Purpose of the ANSI/TIA/EIA-569-B Standard

As the complexity of voice and data telecommunications has increased, standards have been established to ensure the operability, flexibility, manageability and longevity of these critical commercial support systems. Telecommunications now encompasses voice, data and video transmission of business information, fire and security, audio, environmental and other intelligent building controls over media that includes fiber optics, specialized copper data cabling, microwave and radiowave. This booklet concisely describes the architectural design elements of cabling pathways and dedicated rooms for telecommunications equipment.

A multi-tenant commercial building has a life expectancy of at least 50 years. Software, hardware and communications gear have far shorter lifespans of one to five years. Moreover, in a multi-tenant environment, continuous moves, adds and changes are inevitable. It is the purpose of standards to guide design and ease future changes by planning for the future now. These standards are intended to provide for a generic structured cabling plant, capable of running any voice or data application foreseeable in the next 10 to 15 years.

Abbreviations:

AWG	American Wire Gauge
V	Volts
A	Amps
kVA	Kilovolt ampere
V/m	Volts per meter

Section Contents

ANSI/TIA/EIA-569-B

Commercial Building Standard for
Telecommunications Pathways and Spaces

Pathways and Spaces

1. Electric Entrance	5. Voice
2. Telco Entrance	6. Telecommunications Room
3. Telecommunications Equipment Room	7. Grounding and Bonding
4. Data	8. Underfloor System

TIA/EIA-569-B Design Considerations

Entrance Facilities

Entrance facilities include the pathways for outside carrier services, interbuilding backbone, alternate entrance and antennae entrance pathways. The entrance facilities consist of a termination field interfacing any outside cabling to the intrabuilding backbone cabling. The local telephone carrier is typically required to terminate cabling within 50 ft of building penetration and to provide primary voltage protection.

In buildings larger than 20,000 usable sq. ft., a locked, dedicated, enclosed room is recommended. Beyond 70,000 sq. ft., a locked, dedicated room is required, with a plywood termination field provided on two walls.

In buildings up to 100,000 usable sq. ft., a wall-mounted termination field may serve as the entrance facility, using 3/4-inch plywood, 8 ft high. Beyond 100,000 sq. ft., rack-mounted and free-standing frames may also be required. Minimum space requirements are given as follows:

Service Entrance Pathways

For underground facilities, use a minimum 4-inch conduit or duct constructed of PVC type B, C or D, multiple plastic duct, galvanized steel, or fiber glass with appropriate encasement. No more than two 90° manufactured bends are allowed (10 times the diameter). Drain slope should not be less than 12 inches per 100 ft. Recommended conduit fill varies but should not exceed 40 percent for more than two cables.

Maintenance holes (typically 3,500 lb./sq. in., concrete) must be equipped with sump, corrosion-protected pulling iron, cable racks, grounded ladder and only such power and light conductors as required for telecommunications support per NEC requirements.

Gross Building Floor Space (sq. ft. / sq. m.)	Plywood Field		Room Dimension	
5,000/465	8' high x 39" wide	(3m x 99cm)		
10,000/1,000	8' high x 39"	(3m x 99cm)		
20,000/2,000	8' high x 42"	(3m x 107cm)	(A room recommended	
40,000/4,000	8' high x 68"	(3m x 173cm)	beyond this level)	
50,000/5,000	8' high x 90"	(3m x 229cm)		
60,000/6,000	8' high x 96"	(3m x 244cm)	(A dedicated room required)	
80,000/8,000	8' high x 120"	(3m x 305cm)	12' x 6.3'	(4m x 2m)
100,000/10,000	8' high x 2 walls	(3m x 2 walls)	12' x 6.3'	(4m x 2m)
200,000/20,000	8' high x 2 walls	(3m x 2 walls)	12' x 9'	(4m x 3m)
400,000/40,000	8' high x 2 walls	(3m x 2 walls)	12' x 13'	(4m x 4m)
500,000/50,000	8' high x 2 walls	(3m x 2 walls)	12' x 15.6'	(4m x 5m)
600,000/60,000	8' high x 2 walls	(3m x 2 walls)	12' x 18.3'	(4m x 6m)
800,000/80,000	8' high x 2 walls	(3m x 2 walls)	12' x 22.3'	(4m x 7m)
1,000,000/100,000	8' high x 2 walls	(3m x 2 walls)	12' x 27.7'	(4m x 9m)

Rule of thumb: Allow 1 sq. ft. (929 sq. centimeter) of plywood wallmount for each 200 sq. ft. (19 sq. meter) area of floor space.

