CEILING HEIGHTS FOR EQUIPMENT BUILDINGS

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Figures

1. GENERAL

1.01 This section covers ceiling heights for new buildings housing switching, transmission, and power equipment and operations support systems.

1.02 This section is revised and reissued to include recommended minimum ceiling clearances in New Equipment Building System (NEBS) central offices and transmission stations. The adherence to these and other clearances recommended in this section will permit adequate space for cable runs with resultant less overall cabling costs that greatly exceed the cost of providing modestly greater ceiling clearances.

2. BASIS OF CLEARANCE RECOMMENDATIONS

2.01 Because the most economical types of structural floor systems differ in various areas, and because there are numerous variations in the size and arrangement of ventilating ducts, this section specifies minimum clearances under all obstructions that are needed to insure a straightforward and economical cabling job. The building engineer and architect can then design the floor system and cooling air ducts or plenum ceiling in whatever way is most economical, so long as none of this encroaches on these minimum clearances. In the case of ducts, the clearances specified are understood to be free clearances under all protrusions of the duct structure such as flanges, bracing, hangers, reinforcing angles, or insulation.

3. MINIMUM CLEAR CEILING CLEARANCES FOR NEBS (7 FEET) EQUIPMENT

3.01 New NEBS buildings feature 20-foot square building bays, 150 pounds per square foot (psf) floor live load capacity throughout most of the equipment space and 10-foot clear height for frames, cable, and lights. The 10-foot clear height refers to the distance between the floor and the bottom of the lowest ceiling component, usually air ducts or beams. These dimensions and characteristics throughout all buildings provide versatility in the use of the space, and, with compatible standard equipment, more straightforward and economic planning and engineering of NEBS central offices.

A. Equipment Frame Area

3.02 The standard configurations used in a typical equipment frame area are shown in Fig. 1. The configurations apply to the NEBS electronic

switching and transmission equipment. The vertical dimensions are dependent on which of the two basic cooling systems is used. A floor to lowest structural member height of 12 feet 6 inches applies throughout NEBS buildings and building additions.

(a) ***Conventional Cooling System (CCS):*** features an all air system that uses central fan rooms, overhead ducts, and diffusers for air distribution. A clear ceiling height of 10 feet applies measured from the structural floor.

(b) ***Modular Cooling System (MCS):*** features a raised floor with supportwork, water cooled process coolers located among the equipment frames, a suspended ceiling or duct work for local distribution of cooling air from process coolers, and a distribution beneath the floor of chilled water, of room air return to process coolers. The MCS is intended for use where high heat dissipation occurs over large floor areas. A clear ceiling height of 10 feet applies measured from the raised floor.

3.03 Vertical space in the equipment frame area is allocated as follows:

With CCS

Floor to 7-foot level—Equipment frames
7- to 10-foot level—Cable, lights, and clearance
Over 10-foot—Cooling air ducts and diffusers

With MCS

Floor to 1.5-foot level—Raised floor and supportwork
1.5- to 8.5-foot level—Equipment frames
8.5- to 11.5-foot level—Cable, lights, and clearance
Over 11.5-foot—Suspended ceiling (air plenum and lights)

3.04 A Cable Pathways Plan described in Section 801-801-182 should be developed to coordinate the locations of elements in the 7- to 10-foot space over the life of the equipment-building system. The space should be allocated between cable racks, lights, passages for cooling air, and installer access. The plan should be coordinated with the locations of structural columns, cable holes, ceiling inserts, cooling air ducts, and diffusers, etc.

3.05 The NEBS Cable Pathways Plan is shown in Fig. 2. System cable racks running parallel to equipment lineups shall occupy the space within the cable pathways situated 7 to 8 feet above the floor and directly over the lineups. The maximum width of these lineup racks shall not violate the in-aisle pathways spacings, ie, a 2-foot minimum in the maintenance aisle and 16 inches in the wiring aisle.

