

DIVISION 27 – COMMUNICATIONS

270000 VOICE AND DATA COMMUNICATIONS SYSTEMS

A. **Design Considerations**

RESERVED

B. **Special Documentation Requirements**

RESERVED

C. **Materials and Methods of Construction**

1. Telecommunications Service Entrance:

- a. Identify communications manhole to be used on the building plans. Telecommunications Staff will specify. Provide new manhole and underground path to the building if the existing manhole is not available. Distance between manholes should not exceed 600'. The total number of bends in a conduit run shall not exceed two 90° bends or equivalent of sweeps and radius bends. Each bend will have a minimum radius in accordance with existing standards (10 times the I.D. minimum for the bend radius).
- b. Install four (4) four-inch diameter polyvinyl chloride (PVC) Schedule 40 conduits from existing and/or new manholes to the building shear line. The conduits will be installed at a minimum depth of 30" and backfilled with select material. An orange warning tape will be placed in conduit trench approximately 12" below the surface. Encase conduits in concrete (2,500 PSI), except when terminating at a pole. When terminating at a pole, clamp the conduit(s) rigidly to the field side of the pole at a 90° separation from power.
- c. Galvanized steel conduits should be used from the inside of the building to undisturbed earth to prevent a "shearing point" at the building edge. Conduits terminating inside a building will be installed so that the conduit extends four (4) inches beyond the surface from which it emanates. Conduits shall be plugged with inserts to ensure that foreign matter does not enter the building. The ends of metallic conduit shall be reamed, bushed and grounded according to the National Electric Code. All

conduits are to be installed with a minimum 200 lb. test noncorrosive graduated pull tape.

(* Minimize routing of conduits under the building foundation.)

- d. Provide and install the 6'W X 12'L X 7'D in-line manholes allowing two splicing bays and 7'W X 9'L X 7'D auxiliary manholes as needed. Prefabricated manholes preferred whenever possible. Manholes should be equipped with cable racks, pulling irons, 8" sump hole, frame, cover and ladder. A 6'-6" galvanized straight steel ladder is required when the chimney height is 12 inches or less. When the chimney height is 12 inches or more, a hooked ladder is required and manhole steps are to be provided at 12 inch intervals. The frame shall have a nominal opening of 27 inches and the cover is to be marked with a "C"; "Communications", or "T"; "Telephone".
- e. Terminating Space for the service entrance shall have a ¾ inch trade size A-C plywood, 8 ft. High X 4' Wide. The terminating space shall include a two 110 V, 20 -amp AC power outlets and lighting equivalent to 50 foot-candles 3 feet above the floor. A #6 ground should be provided at the terminating space.

2. Telecommunications Closet:

- a. Telecommunications closets should be centrally located away from building corners and in close proximity to electrical service. Limiting the distance between these facilities will include designing an optimal grounding arrangement and minimize intersystem grounding disturbances. A #6 ground should be provided in all telecommunications closets.
- b. Size Requirements are based on distributing telecommunications service to one individual work area per 100 sq. ft. of occupied floor space. Minimum telecommunications closet sizes are shown in the table below:

IF THE SERVING AREA IS: THEN THE CLOSET MUST BE AT LEAST

Less than 5,000 sq. ft.	10 ft. x 7 ft.
Between 5,000 sq. ft. & 8,000 sq. ft.	10 ft x 9 ft.
Larger than 8,000 sq. ft.-	10 ft. x 11 ft.

- c. All walls of the closet shall be lined with rigidly installed wall-to-wall framing of ¾" trade size A-C plywood, 8 ft. high.

Backboards shall be rigidly installed and painted with a nonconductive fire-retardant overcoat.

- d. The temperature of the room shall be kept between 64°F and 75°F.
- e. The telecommunications room shall be kept between 30% and 55% relative humidity.
- f. Floors shall be static free (using asphalt / linoleum tile).
- g. Lighting intensity shall be at least 50 foot candles at 30" above the floor.
- h. Emergency lighting shall be provided.
- i. The rated distributed floor loading shall be greater than 250 psf.
- j. The rated concentrated floor loading shall be greater than 1000 lbs.
- k. Telecommunications closets shall not have door sills or center posts. The door shall be 7' H X 3' W. Sleeves or dam walls around floor slots shall extend 4 inches AFF.
- l. Conduits and cable trays located in ceilings shall protrude 2" into the closet.
- m. Ventilation shall accomplish one air change per hour (minimum).
- n. Closets shall include a minimum of 2 dedicated 110 V AC 20 ampere quad outlets on separate branch circuits.
- o. Each floor of the building should have at least one centrally located closet. These closets should be vertically stacked and connected with four - 4" sleeves for a clear cable pull without offsets extending 2" AFF and below ceiling level on the lower floor. Conduits, reamed and bushed at both ends are to be installed with a minimum 200 lb. test pullwire and no more than two 90° bends without a pull box being placed (See the attached diagram for pullbox installations. Bends are to be 10 times the I.D. for all conduits. The sizing and placing of pull or splice boxes shall not be used in place of 90° bends.

3. Cabling:

- a. Location and number of telephone / data outlets will vary and must be determined by consultation with building occupants. Typically one telephone / data outlet consists of a double gang outlet box with a reducer plate and a one (1) inch conduit extended to a location above the hung ceiling. Poke through outlets should be avoided. In addition to this, a separate data outlet with a double gang outlet box and a reducer plate with a blank cover plate should be provided for future use with coaxial video or fiber optic cable.
 - b. Labs and other heavily wired locations require proper sizing of conduits feeding computer workstation clusters.
 - c. No more than three (3) outlet boxes in any conduit run will be allowed. If multiple boxes are chained together, then the conduit size must be increased accordingly.
 - d. Cable paths to modular furniture or workstations must be enclosed and secure. Raceways between ceilings and floor or furniture must be avoided.
 - e. In a building with a suspended ceiling, each telephone / data outlet should be provisioned with a 1" conduit that extends from the wall outlet to 8" above the ceiling. All conduits should have a pull line.
 - f. Cable trays should be provisioned above ceilings for orderly horizontal distribution of telephone and data cabling.
4. Telecommunications Grounding, Bonding and Electrical Protection:
- a. The telecommunications grounding system shall be directly attached to the closest point in the building's electrical service grounding electrode system.
 - b. Bonding conductors shall be routed with a minimum number of bends. The bends placed in the conductor should be sweeping.
 - c. Make all bonding connection with listed bolts, crimp pressure connectors, clamps, or lugs. Exothermic welding may be used.
 - d. Multiple busbars placed in a building shall be directly bonded with a #6 AWG copper conductor.