with minimal circulation between the two with privacy and security as primary drivers for location.
- g. Provisions should be made for Ice Machine(s) in main vestibules in some buildings, depending on use and railroad

requirements including an adjacent floor sink, water line, and adequate heat to prevent cold weather issues.

## 2.2.4 SPECIAL EQUIPMENT CONSIDERATIONS (2023)

- a. Communications equipment and machines frequently used by many of the individuals within an office are best dispersed through the area. Equipment can be completely distributed to every workstation or can be allocated to a group of neighboring workstations when frequency of use is less. Dispersal will reduce the concentration of activity and noise inherent in centralized work centers, but distractions to individual employees may rise as disturbances are brought nearer to them. Acoustical control is also more difficult in dispersed situations than with centralized facilities where sound barriers are feasible.
- b. Isolation of equipment or work centers from the basic office area is normally undertaken because of:
  - (1) Acoustical disturbance.
  - (2) Climate control (IT, Command Centers or certain Dispatch Centers).
  - (3) Limited access for security reasons or to separate functional groups.
  - (4) Dirty, messy or malodorous operations.
  - (5) Separate Fire Suppression System (IT Room, Dispatch Centers)

## SECTION 2.3 SPATIAL REQUIREMENTS

### 2.3.1 GENERAL CONSIDERATIONS (2023)

- a. Before any office can be planned, relocated or expanded, there should be a reasonable estimate of the amount of space required to house the working activity.
- b. To determine the required floor area, it is necessary to consider the number of employees and departments, the number of private offices and the size of the general office area for each department. Adequate space must be provided for stairways, elevators, corridors, mechanical and electrical equipment rooms, toilet rooms, janitors closets, conference rooms, lounges, food service areas, public areas, security, host railroad requirements, storage and record rooms. The delivery service, mail room and special equipment requirements should be considered when determining the floor area of the building.
- c. The actual space requirements are dictated by five basic factors:
  - (1) *Nature of the work.* The specific requirements of the office operation performed dictates the type and size of the working area, the aisle width, the number and type of files, cabinets, tables and desks.
  - (2) *Nature of space.* The shape of the space effects its utilization economy. The position of columns, depth of bays, and presence of utility piping and/or duct chases, windows, and availability of electrical and phone outlets affect the economical placement of equipment.
  - (3) *Need for privacy.* Private offices, conference rooms, partitions, and railings add to space requirements.
  - (4) *Need for access.* The access requirements of toilet rooms, breakrooms, lounges, file rooms, stock rooms, janitor closets, mail rooms, and electrical, mechanical, and other utility spaces must be considered in space allotments.
  - (5) *Need for expansion.* Provision for operational flexibility during growth cycles.
- d. After making a preliminary evaluation of space required and evaluating the functional requirements, a more refined estimate should be made prior to executing a layout.

- (1) Inventory of the space required in each department for people, equipment and special facilities.
  - (2) Forecast by departments of the space required for normal expansion or contraction over a reasonable period of time.
- e. Taking a space inventory, worker by worker, in each department, has an additional benefit of permitting a close look at each workstation to see if present space is sufficient, or if a change in equipment would alter requirement.
- Where practical, position title or workspace title rather than individual employee's names should be used as a reference in laying out individual work spaces.
- f. A simple inventory form can be drawn up to provide the space estimate. Supervisors can prepare the inventory, with department head's approval. To assist the designer during his interviews with the supervisors, a check list would provide a handy and valuable aid for obtaining information.

### 2.3.2 OFFICE SPACE (2023)

- a. The fundamental unit (module) for office space is the individual worker, seated at his or her work position or their workstation.
- b. Floor area for executive and private offices is often mandated by corporate standards or dictated by economics.

In lieu of restrictions a guide figure of 250 to 350 square feet for executive, and 120 to 200 square feet for other offices may be used as a design tool.

- c. Density of open office space is either mandated by corporate standards or based on some configuration of free standing modules of adequate size to enclose a work space with all its required furnishings.

For preliminary space allocation a figure of 150 square feet per person in offices of 2 to 5 people and 100 square feet per person in offices of more than 5 people may be used.

- d. Certain types of office equipment require more space than normally allowed in an estimate. Any space taken up by this equipment and their operations should be added to that considered for regular office space. Equipment in this category includes:

- (1) Additional monitors (Dispatch or Intermodal operations).
- (2) Duplicating / Copy equipment and large format printers.
- (3) Personal computers.
- (4) IT equipment (including server racks, USB etc.)
- (5) Other special equipment.