3.06 System cable racks running perpendicular (cross-aisle) to equipment lineups shall occupy

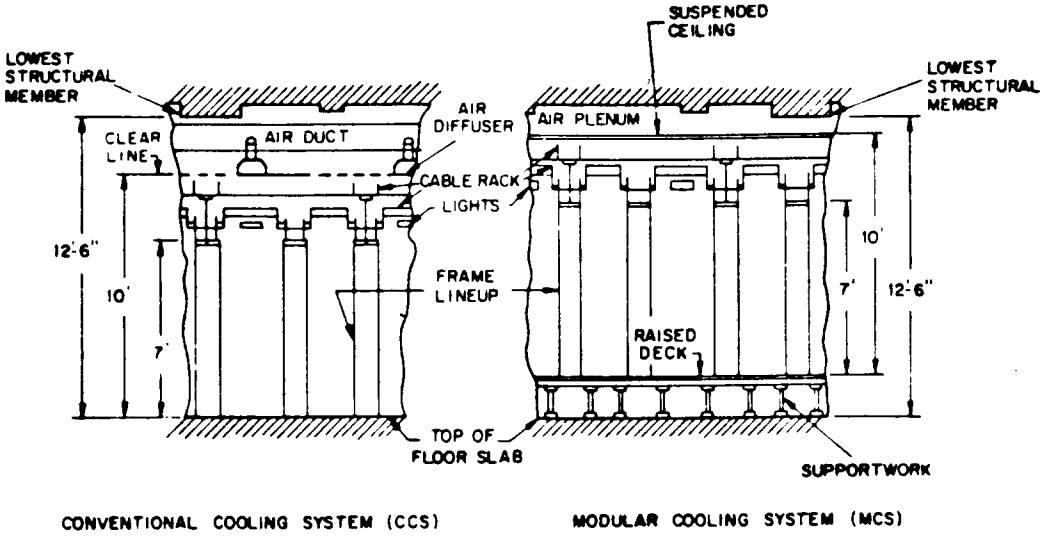

Fig. 1—Typical Equipment Frame Areas

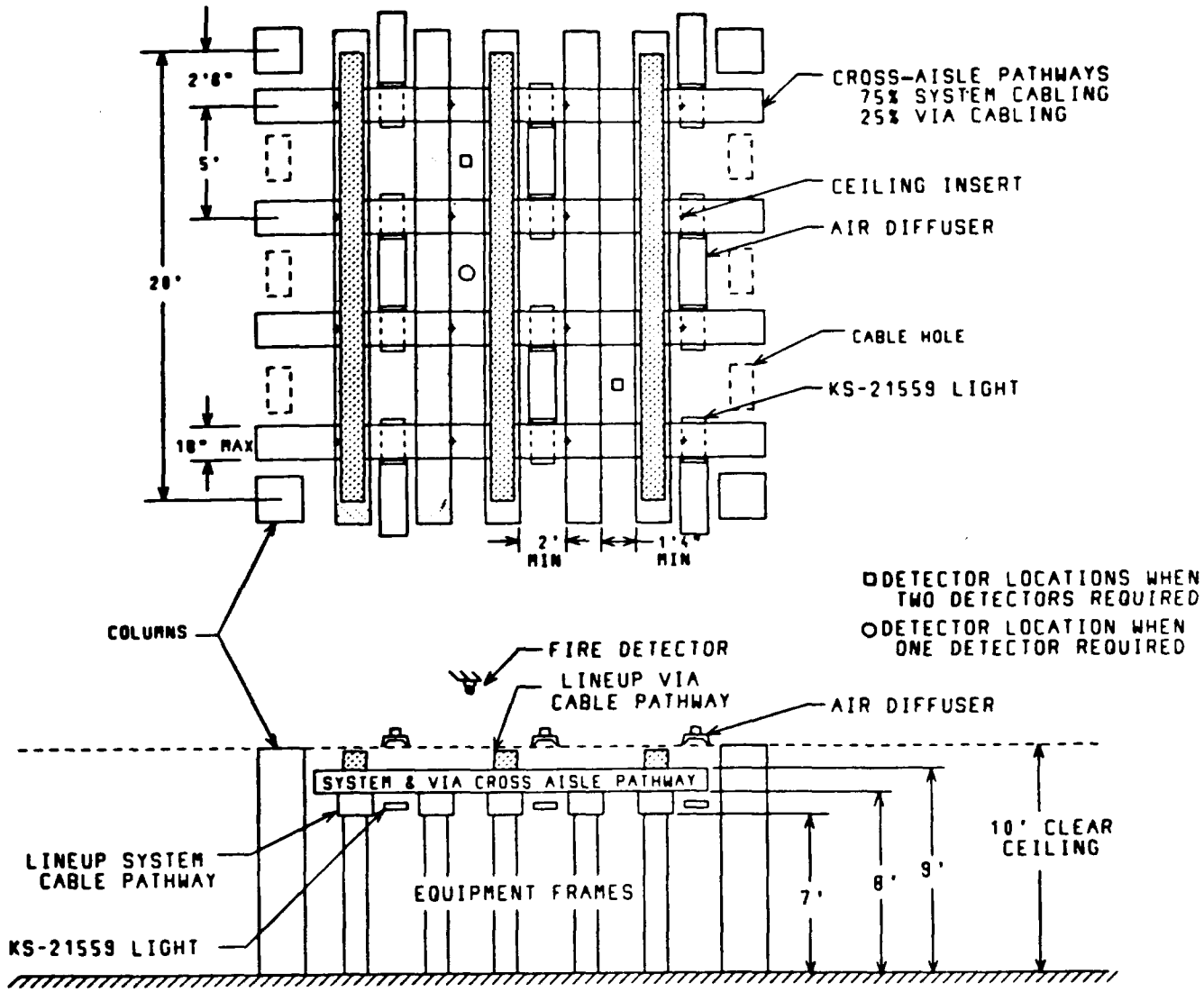

Fig. 2—Cable Pathways Plan for 7- to 10-Foot Space

the space within the cross-aisle cable pathways (maximum width 18 inches on 5-foot centers), situated 8 to 9 feet above the floor across the equipment area as shown in Fig. 2. The cross-aisle pathways are shared by system and via cabling. Approximately 75 percent of the total capacity of the cross-aisle pathways per building bay shall be used for system cable racks.

3.07 Via cable racks running perpendicular (cross-aisle) to equipment lineups shall be located within the cross-aisle cable pathways situated 8 to 9 feet above the floor across the equipment area. The cross-aisle pathways are shared by system and via cabling. Approximately 25 percent of the total capacity of the cross-aisle pathways per building bay shall be reserved for via cable racks and indicated on multibuilding bay FPD sheets.

3.08 Via cable racks running parallel to equipment lineups shall be located within the cable pathways situated 9 to 10 feet above the floor directly over the lineups. The pathway is 1 foot wide and located over no more than three equipment lineups per building bay.

3.09 Lights shall be located over maintenance aisles between 7 feet 3 inches and 8 feet above the floor and on the same 5-foot centers as

the cross-aisle cable pathways. This places them directly below the cross-aisle pathways and thus below any cross-aisle cable racks that are installed.

B. Power Area

3.10 A typical NEBS power area is shown in Fig. 3. This area is primarily for ac and dc power equipment that is not installed in lineups with other equipment frames. Such power equipment has a maximum height requirement of 10 feet which includes the necessary overhead clearance, installation and operation head-room, cable and support systems, bus bars, top access, lighting, etc. As in the equipment frame