

(F&CP's Section 2.13) **jan 15<sup>th</sup>, 2015 Update**

## Design Guidelines, Information Technology and Communications

### 2.13 INFORMATION TECHNOLOGY AND COMMUNICATIONS

#### 2.13.1 GENERAL

- Our facilities require state-of-the-art communications and information technology infrastructure.
- The Campus currently cables its buildings with fiber and structured Cat 6 copper cabling utilizing ADC/Tyco hardware. **UMass IT/ Cable Engineering Services (CES)** is happy to provide specifications and ACAD's of our standard details. Contact: Leslie Smith or Graeme Sephton at 413-545-3535
- Early in the design phase, the designers, building occupants, UMass project manager and UMass UMass Information Technology (UMIT) need to review the project's IT requirements.
- Note that some equipment **must be proprietary** to integrate with the existing Campus infrastructure and systems; specific details will be provided as needed.

#### 2.13.2 CAMPUS I.T. FEEDER CONNECTIONS

Each new building shall be connected, via 4" schedule 40 PVC conduits encased within **concrete ductbank**, to the nearest existing Telcom manhole.

Minimum ductbank entry into the building is generally (1) - 4" conduit for telephone, (1) - 4" conduit for fiber and (2) - 4" spare conduits, IE four conduits total.

The project requirements for adequate phone cable and fiber connections to the campus system shall be provided. For this and other details relating to any of the following guidelines please **consult with UMIT/ Cable Engineering Services, ph. 413-545-3535**.

#### 2.13.3 BUILDING ENTRANCE TERMINAL ROOM

The Building Entrance Terminal (**BET**) is the room where all feeder cables to the building are to be terminated: fiber, CATV (coax) and phone. The room should provide adequate space for equipment and service personnel, be located in the basement or lowest level and in the immediate proximity to where the cable feeder conduits enter the building. Provide in this room the following:

- **Minimum** room size shall **be 8 ft by 15 ft** however building size and function may require larger spaces.
- This room can also serve as one of the UMIT Network Closets and shall conform to the requirements that follow.

#### 2.13.4 UMIT CAMPUS NETWORK CLOSETS

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**UMIT/ Cable Engineering Services**

UMIT **Network Closets** should be centrally located on each floor and directly accessible from the building corridor, at **minimum size 7 ft deep and 12.5 ft wide** with door swinging outwards. Stack these closets vertically within the building. That space allows for **one equipment rack, one patch panel rack and one DAS** equipment rack. Such a closet can then provide **termination capacity for about 500 Cat6** cables, **plus spare capacity** for 25% future growth. If more than 500 cables are to initially be terminated in a closet, it will be necessary to expand the closet for at least one additional rack.

**All of these network closets should comply with the following requirements:**

- Provide 19" **Equipment Racks** of sufficient quantity (and at **minimum three**) for network equipment, cable termination patch panels and DAS equipment, each with vertical cable management and overhead cable tray tie-ins.
- Low-static vinyl tile **floors**.
- **Do not** install drop **ceilings**.
- Any structural steel that requires **fireproofing** should be **enclosed in sheetrock**. No spray-on fireproofing compound should be exposed or visible in UMIT closets due to long-term dust issues.
- Provide two 20 Amp **dedicated circuits** minimum, with corresponding general purpose receptacles every 6 ft along walls. Provide two additional dedicated circuits at the base of each rack required, to be fed by **emergency** or back-up **power circuits** if available.
- Install a copper **ground terminal** block 12" wide with a #6 copper cable (minimum) tied into the building system ground at the electric service entrance. Also **bond** this terminal block **directly to the steel frame** of the building using #2 Cu cable in the immediate vicinity of ground block.
- Install fire-resistant AC **plywood backboard**,  $\frac{3}{4}$ ", with two coats of paint, sky blue color. Backboard to be mounted directly on walls, typically from 9" AFF up to a height of 8"-6" AFF. All receptacles on walls can be located below backboards, 6" AFF.
- Install sufficient 12" **cable tray/ladder rack**; above any backboard terminations and around the perimeter of larger rooms. Install at a height of 7 ft AFF.
- If a cable tray runs down the adjoining corridor, run a cable tray section through the corridor wall and tie to the cable tray within the UMIT closet. Such **pass-through assemblies** should be of a type that close down/seals itself in the presence of heat and fire.
- Provide smoke detector type fire protection. If sprinklers are absolutely required by code, add wire cage protective covers over sprinkler heads. Substitute **smoke/heat detectors**, if possible, in the hope that it eliminates possible water discharge events.

