These are minimum standards which were selected from the most current ANSI/TIA/EIA 568, 569, 606, and 607 standards. The Telecommunications Industry Association and the Electronic Industries Alliance initially developed these standards with the support of the American Institute of Architects (AIA) and the Construction Specifications Institute (CSI). These are minimum requirements, which may be subject to change and/or additions. For more specific information, please refer to the ANSI/TIA/EIA 568 and 569 standards.

All data communication pathways will be installed by a separate contractor that is not associated with the electrical sub-contractor on the same project.

The District's cabling contractor cannot start any installation until all pathways and communication closets are completed and secured.

Any questions regarding these communication standards should be discussed with the designated District Technology Representative prior to the work being started.

1. Communications Closet – General Description

1.1 A minimum of one communications closet should be provided for each floor of an area being served, unless otherwise specified by the designated District Technology Representative.

1.2 The communications closet needs to be dedicated to communication functions and associated support facilities. It should not be shared with electrical installations or any other services except for those that are needed for communications.

1.3 Equipment not related to the support of the Communications Closet such as piping, duct work, and distribution of building power must not be located in this closet.

1.4 Any services not related to the Communications Closet should not pass through this closet and should not be located in the ceiling space above it.

1.5 The communications closet needs to be located as close as possible to the center of the area being served.

1.6 Communication closets should be located away from sources of electromagnetic interference. Avoid building communication closets to adjacent rooms which may be housing electrical power supply transformers, motors, generators, x-ray equipment, etc.

1.7 Communication closets should not be designed to be directly below/under bathrooms or any other rooms requiring water lines or roof drains.

2. Main Communications Closet

2.1 In many instances throughout the District, the Main Communications Closet also doubles as the Entrance Facility for all communication providers at a campus or a building. To determine proper entrance pathways and entrance points consult with the District Technology Representative before any decisions are made.

2.2 Shall be dedicated to telecommunications and data functions only.

2.3 Equipment not related to the support of the Communications Closet such as piping, duct work, and distribution of building power must not be located in this closet.

2.4 Any services not related to the Communications Closet should not pass through this closet and should not be located in the ceiling space above it.

2.5 Should be located as close to the center of the building structure as possible.

2.6 Should be located away from sources of electromagnetic interference. Avoid building communication closets to adjacent rooms which may be housing electrical power supply transformers, motors, generators, x-ray equipment, etc.

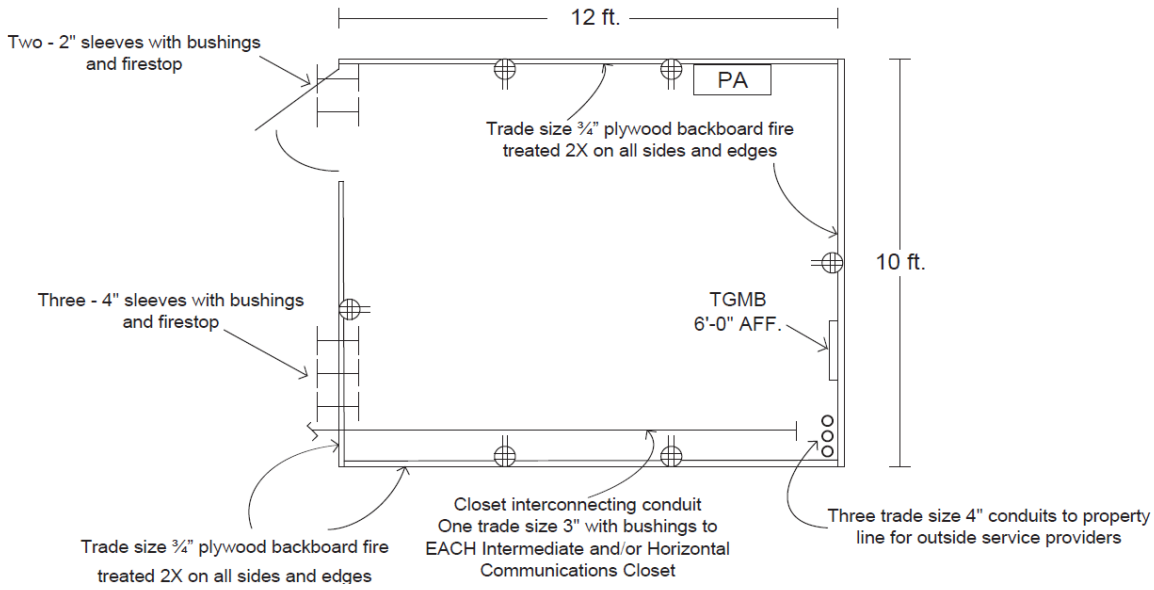
2.7 Should not be designed to be directly below, under, or next to bathrooms or any other rooms requiring water lines or roof drains.