areas, the equipment in the power area might be on the floor and cooled by CCS or it might be on a raised floor that is part of an MCS, but in either case the vertical space allotment is 10 feet. The power area has a total floor load allocation of 140 psf which includes all power equipment, cable, and bus bars. These two requirements, height and floor load, are applicable to all types of power equipment such as generator sets, batteries and stands, rectifiers, and control equipment.

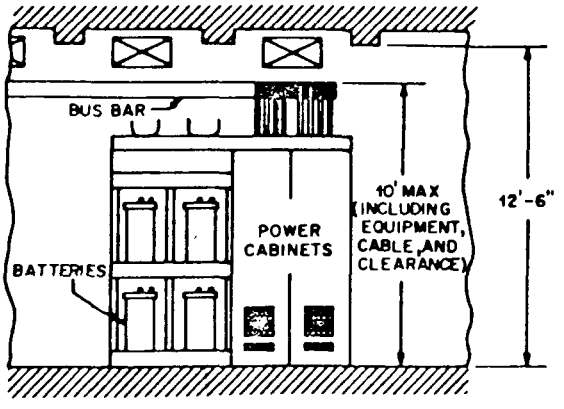

Fig. 3—Typical Power Area

3.11 Where large emergency power generators are to be located, it is expected that the 12-foot 6-inch clearance between floor and lowest structural number will provide adequate space for installation.

C. Distributing Frame Area

3.12 Figure 4 illustrates a typical distributing frame area. Main distributing frames (MDFs) are the most common example. These frames vary in height, but the combination of the frame, its associated cabling (system and terminating via and any through via cabling), and required clearances is limited to 10 feet. However, in some very large wire centers the cabling area may have to be extended above the 10-foot level due to cable quantities and spreading requirements. In these cases placement of CCS overhead air ducts may be restricted over the DF area to provide the required cabling space. A cable pathways plan for the DF area described in Section 760-100-090 should be developed to coordinate the allocation of space between the top of the DFs and the 10-foot level. Again, as with equipment frames and power equipment, the distributing frames may be on the floor or on the raised floor of an MCS, but in either case the vertical space allotment for frames and cable is the same.

D. Cable Entrance Area

3.13 The Cable Entrance facility (CEF) (formerly called cable vault) in NEBS offices requires the 12-1/2 feet floor to lowest structural number clearance for equipment, cable, and clearances. Design criteria for the CEF are contained in Section 760-200-031.