### 2.3.3 FILE SPACE (1991)

- a. Each open file will require the following space allowance without consideration of any working area in front of the open drawer:
- (1) Standard letter file (15" x 30") - allows 6-1/4 square feet.
  - (2) Standard legal file (18" x 30") - allow 7-1/2 square feet.
  - (3) Lateral files:
    - 18" D x 30" L - allow 7 square feet.

- 18' D x 36' L - allow 8-1/4 square feet.
- 18' D x 42' L - allow 9-1/2 square feet.
- b. Working space in front of file cabinets:
  - (1) Minimum, 2'-4" from front of open drawer.
  - (2) Desirable, 3'-8" from front of open drawer (especially if work space is also on an aisle).
- c. Area requirements for file rooms should be based on the physical shape and nature of the space and the arrangement chosen for file cabinet layout.

### 2.3.4 STORAGE SPACES (2023)

- a. Storage requirements depend on the practices of the particular railroad, and the record keeping methods of the management.
- b. Consideration should be given to various types of storage:
  - (1) Vaults.
  - (2) Stock rooms.
  - (3) File rooms.
  - (4) Mobile files.
  - (5) Shelving.
  - (6) Janitor's supplies.
  - (7) Coat closets.
  - (8) Police / Security Storage (Secured Room, special wall and ceiling construction may be needed)
  - (9) Receiving Room for large item storage (Water pallets etc. – exterior access and overhead door to allow for deliveries)

### 2.3.5 SPECIAL ROOM ALLOWANCE (2023)

- a. Depending on the operations, offices will require allied rooms of a size matched to their use. Allow 500 square foot for 15 persons plus 10 square foot for each additional person in:
  - (1) Reception room. (Should have security features to keep guests from entering general building)
  - (2) Waiting room.
- b. Space should be provided for the rooms listed below. Some rooms may be able to have combined functions such as a Training / Break Room or a Conference Room / Storm Hardened Room.
  - (1) Lunch or Break room.
  - (2) Nursing Room (as required by Federal Law)
  - (3) Training Room.

- (4) Mail room or Mailbox Area.
- (5) Conference room(s).
- (6) Storm-hardened room or shelter (Verify with host railroad)
- (7) IT Room
- (8) Equipment spaces.

### 2.3.6 SPACE REQUIRED FOR AISLES (2023)

- a. Aisle or passageways leading to main exits are mandated by code requirements. Verify code requirements for required clearances at egress doors.
- b. Recommended aisle widths between workspaces or cubicles:
  - (1) Secondary aisle - 3'-0".
  - (2) Intermediate aisle - 3'-3".
  - (3) Main aisles and Corridors - 5'-0".

### 2.3.7 CONFERENCE ROOM (2023)

- a. The size of the room is directly related to the number of persons to be seated or host railway requirements.
  - (1) Small conference room seating 4 to 6 people - allow 150 to 200 square feet.
  - (2) Medium conference room seating 8 to 12 persons - allow 250 to 325 square feet.
  - (3) Large conference room seating 14 to 24 persons - allow 450 to 600 square feet.
- b. Conference tables may be rectangular, round, boat shape or oval. Table width should be increased as the number at the table increases. Provide tables with integrated electric outlets and data ports.
- c. Provide code required floor outlets under center of conference table with supporting data ports.
- d. Allow 30 inches per person for chair space to permit comfortable seating at the table.
- e. Recommended egress from conference rooms should be per current building codes based on occupant loads.
- f. A hard-surface ceiling over the conference table in large rooms is desirable to reinforce voice travel. Floors should be carpeted to minimize background noise.
- g. Consideration should be given to the incorporation of any of the following special features as required.
  - (1) Coat racks or closets.
  - (2) Special electronic conference equipment (eg, Integrated computer system hardwired to other equipment, Large format TV, ceiling projector, retractable screens, built-in cameras, microphones and wi-fi repeater etc.).
  - (3) Toilet facilities near conference room.
  - (4) Kitchenette or serving counter with integrated storage.
  - (5) Sound and/or video systems.

