

**SECTION 27 10 00  
STRUCTURED CABLING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies requirements for telecommunications structured cabling systems.

**1.2 SUMMARY**

- A. Section Includes:
1. Computer Room Backbone Structured Cabling.
  2. Computer Room Horizontal Structured Cabling.
  3. Facility Backbone Structured Cabling.
  4. Facility Horizontal Structured Cabling.

**1.3 REFERENCES**

- A. VA Infrastructure Standard for Telecommunications Spaces.

**1.4 RELATED WORK:**

- A. Cabling labeling and identification: Section 27 05 53, IDENTIFICATION FOR COMMUNICATIONS SYSTEMS.
- B. Cable termination locations and equipment: Section 27 11 19, COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS.

**1.5 SUBMITTALS:**

- A. Submit in accordance with Section 27 05 00, COMMON WORK RESULTS FOR COMMUNICATIONS SYSTEMS.

**PART 2 - PRODUCTS**

**2.1 COMPUTER ROOM BACKBONE STRUCTURED CABLING.**

- A. Backbone structured cabling in the computer room environment (first level backbone) connects the Main Distribution Areas (MDAs) to the Horizontal Distribution Areas (HDAs).
1. Install first level backbone structured cabling in overhead cable tray and fiber raceway systems following diverse path routing.
  2. All cabling used shall be pre-terminated and procured to the specific length required by the design (horizontal and vertical paths) with no more than 1 meter of excess length on each end.
  3. Terminate first level backbone structured cabling in the top RU positions of each network cabinet, working downward, with patch panel equipment mounted on the front rails.

4. Mirror distribution on the A-side and B-side MDA and HDA elements.
  - a. In MDA network cabinets:
    - 1) Install angled UTP patch panel(s) for each backbone UTP patch panel in the same-side HDA in the computer room beginning in RU45.
    - 2) Install an angled panel cover on the lowest UTP patch panel.
    - 3) Install a blanking panel in the RU below the UTP patch panels.
    - 4) Install fiber optic distribution cabinets to support the backbone fiber distribution from each HDA.
    - 5) Install a blanking panel in the RU below the fiber optic distribution cabinet(s).
  - b. In HDA network cabinets:
    - 1) Install fiber optic distribution cabinet(s) and populate with fiber optic distribution cassettes starting in RU45.
    - 2) Install a blanking panel in the RU below the last fiber cabinet.
    - 3) Install UTP patch panel(s) below the blanking panel.
    - 4) Install a blanking panel in the RU below the last UTP patch panel.
5. Install UTP cables between the same-side MDAs and HDAs.
6. Install 12- or 24-strand multimode fiber optic cables between each fiber cassette in the HDA to either the same-side MDA or the opposite side MDA as appropriate.

## **2.2 COMPUTER ROOM HORIZONTAL STRUCTURED CABLING.**

- A. Horizontal structured cabling in the computer room environment connects the Equipment Distributors (EDs) in the server cabinets to each supported Horizontal Distribution Area (HDA).
  1. Install horizontal structured cabling in overhead cable tray and fiber raceway systems following diverse path routing.
  2. All cabling used shall be pre-terminated and procured to the specific length required by the design (horizontal and vertical paths) with no more than 1 meter of excess length on each end.
  3. In the server cabinets, terminate horizontal structured cabling in EDs located in the top 5U of each cabinet, with patch panel equipment mounted on the rear rails.

- a. Install fiber optic distribution cabinet(s) starting in RU45 and populate with fiber optic distribution cassettes to support the requirement.
- b. Install a blanking panel in the RU below the last fiber cabinet.
- c. Install copper UTP patch panel(s) below the blanking panel.
4. In the HDAs, terminate horizontal structured cabling in the RU positions immediately below the first level backbone structured cabling equipment of each network cabinet, working downward, with patch panel equipment mounted on the front rails.
  - a. Install fiber optic distribution cabinet(s) and populate with fiber optic distribution cassettes to support each server cabinet.
  - b. Install a blanking panel in the RU below the fiber optic distribution cabinet(s).
5. Install 12- or 24-strand multimode fiber optic cables between the server cabinet ED and both HDAs.
6. Install UTP cables between the server cabinet ED and both HDAs.