E. Operations Spport Systems Area

3.14 Operations support systems (OSS) assist maintenance, operations, administration, and recordkeeping in central offices and transmission stations. Many of the systems utilize minicomputers, microprocessors, and general purpose computers. OSS configurations are either single site or distributed. They may be located in switching and transmission equipment frame areas, in separate areas or rooms, or in both. OSS facilities located in separate rooms require a maximum clear height of 10 feet.

F. Operating Rooms and Nonequipment Spaces

3.15 Operating rooms, lounges, test bureaus, assignment quarters, business offices, and other nonequipment areas located in an equipment

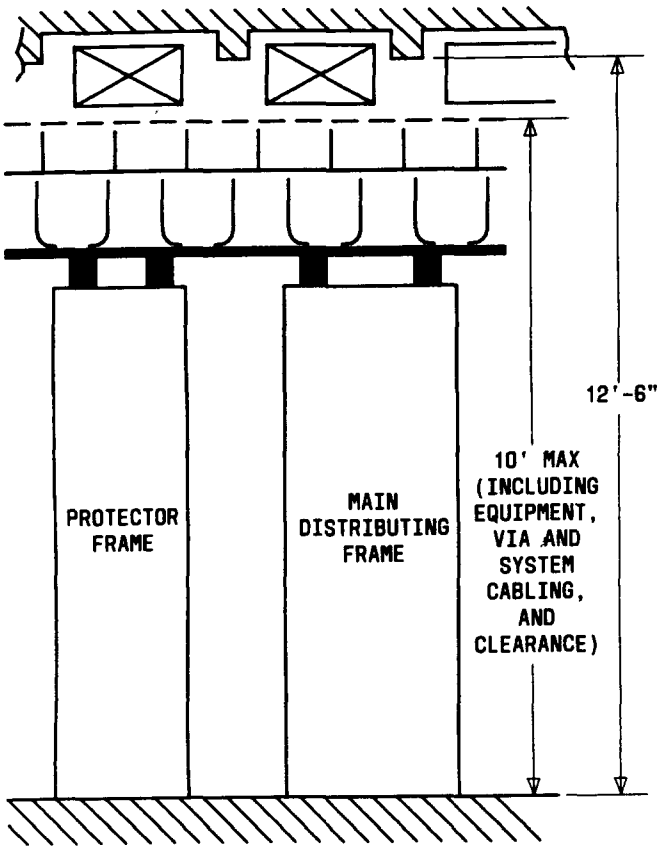

Fig. 4—Typical Distributing Frame Area

building may be arranged in a very satisfacto manner with a finished ceiling height of 10 feet. Where such quarters are not located on equipment floors, such as an entire operating room floor or a side building appendage for nonequipment areas, it is recommended that they be designed for a finished ceiling height of 9 feet.

G. Additions to Existing High Bay Buildings

3.16 Where lateral additions are being made to existing buildings, it may sometimes be desirable to consider changing the floor-to-floor height of the addition in order to provide the NEBS cost advantages. Where vertical additions are made to existing buildings, the new floors should be designed to the recommended 10-foot clear dimension and a floor to lowest structural number of 12 feet 6 inches.

4. SUMMARY OF NEBS CEILING HEIGHT STANDARDS

4.01 Table A presents a summary of equipment vertical space allocations and clear ceiling heights.

TABLE A

SUMMARY OF NEBS EQUIPMENT SPACE ALLOCATIONS AND CLEAR CEILING HEIGHTS

EQUIPMENT	VERTICAL SPACE	CLEAR CEILING HEIGHT
EQUIPMENT FRAME AREA		10 feet
Frames	Floor to 7 feet*	
Cable distribution system and installation clearances	7 to 10 feet	
POWER AREA		10 feet**
All equipment, cable, and installation clearances	Floor to 10 feet*	
DISTRIBUTING FRAME AREA		10 feet
All equipment, cable, and installation clearances	Floor to 10 feet*	
CABLE ENTRANCE AREA		12½ feet
All equipment, cable, and installation clearances	Floor to 12½ feet	
OPERATIONS SUPPORT SYSTEMS AREA		10 feet
All equipment, cable, and installation clearances	Floor to 10 feet*	
CONVENTIONAL COOLING SYSTEM		—
(Overhead ducts and diffusers)	10 to 12½ feet	
MODULAR COOLING SYSTEM		—
Raised floor	Floor to 1½ feet	
Supply, return, and drain piping	Floor to 1½ feet	
Process coolers	1½ to 11½ feet	
Suspended ceiling (air plenum and lights)	11½ to 12½ feet	

* The following apply in equipment areas where the MCS and/or raised floor is used:

Vertical space dimensions from the floor are increased 18 inches since equipment is placed on top of an 18-inch high raised floor.

** Power Generator Areas may require the full 12-foot 6-inch floor to lowest structural distance (see Section 760-240-120).