2.8 Size of the Main Communications Closet.

2.8.1 The size of the area that is going to be served will determine the size of the communications closet. For most installations a minimum 10 foot by 12 foot room is required, however in some particular instances, this size may change. Confer with the District Technology Representative to determine the size for this closet.

2.8.2 The figure below is a basic layout for a 12 ft. by 10 ft. Main Communications Closet. Confer with the District Technology Representative for location of light switch, light, thermostat, sprinkler head, etc…

Figure 2.8.2 Basic 12ft by 10 ft Main Communications Closet



2.9 Construction of the Main Communication's Closet.

2.9.1 All walls shall be covered with rigidly fixed ¾ inch A-C plywood, preferably void free.

2.9.2 The plywood will be securely mounted to the wall, at least 8 feet in height and capable of supporting attached equipment and/or racks.

2.9.3 The plywood sheets shall be fire rated or covered with 2 coats of fire retardant paint on all sides (including edges).

2.9.4 Lighting in the closet should be a minimum of 500 lx (50 foot candles) measured 3 feet above the finished floor.

2.9.5 The door to the closet should be 36 inches wide and 80 inches high, hinged to open outward, and fitted with a lock that is keyed to the District's TIS communications closet key.

2.9.6 A minimum of six (6) dedicated 120V, non-switched, ac quad electrical outlet receptacles are required.

2.9.7 Each outlet should be on a separate branch circuit, rated at 20A, and connected to a 20A branch circuit. Confer with the District Technology Representative for location of these circuits.

2.9.8 Convenience outlets around the perimeter walls should also be provided, if requested. Confer with the District Technology Representative for location of these circuits.

2.9.9 Continuous cooling, 24 hours per day, 365 days per year, shall be provided via a split system a/c unit. If an internal system is provided, it should be mounted above the door area, with all water and condensation lines outside of the room.

2.9.10 Floor, walls, and the ceiling should be sealed to reduce dust.

2.9.11 A 12 inch TMGB Pattern Grounding Busbar (4"W x ¼"H x 12"L) will be installed as shown in **Figure 2.8.2**. Access to the facilities grounding system with a minimum 6 gauge stranded conductor must be provided.

2.9.12 Sprinkler heads should not be installed in the middle of the room or above any potential location where an equipment rack may be installed. Confer with the District Technology Representative for location of sprinkler heads in this communication room.

2.10 Service Providers.

2.10.1 A minimum of three (3) underground 4-inch EMT conduits are required for access from the property line to the Main Communications Closet. No flex conduit is permitted.

2.10.2 Confer with the District Technology Representative to determine the termination points for the conduits in the Main Communications Closet and the property line.