- (6) Built-in bulletin, white dry-erase boards and/or Smart boards
- (7) Special ventilation with separate controls.
- (8) Blinds and room darkening equipment.
- (9) Dimmable lighting and occupancy sensors.

## SECTION 2.4 STRUCTURAL REQUIREMENTS

### 2.4.1 FRAMING SYSTEMS (2023)

- a. The structural system will be influenced by the building size, use, location, life expectancy, and economic factors.
- b. The building designer must use his own judgement in making the final decision for the type of construction utilized, as there can be no hard and fast rule to govern. A careful study of the principal use, location and cost will be a factor in selection of the structural system and the exterior finishes. Consideration for the availability and cost of materials should be considered.
- c. An office building is a complex, made up of many units. It is therefore wise to base the floor plan on a modular design. The designer should study many modular bay sizes in order to make the space fit the requirements. He should also study the effects different modules would have on the installation cost for lighting and heating.
  - (1) Have as few columns as possible and have them in exterior or corridor walls rather than free standing.
  - (2) Use a practical module and integrated lighting, air conditioning, underfloor duct outlets and window mullions so that subsequent subdivision will permit partitions on the modular lines without requiring relocation of these facilities.
- d. A center core design which includes mechanical rooms, HVAC ducts and toilet rooms will leave the office area open for arranging offices and planning for the most economical use of floor area. Stairways should be at exterior walls placed far apart to meet code requirements for distance and direct egress to the exterior. Elevators should be placed near a main entry with considerations for security, smoke and fire containment.
- e. Exterior building thermal envelope should be designed to meet current energy and building codes with required insulation, vapor barrier and minimal thermal bridging to keep long-term energy costs low.

### 2.4.2 FLOOR SYSTEMS (2023)

- a. Floor live loads as required by governing codes. Different loading requirements of the floor areas should be considered such as the following areas:
  - (1) Office Areas
  - (2) Public Corridors
  - (3) Rest Rooms
  - (4) IT Rooms
  - (5) Light Storage
  - (6) Heavy Storage such as files and special archive rooms
- b. Floor construction with concrete over metal decking, precast concrete panels with voids or poured concrete with under floor ducts provide a flexible means of furnishing power and communications to an open floor plan, utilizing modular office partitions.

### 2.4.3 PARTITIONS (2023)

- a. Core area partitions should be constructed of a permanent type material such as masonry, with or without plaster, or other permanent finish.
- b. Corridor partitions should be constructed of abuse resistant materials that meet code requirements for flame spread & smoke development for wall finish materials and possible fire rated wall construction as required by code such as metal or wood studs with type-x abuse resistant gypsum board or masonry.
- c. Office partitions of metal or wood studs with gypsum board, will fulfill safety and privacy requirements if conditions warrant.
- d. Modular office partition systems:
  - (1) Partitions are available in a variety of heights, styles, materials and finishes.
  - (2) Various length components can be combined to create a wide variety of modular cubicles to serve as workstations.
  - (3) Modules may be activated or non-activated type.
    - (a) Activated modules have either integrated wiring in the panels or cableways in the panels through which wiring can be pulled.
    - (b) Non-activated panels must have surface mounted conduit applied after installation.
  - (4) Power and communication connection is usually through:
    - (a) A power pole between the module and cabling above a suspended ceiling with main runs on cable trays.
    - (b) Poke-through connection through the floor.
    - (c) Flat cable system from baseboard, under carpet, to module.
    - (d) Internal building Wi-Fi

## SECTION 2.5 FINISH MATERIALS

### 2.5.1 EXTERIOR MATERIALS (2023)

- a. The selection of exterior materials will be largely dependent on the type of structural system selected. Visibility and access to the public will determine to a great extent the amount of aesthetic treatment and host railroad standards.
- b. In many instances, local building codes will specifically prohibit certain types of exterior finish or specify a minimum fire rating to be provided. Building and energy codes also specify acceptable roof colors and required solar reflectivity ratings and may also impact any roof overhang sizes.
- c. Windows:
  - (1) Air-conditioned buildings should have insulating and/or tinted glazing. The windows may or may not be operable.
  - (2) Windows in non-air-conditioned buildings may or may not be insulating or tinted. The windows should be awning or hopper type, with screens, to provide ventilation.
  - (3) Building codes dictate formulas for computing window areas based on room size, ventilation, and light.