Equipment Room

An equipment room is essentially a large telecommunications room that may house the main distribution frame, PBXs, secondary voltage protection, etc. The equipment room is often appended to the entrance facilities or a computer room to allow shared air conditioning, security, fire control, lighting and limited access.

Number of Workstations	Equipment Room Floor Space (sq. ft.)	
1–100	150	(14 sq. meters)
101–400	400	(38 sq. meters)
401–800	800	(74 sq. meters)
801–1,200	1,200	(111 sq. meters)

Rule of thumb: Provide 0.75 sq. ft. (697 sq. centimeter) of equipment room floor space for every 100 sq. ft. (9 sq. meter) of user workstation area.

Location

Typically, rooms should be located away from sources of electromagnetic interference (transformers, motors, x-ray, induction heaters, arc welders, radio and radar).

Perimeters

Typically, no false ceiling; all surfaces treated to reduce dust; walls and ceiling painted white or pastel to improve visibility.

Limited Access

Typically, single or double 36″ x 80″ lockable doors with no doorsills.

Other

Typically, no piping, ductwork, mechanical equipment or power cabling should be allowed to pass through the equipment room. No unrelated storage.

Ceiling Height

Minimum clear height in room shall be 8 ft. (2.4 m), the height between the finished floor and the lowest point should be 10 ft. (3 m) to accommodate tall racks and overhead raceways. False ceilings should not be installed.

HVAC

24 hours a day, 365 days a year, 64° to 75° F, 30 to 55 percent humidity, positive pressure, with independent power from telecommunications equipment.

Lighting

Typically, 8.5 ft. high, providing 50 ft. candles at 3 ft. above floor.

Electrical

Typically, a minimum of two dedicated 15 A, 110 V AC duplex outlets on separate circuits is required. Convenience duplex outlets shall be placed at 6 ft. intervals around the perimeter. Emergency power should be considered and supplied if available.

Bonding and Grounding

Access shall be available to the bonding and grounding as specified in J-STD-607-A.

Dust

Less than 100 micrograms/cubic meter/24 hour period.

Note: The term "typically" is applied here to indicate, where applicable, that these requirements also apply to other elements of the cabling system spaces. Lighting requirements, for instance, are largely identical for entrance facilities, equipment rooms and telecommunication rooms.

Intrabuilding Backbone Pathways

Within a building, the intrabuilding backbone pathways extend between the entrance facilities, equipment room and telecommunications rooms. Telecommunication rooms should be stacked vertically above each other on each floor, and provided with a minimum of three 4-inch sleeves (a stub of conduit through the floor) for less than 50,000 sq. ft. served. An equivalent 4" x 12" slot may be used in lieu of three sleeves. Firestopping is required. If rooms are not vertically aligned, then 4-inch horizontal conduit runs are required. Include no more than two 90° bends between pull points. Pulling iron or eyes embedded in the concrete for cable pulling is recommended. Fill should not exceed 40 percent for any run greater than two cables.
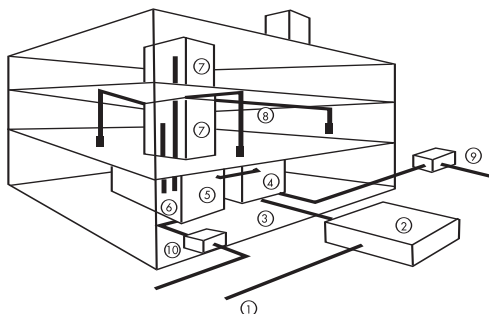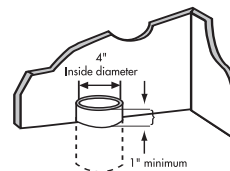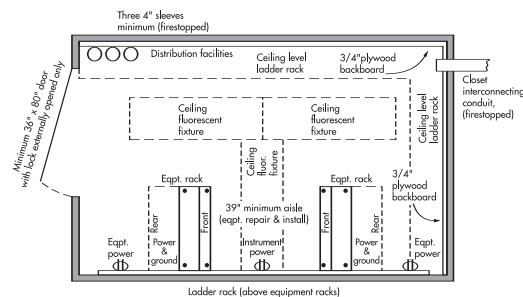