2.10.3 Pull boxes are required every 200 feet and/or where there are two (2) 90-degree bends, or equivalent.

2.10.4 Pull boxes or hand holes for outside of buildings should be a minimum Quazite Catalog 1730 type box or equivalent, and should be set on a bed of gravel for drainage. Due to the (3) 4-inch EMT conduits, a larger box may be required. If the box(es) are located on any roadway or driveway, the cover must be rated to meet these conditions. **Refer to figure 5.6.5.**

2.10.5 Conduits for outside pull boxes or hand holes must enter from the bottom at a 45 degree angle. **Refer to figure 5.6.5.**

2.10.6 Conduits must have an insulated bushing at each end.

2.10.7 A pull string is required in each conduit.

2.10.8 The bend radius of a conduit must be at least 10 times the internal diameter of the conduit.

2.11 Connectivity from the Main Communications Closet to all Horizontal and/or Intermediate Communications Closets. Please also review section 5 below **Conduit for Backbone Pathways** for additional information.

2.11.1 At least one (1) 3-inch conduit is required for each Horizontal or Intermediate Closet from the Main Communications Closet. No flex conduit is permitted.

2.11.2 The conduits must have bushings at each end.

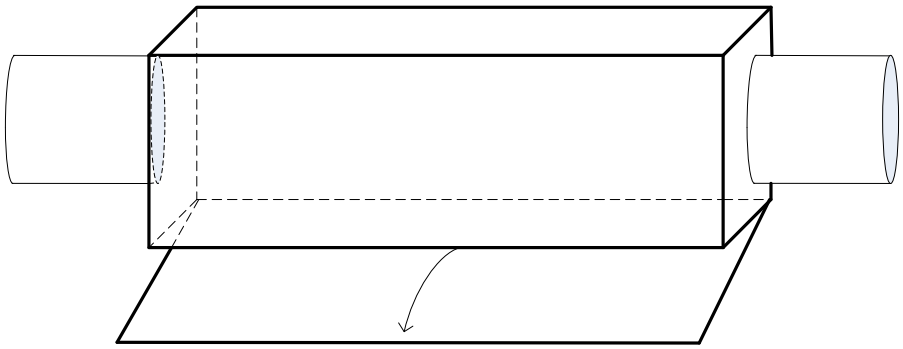
2.11.3 A pull string is required in each conduit.

2.11.4 Pull boxes are required every 100 feet and/or where there are two (2) 90-degree bends, or equivalent.

2.11.5 The bend radius of a conduit must be at least 10 times the internal diameter of the conduit.

2.11.6 Pull boxes shall not be used in lieu of a bend. Conduits should enter the pull box from opposite ends of each other. See figure below.

Figure 2.11.6 Pull box entry and exit points

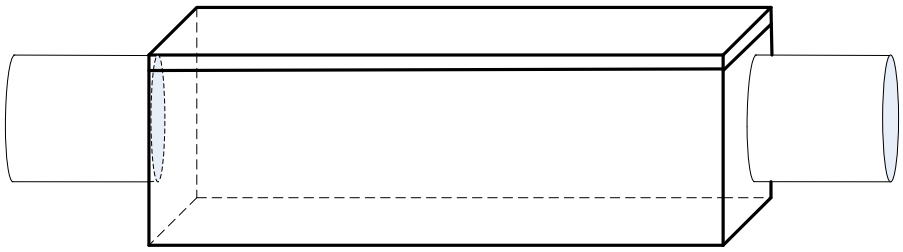


2.11.7 Pull boxes in ceiling spaces should be 36 inch gutter boxes which must conform to local regulatory, code and standards requirements; open downward, and should be no more than 24 inches above the finished ceiling. **Refer to figure 2.11.6.**

2.11.8 The conduits should enter the communication closets higher than the ceiling of the area it is going to service.

2.11.9 Pull boxes for outside areas should be a minimum of 36 inch gutter boxes of metal construction, NEMA 4X rated, open from the top or from the side if the top area is obstructed.

Figure 2.11.9 Outside NEMA 4X rated pull box.