- (4) Building codes require minimum ratings for glazing and window assembly thermal and insulation properties.
- (5) Windows with built-in interior light shelves can be used to increase natural daylighting and reduce interior lighting / energy needs, which is required by some building and energy codes. Integral shades or exterior awnings can be used to reduce solar heat gain and decrease cooling needs within the building.
- (6) In many buildings, certain building functions / occupants require views to specific locations such as a view to a yard operation of internal building function that should be taken into consideration.

## 2.5.2 WALL AND CEILING FINISHES (2023)

- a. The type of wall and ceiling finish chosen will be determined by fire and smoke resistance requirements, the need for rated wall assemblies, appearance, and durability and maintenance considerations.
- h. Lobby and corridor walls, in many cases, influence public opinion. Therefore, attractive, easily cared for materials should be used in such locations. Vinyl, fiberglass or plastic coverings, marble, ceramic tile, or paint are appropriate. (See Table 6- 2-1).
- b. In general, office walls should have a hard, durable surface with low transmittance of sound. Many special paints and epoxy finishes are available which are attractive and durable.
- c. Sanitary requirements in toilet rooms can be met by using ceramic tile, plastic surfaces, enamels and epoxies which are durable and easily cleaned.
- d. Ceilings in general, should be fire retardant, sound absorbing, and in public areas aesthetically pleasing. The designer should include in the contract documents a reflected ceiling plan showing the location of lighting fixtures, other electrical, and mechanical components.
- e. In IT rooms, it may be desirable to install a taller ceiling with data cable trays exposed inside the IT room for ease of access. As cable trays penetrate the IT room walls, they can be above the surrounding occupied spaces lower ceilings.

## 2.5.3 FLOOR COVERINGS AND FINISHES (2023)

- a. The selection of floor coverings and finishes will be governed by the use to which specific areas are subjected. Heavy traffic areas such as lobbies and corridors require substantial materials such as terrazzo, ceramic, quarry tile or stained concrete. Resilient type coverings may also be used.
- b. Vinyl resilient floor coverings are suitable for general or private offices. Executive offices are generally carpeted and may include carpet tiles. Carpeting with resilient backing which may be cemented in place is being used more often where tile or resilient surfaces have previously been used.
- c. Concrete floors may, in some cases be stained for appearance and surfaced with epoxy finishes which are durable and easily maintained.
- d. Non-slip type flooring with a low coefficient of friction should be used in entry ways, main corridors and restrooms / shower areas. Special considerations in areas with snowfall should be used in entryways and the possible use of spiked shoes and accumulation of ice and snow.
- e. IT Rooms may require Static Dissipative Flooring, verify with host railroad requirements.

Table 6-2-1. Wall and Ceiling Finishes

Wall Finish Materials		Type of Occupancy			
Material	Decorative Value	Public Corridors	General Office	Private Office	Executive Office
Clay Products (glazed and ceramic tile)	Murals	Recommended	Satisfactory for Murals		Satisfactory for Murals
Concrete	Not Recommended Exposed				
Masonry (exposed CMU)	Should be Painted	Satisfactory	Satisfactory	Satisfactory	Not Recommended
Masonry (marble-stone-brick)	Good Natural Finish	Recommended			Suitable for Decor
Metals (stainless steel-bronze)	Limited	Recommended			
Paint (latex-alkyd-epoxy)	Color	Satisfactory Above Wainscot	Recommended	Recommended	Recommended
Paper or Vinyl Wall coverings	Color and Pattern	Not Recommended	Not Recommended	Not Recommended	Suitable for Decor
Plaster	Must Be Painted	Recommended Above Wainscot	Recommended	Recommended	Recommended
Drywall	Must Be Painted	Abuse Resistant Type	Satisfactory	Satisfactory	Satisfactory
Plastic Covered Vinyl	Color and Pattern	Recommended Above Wainscot	Satisfactory	Satisfactory	Satisfactory
Plastic Laminate	Color and Pattern	Recommended	Recommended	Recommended	Recommended
Plastic	Special Decor	Decor Only			Decor Only
Porcelain (on metal)	Color	Recommended			
Textiles	Color and Pattern	Not Recommended	Not Recommended	Recommended	Recommended
Wall Protection System	Color and Patterns	Recommended	Satisfactory	Satisfactory	Satisfactory

### 2.5.4 COLORS (2023)

- a. Color, texture, lighting and other design aspects, when used with discretion, comprise that extra ingredient that sets apart the extraordinary building from the commonplace. The proper use of color and texture can enhance architectural features.
- b. The goal of good design is to produce an attractive and pleasant environment. Colors should be selected to suit the purpose of the area and assist in creating a congenial workspace. Consider using colors that represent the host railroad logo colors as accents or incorporated into the overall color scheme.
- c. Consideration should be given to the exposure of the space to natural lighting as well as to the type of artificial lighting used. In some instances, such as public corridors, entry ways, the use of colors that easily hide dirt and handprints should be considered.
- d. Paint systems that are easy to clean and durable should be used.