Backbone and Horizontal Pathways

1. Telco Conduit
2. Telco Manhole
3. Entrance Conduit
4. Telco Entrance Facility
5. Telecommunications Equipment Room
6. Vertical Backbone
7. Telecommunications Room
8. Horizontal Cabling
9. Interbuilding Backbone
10. Electrical Entrance Facility

Telecommunications Room

The telecommunications room on each floor is the junction between backbone and horizontal pathways. It contains active voice and data telecommunications equipment, termination fields and cross-connect wiring. More than one telecommunications room per floor is required if distance to a work area exceeds 300 feet, or if floor area served exceeds 10,000 square feet. Recommended room sizing is 10' x 11' for each 10,000 square-foot area served. Power, lighting, air conditioning and limited access are typical. See requirements for equipment room. There are a minimum of three 4-inch firestopped backbone sleeves in the floor at the left side of a plywood termination field, which are ideally located near the door. A fire extinguisher is recommended.

4"
Inside diameter

1" minimum

Riser Sleeve

Three 4" sleeves
minimum (firestopped)

Distribution facilities

Minimum 36" x 80" door
with lock externally opened only

Ceiling level
ladder rack

3/4" plywood
backboard

Closet
interconnecting
conduit,
(firestopped)

Ceiling
fluorescent
fixture

Ceiling
fluorescent
fixture

Ceiling level
ladder rack

Ceiling
floor
fixture

Eqpt. rack

Eqpt. rack

3/4"
plywood
backboard

Rear

Front

39" minimum aisle
(eqpt. repair & install)

Front

Rear

Eqpt.
power

Power
&
ground

Instrument
power

Power
&
ground

Eqpt.
power

Ladder rack (above equipment racks)

Typical Telecommunications Room

Horizontal Pathways

Horizontal pathways extend between the telecommunications room and the work area. A variety of generic pathway options are described. Choice of pathway(s) is left to the discretion of the designer. The most commonly employed pathway consists of cable bundles run from the telecommunications room along J-hooks suspended above a plenum ceiling, which fan out once a work zone is reached. They then drop through interior walls or support columns or raceways, and terminate at an information outlet (I/O).
Other options include the following:

Underfloor Duct
Single - or dual-level rectangular ducts imbedded in greater than 2.5-inch (7 cm) concrete flooring.

Flushduct
Single-level rectangular duct imbedded flush in greater than 1-inch (3 cm) concrete flooring.

Multi-channel Raceway
Cellular raceway ducts capable of routing telecommunications and power cabling separately in greater than 3-inch (8 cm) reinforced concrete.

Cellular Floor
Pre-formed hollows or steel-lined cells are provided in concrete with header ducts from the telecommunications room arranged at right angles to the cells.

Trenchduct
A wide, solid tray, sometimes containing compartments, and fitted with a flat top (with gaskets) along its entire length. It is embedded flush with the concrete finish.

Access Floor
Modular floor panels supported by pedestals, used in computer rooms and equipment rooms.

Plenum/Ceiling
Bundled cables, suspended above a false ceiling, fan out to drop through walls, power poles or along support columns to baseboard level.

Conduit
To be considered only when outlet locations are permanent, device density low and flexibility (future changes) are not required.

Cable Trays
Options include channel tray, ladder tray, solid bottom, ventilated and wireway.

Perimeter Pathways
Options include surface raceway, recessed, molding and multichannel (to carry separate power and lighting circuits).
**Rule of thumb:** Typically, size horizontal pathways by providing 1 sq. in. of cross-section area for every 100 sq. ft. of workspace area being served.
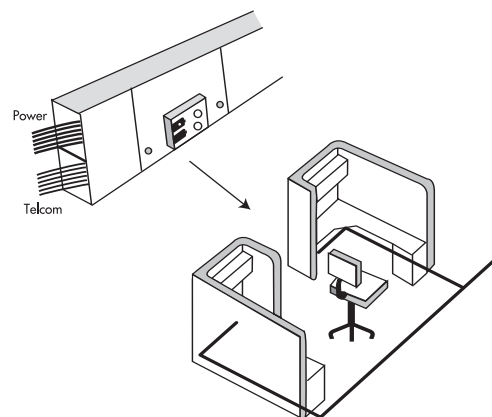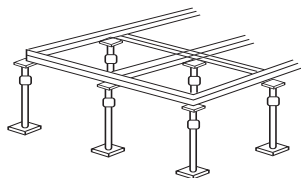