2.12 Access to the serving area.

2.12.1 Three 4-inch sleeves with bushings leading out of the closet to the area that needs to be service are required. **Refer to Figure 2.8.2.**

2.12.2 An additional two 2-inch sleeves with bushings leading out of the closet to the area that needs to be serviced are required for the PA system wiring. These 2 sleeves need to be above the door. **Refer to Figure 2.8.2.**

2.12.3 Sleeves should enter the closet 12 inches higher than the ceiling of the area that it is going to service.

3. Horizontal and/or Intermediate Communications Closets

3.1 Shall be dedicated to telecommunications and data functions only.

3.2 Equipment not related to the support of the Communications Closet such as piping, duct work, and distribution of building power must not be located in this closet.

3.3 Any services not related to the Communications Closet should not pass through this closet and should not be located in the ceiling space above it.

3.4 Should be located as close as possible to the center of the area being served.

3.5 Should be located away from sources of electromagnetic interference. Avoid building communication closets to adjacent rooms which may be housing electrical power supply transformers, motors, generators, x-ray equipment, etc.

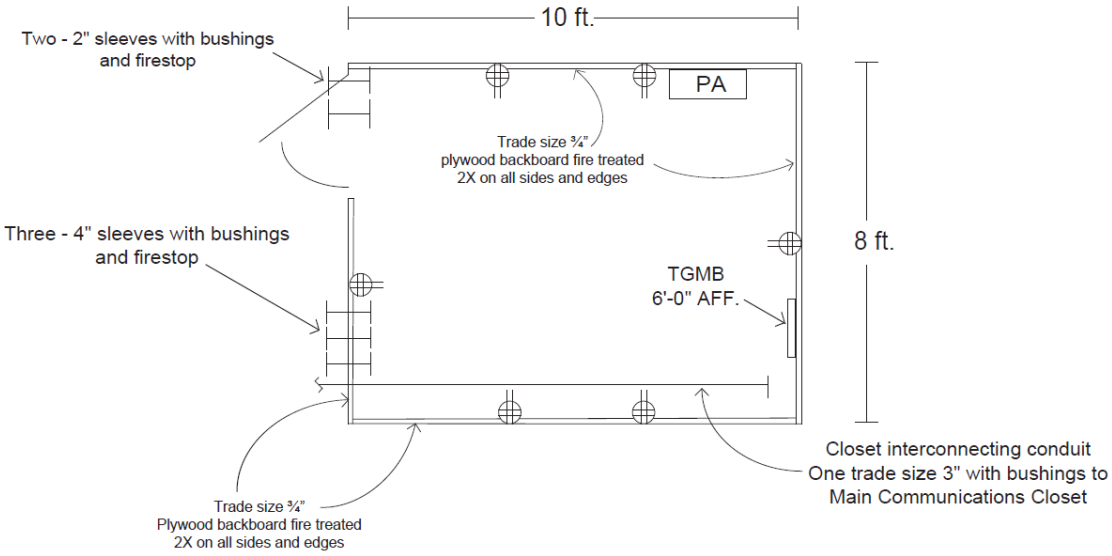
3.6 Should not be designed to be directly below, under, or next to bathrooms or any other rooms requiring water lines or roof drains.

3.7 Size of Horizontal and/or Intermediate Communications Closets.

3.7.1 The size of the area that is going to be served will determine the size of the communications closet. For most installations a minimum 10 foot by 8 foot room is required, however in some particular instances, this size may change. Confer with the District Technology Representative to determine the serving size for this closet.

3.7.2 The figure below is a basic layout for an 10 ft. by 8 ft. Intermediate and/or Horizontal Communications Closet. Confer with the District Technology Representative for location of light switch, light, thermostat, sprinkler head, etc…

Figure 3.7.2 Basic 10ft by 8ft Communications Closet



3.8 Construction of the Communication's Closet.

3.8.1 All walls shall be covered with rigidly fixed ¾ inch A-C plywood, preferably void free.

3.8.2 The plywood shall be securely mounted to the wall at least 8 feet in height and capable of supporting attached equipment and/or racks.

3.8.3 The plywood sheets shall be fire rated or covered with 2 coats of fire retardant paint on all sides (including edges).