### 2.5.5 SOUND CONTROL (2023)

- a. Sound control is an important factor to be considered in the design of office buildings. Sound control, in general, consists of sound absorption within a room or space, and sound attenuation (transmission loss) between rooms or spaces.
- b. Special care should be exercised in the design of ceiling systems and partitions to minimize the transmission of sound from space to space. Insulating partitions in sound sensitive areas, carrying the partition walls to the underside of the deck above and using (Acoustical Ceiling Tile) ACT ceiling tiles with a high .70 or greater (Noise Reduction Coefficient) NRC rating all contribute to sound control.
- c. Integrated ceiling systems that incorporate lighting, ventilating and acoustical qualities are available from various manufacturers.
- d. Acoustical ceilings with a high NRC rating, either glued or suspended, will alleviate noise problems. These are available in either metal or mineral fiber.
- e. Wall finishes and partition systems are available which will alleviate reflected sound within offices or spaces.

### 2.5.6 FURNITURE (2023)

- a. Furnishing the office building with new furniture will require a departmental survey to obtain the requirements of each workstation, office space or special use room or area.
- b. Integrated modular partitions and their accompanying modular furniture will provide more storage space and work surfaces per square foot of floor area than a system of demountable partitions and conventional furniture pieces purchased independently.
- c. The public or reception area of the building should have a directory placed in a prominent position. Lobby furniture should be comfortable and of durable material, and attractive design. If applicable, sand filled cigarette butt containers should be placed no closer than 15' from an entry point or per current codes.
- d. Confirm with host railroad preferred furniture vendor, styles and colors.

## SECTION 2.6 MECHANICAL CONSIDERATIONS

### 2.6.1 HEATING, VENTILATING, AND AIR CONDITIONING (2023)

- a. The selection of equipment and design of HVAC systems should be reflective of the site constraints, existing building systems, energy conservation, current energy and building codes, availability of fuel, and low lifetime maintenance costs.
- b. In making decisions regarding the selection of HVAC equipment, the following guidelines should be considered:
  - (1) Air cooled equipment is usually less difficult to install and maintain.
  - (2) The transfer of internal heat from equipment to perimeter offices and support spaces is desirable.
  - (3) The use of economizer cycles to obtain "free cooling" should be considered. However, where relative humidity control is required, careful consideration should be given to its effects on relative humidity control.

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- (4) Ventilation and temperature requirements shall be in accordance with current ASHRAE & IECC recommendations.
  - (5) The location of equipment requiring frequent, routine maintenance should be provided with a suitable means of access that does not require removal of any part of the building such as ceiling tiles.
  - (6) The use of reheat systems should be avoided if possible.
  - (7) The duct work should be in accordance with a recognized industrial standard.
- c. The criteria found in [Table 6-2-2](#) should be considered in the design of HVAC equipment and systems.

### 2.6.2 PLUMBING (2023)

- a. Sanitary facilities should be located in a central core area, where possible, to reduce the amount of piping required. Toilet rooms should be located back-to-back where practical. Avoid placement of fixtures on exterior walls in northern climates. Stack facilities in multi-story buildings.
- b. All main piping should be accessible to the degree possible to facilitate alterations and maintenance.
- c. All plumbing shall be installed to meet state and local codes including adequate male and female toilet and if applicable, shower facilities. Fixtures to meet building code flow rate and control requirements for low water usage.
- d. Separate gender-neutral restrooms may be required in certain municipalities.
- e. Per host railroad requirements, drug testing rooms may be required. A drug testing room should contain an accessible toilet with the ability to turn off the water supply from outside of the room in a keyed valve box. A lavatory should be placed just outside of the drug testing room. This space can be used as a single user toilet room when not being used as a drug testing room.
- f. A lactation rooms and other special rooms may be required per federal and / or local municipal requirements.