- Closets and network **spaces** should be "**stacked**" within a building, with 4 - 4" sleeves to the spaces above and below. Make the sleeve/ bushing rise above the floor approximately 3" to minimize the possibility of water migrating down through the building. The sleeved openings should be located against a wall with backboard attached.
- Install **cable tray** from the Building Entrance Terminal room to the nearest of each of these stacked closets. Alternatively, install an adequate quantity of 4" conduits. If conduit runs are used to feed closets they shall have readily accessible pull box(es) at or after every two 90 bends and/or every hundred feet.
- Install 19" Equipment Racks with cable tray tie-ins overhead, fiber termination units, UPS units and Ethernet data switches. (**Jim Mileski, UMIT Network Services (NS)**, will determine the required network equipment list and specifications, all to be provided by the construction project.)
- Within each UMIT closet terminate the building **phone cable riser** as an IDF (Intermediate Distribution Frame) termination field. (Discuss cable sizing with UMIT/CES.)
- Within each UMIT closet terminate a network **fiber riser** cable – typically 12 SM originating in the Cable Entrance Room. (Discuss cable sizing with UMIT/CES.)
- All **fiber terminations** must be pig-tail LC type connectors.
- Evaluate the **heat load** and cooling needs of each closet based on equipment schedules provided by UMIT. Communicate that quantity to the **HVAC designer**.
- Every UMIT space should have a standard UMass **card access** type controller to regulate entry.

### 2.13. 5 CABLE SUPPORT AND PATHWAY REQUIREMENTS

- Where main corridors have readily accessible suspended ceilings provide **cable tray**, sized according to expected IT cable capacity. Coordinate height to allow easy removal of ceiling tiles and also allow 8" minimum clearance above for cable placement.
- Design the cable pathways, especially the primary ones in vicinity of closets, to **facilitate** easy future **cable additions**. Provide at least 25% additional cable capacity in all fire stop pass-through assemblies and all cable trays and support hardware.
- Alternatively, run a **Snaketray** type support system along both sides of the corridor with crossovers

spaced as required. Cable path shall be installed to meet all requirements of Cat 6 structured wiring system. Since this limits workstation cable lengths to 295 feet, the corresponding designed cable path should not exceed approx. 270 feet.

- Where a few cables are to be installed above a suspended ceiling, such as an office or work room, provide **metal hangers** fastened to the underside of the slab, walls above ceiling or to building steel above. Hangers to be Erico Caddy “Cable Cat Clips” for Category 6 cable support OR approved equal. Distance between hangers shall comply with Cat 6 requirement, slightly randomized separation distances between 3 ft and 5 ft and averaging ~4 ft overall.
- All **ceiling systems must provide ready access** to the cable trays and J-hooks for maintaining, repairing, upgrading or adding additional cables after the construction project is complete. Where solid ceilings are installed, 2 ft x 2 ft **access panels must be provided every 10 feet** along ceiling pathways.
- Provide cable **pathway details and access** details during the design **review process**.
- Where cable path is in an **exposed area**, and if cable tray inappropriate, use adequately sized **EMT** (based on 40% fill) with **pull boxes** every 80 feet maximum and/or every two 90 degree bends. Bends shall be sweeps, not pull boxes nor LB types. EMT shall be **identified** every 20 ft with plastic adhesive type labels, lettering .5 inches high, to read “TEL/DATA”. EMT shall have a **pull string** installed with all cable runs.

### 2.13.6 CABLING & OUTLET REQUIREMENTS

- The I.T. infrastructure needs to **provide tel/data outlets at all of the following locations:** phone, FAX, Ethernet, card access, CCTV, security, wireless access points (WAP’s), networked equipment such as printers, ceiling/data projectors, display screens, A/V equipment racks and associated accoutrements, copy machines, vending machines, cash registers, elevators and their control machinery, power and energy management monitors, clocks, fire alarm panels, etc.
- All UMIT outlets/jacks shall be connected back to UMIT closets with a proprietary **Cat 6 wiring system manufactured by ADC/Tyco**; Proprietary Bidding justification memo is attached. All Cat 6 cables shall terminate on **rack-mounted patch panels** in UMIT closets. Installers shall provide evidence of appropriate certification/training and experience.
- Each of the above listed systems have their own particular UMass requirements. In consultation with users and occupants, the designer will need to **identify the locations** of such equipment and include any such special requirements to integrate them into existing UMass systems.