3.8.4 Lighting in the closet should be a minimum of 500 lx (50 foot candles) measured 3 feet above the finished floor.

3.8.5 The door to the closet should be 36 inches wide and 80 inches high, hinged to open outward, and fitted with a lock that is keyed to the District's TIS communications closet key.

3.8.6 A minimum of six dedicated 120V, non-switched, ac quad electrical outlet receptacles are required.

3.8.7 Each outlet should be on a separate branch circuit, rated at 20A, and connected to a 20A branch circuit. Confer with the District Technology Representative for location of these circuits.

3.8.8 Convenience outlets around the perimeter walls should also be provided, if requested. Confer with the District Technology Representative for location of these circuits.

3.8.9 Continuous cooling, 24 hours per day, 365 days per year, shall be provided via a split system a/c unit. If an internal system is provided, it should be mounted above the door area, with all water and condensation lines outside of the room.

3.8.10 Floor, walls, and the ceiling should be sealed to reduce dust.

3.8.11 A 10 inch TGB Pattern Grounding Busbar (2"W x ¼"H x 10"L) will be installed as show in figure 3.7.2. Access to the facilities grounding system with a minimum 6 gauge stranded conductor must be provided.

3.8.12 Sprinkler heads should not be installed in the middle of the room or above any potential location where an equipment rack may be installed. Confer with the District Technology Representative for location of sprinkler heads in this communication room.

3.9 Connectivity to the Main Communications Closet. Please also review section 5 below **Conduit for Backbone Pathways** for additional information.

3.9.1 At least one (1) 3-inch conduit is required for each Horizontal or Intermediate Closet from the Main Communications Closet. No flex conduit is permitted.

3.9.2 The conduits must have bushings at each end.

3.9.3 A pull string is required in each conduit.

3.9.4 Pull boxes are required every 100 feet and/or where there are two (2) 90-degree bends, or equivalent.

3.9.5 The bend radius of a conduit must be at least 10 times the internal diameter of the conduit.

3.9.6 Pull boxes shall not be used in lieu of a bend. Conduits should enter the pull box from opposite ends of each other. **Refer to figure 2.11.6.**

3.9.7 Pull boxes in ceiling spaces should be 36 inch gutter boxes which must conform to local regulatory, code and standards requirements; open downward, and should be no more than 24 inches above the finished ceiling. **Refer to figure 2.11.6.**

3.9.8 The conduit should enter the communication closet higher than the ceiling of the area it is going to service.

3.10 Access to the serving area.

3.10.1 Three 4-inch sleeves with bushings leading out of the closet to the area that needs to be serviced are required. **Refer to figure 3.7.2.**

3.10.2 An additional two 2-inch sleeves with bushings leading out of the closet to the area that needs to be serviced are required for the PA system wiring. These 2 sleeves need to be above the door. **Refer to figure 3.7.2.**

3.10.3 Sleeves should enter the closet 12 inches higher than the ceiling of the area that it is going to service.

4. Conduit for Horizontal Pathways – Communication Closets to Work Areas

4.1 All horizontal cabling should be run in an appropriate pathway as defined in the ANSI/TIA/EIA-569-B standards.

4.2 Conduit sizing – a dedicated one inch conduit is requested for every work station (voice, data and/or video) stubbed out at 12 to 18 inches above a readily accessible ceiling space. The one inch conduit will be routed to the nearest readily accessible ceiling space of no higher than 12 feet above the finished floor. This one inch conduit will also be routed to the closest

pathway that is going to be used for cabling to any communications closet. No flex conduit is permitted.

4.3 Conduits must have an insulated bushing at one end and terminate into a single gang or larger outlet box as required at the workstation end. If a larger outlet box is required, it must have a single gang adapter included.