### 2.6.3 ENERGY EFFICIENCY (2023)

The energy conservation/efficiency standards of the building should be per latest IBC Mechanical Code, latest IECC and ASHRAE 90.1, or per governing codes whichever is more stringent.

### 2.6.4 ELEVATORS (1991)(R2023)

Office buildings of two or more stories should have an elevator for accessibility and moving materials.

## SECTION 2.7 ELECTRICAL EQUIPMENT

### 2.7.1 ELECTRICAL CONSIDERATIONS (2023)

- a. The electrical systems design must conform to the latest edition of the National Electrical Code, and local and state codes.
- b. To the extent possible, electrical systems must make use of products tested and certified by qualified and recognized testing laboratories, such as UL.

- c. It is recommended that conductors, raceways, boxes, as well as sub-feeders be sized one size larger than calculated electrical load requires. Conduit should be sized for anticipated load growth.
- d. A standby system should be provided as backup for vital equipment, IT and Communication equipment, etc., or to aid in fire or rescue operations.
- e. Surge protection should be utilized where appropriate (computer systems and other electronic systems, etc.) and should conform to NEC Article 280 and host railroad requirements.
- f. Communications equipment should be powered through dedicated circuits and be provided with a backup emergency powered system where appropriate (UPS, generator, or secondary utility company power source). Independent mechanical systems for communications / IT rooms should be used to maintain correct temperatures.

### 2.7.2 LIGHTING (2023)

- a. Factors which aid in determining the most appropriate lighting system include:
  - (1) Economics.
  - (2) Appearance.
  - (3) Room finish.
  - (4) Code dictated energy consumption.
  - (5) Color.
  - (6) Task visibility.
- b. The use of occupancy sensors, dimmable lighting and daylighting of spaces (where appropriate) should be used to meet current codes and reduce energy consumption.
- c. Appropriate illumination levels should be as per IES Lighting Handbook and IECC, latest editions and host railroad requirements, whichever is more stringent.
- d. Consideration should be given to the lighting of the building exterior, walkways and parking lot. Lighting levels shall be as listed in the IES Lighting Handbook and IECC, latest editions and host railroad requirements, whichever is more stringent.
- e. Emergency lighting should be provided to maintain a minimum average illumination of 1.5 foot candles for a minimum of 90 minutes (or as governing code requires) in event of power failure in:
  - (1) Exit corridors.
  - (2) Hallways.
  - (3) Stairways.
  - (4) Illuminated exit signage.

## SECTION 2.8 FIRE AND LIFE SAFETY

### 2.8.1 FIRE PROTECTION (2023)

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- a. The railroads' best interests are served when its facilities and the people who occupy them are adequately protected against the threat of fire. The railroads specific policy requirements and/or other guidelines for a consistent and comprehensive fire protection program, should be included in the design.
- b. Implementation relies on the application of sound fire safety judgement coupled with compliance with all applicable fire protection codes and standards including requirements for the building site location, occupant load, building use and separation of functions.
- c. Special consideration should be given to any building or areas containing essential electronic equipment due to the high dollar value, complex wiring and design usually associated with these areas. Dry / chemical type systems should be considered for these locations.
- d. All fire protection equipment shall be listed and/or approved by local codes or standards.

### 2.8.2 LIFE SAFETY (2023)

- a. All occupied buildings should comply with the appropriate provisions of NFPA Code 101 and / or applicable IBC, and all other applicable codes. The goal is to provide all facilities with an adequate level of life safety so that in the event of a fire or other mishap, occupants will be provided with the means to reach an area of safety in as brief a time as is practical, without having to endanger themselves during the process of evacuation. This concept necessitates a reasonable degree of redundancy due to the possibility that individual exits may be blocked by fire, heat or smoke.
- b. Proper placement of AED devices, First Aid Kits and individual Fire Extinguishers in easily accessible locations should be considered such as in training or break rooms, and near main points of exit.
- c. In many areas of the country, Storm Shelters designed to code standards or Storm Hardened Rooms should be considered as essential Life Safety design to protect occupants.
- d. Separation of non-office functions from other functions by fire rated assemblies per code requirements.
- e. In multi-story buildings, Areas of Rescue Assistance are required at each floor.