### **2.3 FACILITY BACKBONE STRUCTURED CABLING.**

- A. Backbone structured cabling (inter-building and intra-building first level backbone) connects the Entrance Rooms to the Main Distribution Areas (MDAs) in the computer room, and connects the Main Distribution Areas to each Telecommunications Room (TR). This specification describes facility backbone structured cabling when the Entrance Rooms and computer room are in the same building, connected entirely by environmentally conditioned pathways (no outside plant pathways are transited).
  1. Interior to each telecommunications space, install facility backbone structured cabling in overhead cable tray and fiber raceway systems.
  2. All facility backbone structured cabling shall be redundant and follow diverse path routing.
  3. Facility backbone cabling shall be field-terminated (fusion spliced).
  4. In the Entrance Room, MDA, and TR network racks or cabinets designated for facility backbone distribution, install fiber optic

distribution cabinets as required for the quantity of fibers installed.

5. Between each Entrance Room and the computer room:
  - a. Provide 2 diversely routed paths of backbone cabling from each Entrance Room. One path will terminate on the A-side MDA and one path will terminate on the B-side MDA.
  - b. Install a minimum of 24 strands of multimode fiber optic cabling and 12 strands of single-mode fiber optic cabling per path.
  - c. Populate the fiber optic distribution cabinets on each end with a sufficient quantity of multimode OM4 and single-mode OS1 fiber optic splice cassettes per path.
6. Between each MDA and each TR:
  - a. No zone/intermediate distribution areas (ZDAs/IDAs) intermediate cross-connects (ICCs) shall be used. All facility backbone cabling between the MDAs and TRs shall be run directly and continuously.
  - b. Provide 2 diversely routed paths of backbone cabling, one from the A-side MDA and one from the B-side MDA.
  - c. Where the TR is located in the same building as the computer room MDAs (does not transit outside plant pathways), install a minimum of 24 strands of multimode fiber optic cabling and 12 strands of single-mode fiber optic cabling per path.
    - 1) Populate the fiber optic distribution cabinets on each end with a sufficient quantity of multimode OM4 and single-mode OS1 fiber optic splice cassettes per path.
  - d. Where the TR is located in a different building as the computer room (transits outside plant pathways), install a minimum of 24 strands of single-mode fiber optic cabling per path. In addition for the A-side backbone, install a minimum of 24 strands of multi-mode fiber optic cabling.
    - 1) Populate the fiber optic distribution cabinets on each end with a sufficient quantity of multimode OM4 and single-mode OS2 fiber optic splice cassettes per path.

#### **2.4 FACILITY HORIZONTAL STRUCTURED CABLING.**

- A. Facility horizontal structured cabling (horizontal distribution) connects the Telecommunications Room (TR) to each end-user Work Area Outlet (WAO).
1. Interior to each TR, install horizontal distribution structured cabling in overhead cable tray systems.
  2. All horizontal distribution structured cabling shall have a minimum of 2 cables per WAO.
  3. Horizontal distribution structured cabling may be field-terminated.
  4. In each TR install sufficient UTP patch panels to support the quantity of WAOs in the TR's serving zone.
    - a. Plan network racks such that patch panels and horizontal cable managers are located in the top 1/3 (RU31-45), switching equipment in the middle 1/3 (RU16-30), and power distribution and other services in the bottom 1/3 (RU1-15).
  5. Install a minimum of 2 UTP cables between the TR UTP patch panels and each work area faceplate.
  6. Each typical end-user receptacle shall be constructed of a single-gang workbox with one connector chassis, a minimum of two non-proprietary Category 6A 8P8C media interface connectors (RJ-45), and a four-position keystone faceplate.
    - a. Modular plug terminated links (MPTL) are permitted to service wireless access points (WAPs), cameras, and other Power over Ethernet (PoE) devices where mating will be very infrequent.

### **PART 3 - EXECUTION**

#### **3.1 IMPLEMENTATION:**

- A. 100% construction drawing sets shall include drawings detailing the computer room and facility/campus structured cabling systems, including:
1. Cable media performance categories for each type of run.
  2. Cabling and equipment quantities.
  3. Elevation drawings showing equipment placement in individual enclosures.
  4. Full interconnection diagram for all structured cabling.
  5. Port map and cable label matrices.

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Bid Documents

B. All cabling and equipment shall be labeled per the requirements of the  
VA Infrastructure Standard for Telecommunications Spaces.

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