4.4 The bend radius of a conduit must be at least 10 times the internal diameter of the conduit.

4.5 A pull string is required in each conduit.

4.6 Cable paths must avoid interfering with the serviceability of all existing facilities.

4.7 Pull Boxes for Horizontal Pathways - Confer with the District Technology Representative for proper sizes.

4.7.1 Pull boxes are required every 100 feet and/or where there are two (2) 90-degree bends, or equivalent.

4.7.2 Pull boxes must not be used in lieu of a bend. Conduits should enter the pull box from opposite ends of each other. **Refer to figure 2.11.6.**

4.8 Cable Trays

4.8.1 The top of cable trays will not be higher than 12 feet above the finished floor.

4.8.2 Confer with the District Technology Representative for location and type of cable tray that will need to be used.

5 Conduit for Backbone Pathways – Main Communications Closet to Intermediate and/or Horizontal Closets

5.1 All backbone cabling should be run in an appropriate pathway as defined in the ANSI/TIA/EIA-569-B standards.

5.2 Conduit sizing – a dedicated three inch conduit is requested from each Horizontal or Intermediate Closet to the Main Communications Closet. No flex conduit is permitted.

5.3 Conduits must have an insulated bushing at each end.

5.4 A pull string is required in each conduit.

5.5 The bend radius of a conduit must be at least 10 times the internal diameter of the conduit.

5.6 Pull Boxes - Confer with the District Technology Representative for proper sizes.

5.6.1 Pull boxes are required every 100 feet and/or where there are two (2) 90-degree bends, or equivalent.

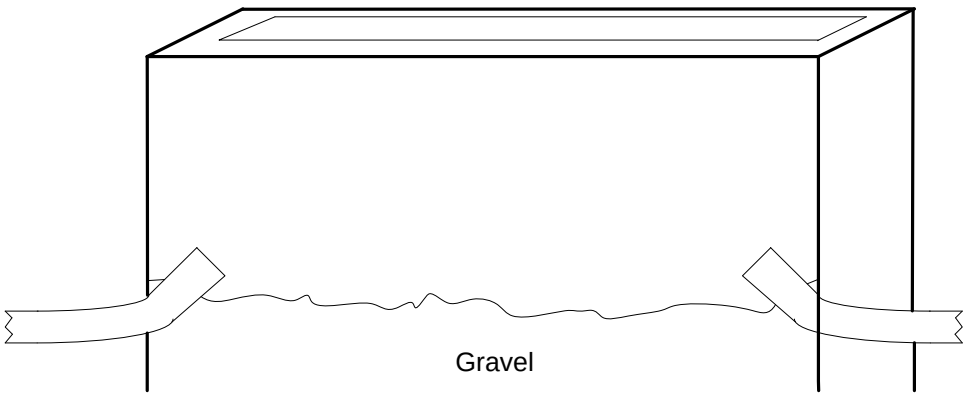
5.6.2 Pull boxes for inside of a building should be 36 inch gutter boxes which must conform to local regulatory, code and standards requirements.

5.6.3 Pull boxes or hand holes for outside of buildings should be a minimum Quazite Catalog 1730 type box or equivalent, and should be set on a bed of gravel for drainage. If they are located on any roadway or driveway, the cover must be rated to meet these conditions. **Refer to figure 5.6.5.**

5.6.4 Pull boxes must not be used in lieu of a bend. Conduits should enter the pull box from opposite ends of each other. **Refer to figure 2.11.6.**

5.6.5 Conduits for outside pull boxes or hand holes must enter from the bottom at a 45 degree angle.

Figure 5.6.5 Outside pull box, minimum Quazite Catalog 1730 type, equivalent or larger.



5.6.6 A pull string and bushings are required in each conduit.

5.7 Where a penetration into an existing building is required in order to extend the data communications pathway in or out of that building, a Smart LB will be used. Information on Smart LB's can be found by doing a Google Search for Smartlb.

5.8 Cable paths must avoid interfering with the serviceability of all existing facilities.

Any questions regarding the building of communication closets, running of conduit pathways, or height accessibilities in ceilings should be discussed with the designated District Technology Representative **before** work is performed.