- **Tel/data outlets** in walls shall comprise a 4" square metal box, flush in the wall where possible, with an adapter for a single gang cover plate.
- Outlets shall have a 1" EMT (or other surface raceway) homerun to the nearest I.T. network closet. Homeruns to have bushings at each end, and pull string. Alternately, if there is a readily accessible drop ceiling, **stub a 1" EMT up in the wall** and extend it up to the accessible ceiling space. Typically that means just stubbing out of the wall just above the drop ceiling in the immediate vicinity of the outlet, or any adjoining corridor. Install plastic bushings and pull string.
- Provide a **path for cable support** from EMT stub up to the IT Network closet using hangers, cable trays or snake trays. Metal hangers shall be fastened to the walls or underside of floor/ceiling construction above. Hangers shall be Erico Caddy "Cable Cat Clips" for category 6 cable support or equal. Distance between hangers shall be random spacing between 3ft and 5 ft with 4 feet average.
- **Outlet** height shall be in the range 18" to 48" AFF (with exceptions as needed). **Coordinate with the furniture** specifics and equipment locations. Outlets should not be installed in a location that will later be covered over by a modular furniture panel or become otherwise inaccessible.
- Provide Data Outlets for all **vending machines**. Locate on the walls behind vending machines with 78" clear AFF, with two Cat 6 cables per outlet.

### 2.13.7 Cat 6 CABLE SYSTEM

- The horizontal cabling system shall be a Category 6 wiring system. In buildings with ducted air handling systems, the cable shall be riser-rated (CMR) and jacket color blue. The one exception to Cat 6 cabling will be the **wireless AP devices** which will be fed with two **Cat 6A** cables – see WAP details below. Cat 6A jacket color shall be **green** or **yellow**.
- Also it is anticipated that there will be some **special research applications** that demand 10 Gig Ethernet services, and such jacks should be identified as specifically **requiring Cat 6A cabling**.
- The typical Tel/Data jack outlet shall comprise a double gang deep box with a single gang ring with two or three cables terminated on RJ45 jacks.
- These outlet boxes are typically connected by 1" EMT feeders to the nearest accessible ceiling.
- Above drop ceilings, Cat 6 cables shall be supported by either J-hooks, or where cable quantities require, cable tray systems.
- At the data closet, **terminate all cables on rack-mounted patch panels**.
- All Cat 6 Tel/Data cables are treated the same, and terminated the same. Because they are the same, therefore **any cable** can be **used for phone or data** depending on need.
- **Label** every jack and cable termination using UMIT naming conventions.
- **All** cable terminations shall be **labeled, tested and documented**.

### 2.13.8 ACTIVE NETWORK SYSTEM DESIGN

- At the point where the designer can provide a provisional layout of the building, room functions, approximate numbers of occupants, density of IT services and an UMIT Closet schedule, UMIT/Enterprise Infrastructure (UMIT/EI) group will provide a **schedule of the network equipment**.
- At the point where the Designer is able, provide the settled floorplan design to UMIT/NS who will then provide the wireless design back to the Designer, and define exactly what and where the **wireless AP devices** should be installed ( by the Contractor).
- **Each AP device shall be fed by two Cat 6A cables.** This Cat 6A requirement is the one category that is an exception to all cable being Cat 6. The Cat 6A cable jackets and associated jacks shall all be yellow or green to distinguish them. All Cat 6 jackets and jack inserts shall be blue.
- Similarly the designer should work with UMIT/CES to determine our standardized campus implementation for a Digital Antenna System (**DAS**), to provide adequate **cell phone coverage**.
- For Audio Visual requirements in teaching spaces, coordinate with Robert Davis, UMIT/ **Computer Classrooms**, to provide the UMass standard requirements.

Again, for specific details or questions relating to any of the forgoing guidelines, please **contact UMIT/ Cable Engineering Services, ph. 413-545-3535**.