Perimeter Pathway and Modular Office Path

Note: Typically, a pull box, splice box or pulling point is required for any constrained pathway where there are more than two 90° bends, a 180° reverse bend or length more than 100 ft.
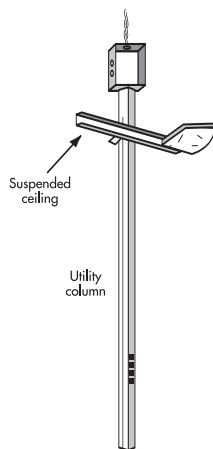
A Variety of Horizontal Pathways

Trench duct

Power Telecom Cellular floor
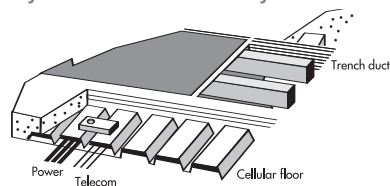
Access Floor

Access Floor

Suspended
ceiling

Utility
column

Ceiling Utility Pole

Consolidation Points and MUTOAs

Consolidation points provide limited area connection access. Typically, a permanent flush wall, ceiling or support column-mounted panel serves modular furniture work areas. The panels must be unobstructed and fully accessible without moving fixtures, equipment or heavy furniture.

A Multi-User Telecommunication Outlet Assembly (MUTOA) is another methodology to reduce cabling moves, adds and changes in modular furniture settings. The user cord is directly connected to the MUTOA. A MUTOA location must be accessible and permanent, and may not be mounted in ceiling spaces or under access flooring. Similarly, it cannot be mounted in furniture unless that furniture is permanently secured to the building structure.

For more descriptive information on distance limitations and purposes of consolidation points and MUTOAs, see ANSI/TIA/EIA-568-B.1.
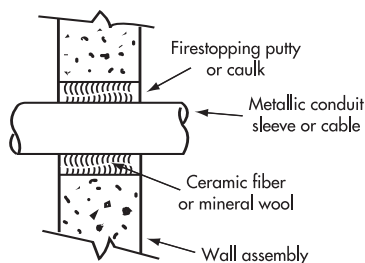
Electromagnetic Interference

Voice and data telecommunications cabling should not be run adjacent and parallel to power cabling — even along short distances — unless one or both cable types are shielded and grounded. For low voltage communication cables, a minimum 5-inch distance is required from any fluorescent lighting fixture or power line over 2 kVA and up to 24 inches from any power line over 5 kVA*. In general, telecommunications cabling is routed separately, or several feet away from power cabling. Similarly, telecommunications cabling is routed away from large motors, generators, induction heaters, arc welders, x-ray equipment and radio frequency, microwave or radar sources.

*Note: Distance recommendations from (1990) TIA/EIA-569 are reproduced here by popular request. For current recommendations, refer to NEC/NFPA 70, Article 800-52.

Firestops

Annex A of the standard discusses various types of packing used
to re-establish the integrity of fire-rated structures when these barriers
have been penetrated by cable. This section of the standard briefly discusses
passive mechanical systems and non-mechanical systems such as putty, caulk,
cements, intumescent sheets and strips, silicone foams and pre-manufactured
pillows. The most common method is stuffing all apertures with
ceramic/mineral wool and caulking both sides with fire-resistant putty.
The information refers the designer to check manufacturer specifications
and UL ratings against NFPA, ASTM and NEC codes.

Firestopping putty
or caulk

Metallic conduit
sleeve or cable

Ceramic fiber
or mineral wool

Wall assembly

Cut-a-Way of Typical Firestop

Purpose of the ANSI/TIA/EIA-606-A Standard

Modern buildings require an effective telecommunications infrastructure
to support the wide variety of services that rely on the electronic transport
of information. Administration includes basic documentation and timely
updating of drawings, labels and records. Administration should be synergistic
with voice, data and video telecommunications, as well as with other building
signal systems, including security, audio, alarms and energy management.
Administration can be accomplished with paper records, but in today's
increasingly complex telecommunications environment, effective
administration is enhanced by the use of computer-based systems.
A multi-tenant commercial building has a life expectancy of at least
50 years. Moreover, in a multi-tenant environment, continuous moves,
adds and changes are inevitable.
Administrative recordkeeping plays an increasingly necessary role
in the flexibility and management of frequent moves, adds and changes.
This booklet concisely describes the administrative recordkeeping elements
of a modern structured cabling system.