

Division 27 | Communications

Section includes various guidelines for the operation and maintenance of communication systems, common work results, structured cabling, data communications, and audio-video communications.

This design guideline is written to the designer of record (DOR). This guideline is written to document UA standards of work, assist the designers in ensuring UA standards are incorporated into the contract documents and provide a resource to facilitate the design process. It is the designer of record's responsibility to coordinate the criteria set forth in design guideline and in conjunction with the manufacturer requirements and use the most stringent standard.

Section 27 00 00 – OIT and Telecommunications

A. General

1. Voice and data telecommunications for campus are managed by the Office of Information Technology (OIT) located in Gordon Palmer Hall.
2. All designs for telecommunication additions or changes should be coordinated and reviewed by OIT.
3. The project specifications shall state “The project electrical contractor shall be required to attend at least one pre-installation meeting with OIT prior to installation of raceway, electrical boxes, cable tray and other infrastructure related to OIT’s structured cabling. This meeting will be coordinated by the UA Construction Project Manager.”
4. The requirements below are general in nature and may be changed for a particular design, depending on the needs. All deviations must be approved by OIT.
5. Basic requirements for all new building structures will include underground service entrance ducts, Telecommunication Closets (TC), a conduit riser system between TCs, and a horizontal cable distribution system.
6. All copper and fiber optic communication lines will be installed by OIT. OIT will furnish and install the following:
 - All cabling associated with voice, data (including wireless) and cable TV
 - Face plates
 - Jacks
 - Equipment racks within TC
 - Patch panels
 - Networking switches and access points
 - Cable trays within TC
 - Punch-down blocks associated with telephone system
 - Cable testing
 - Cable labeling
 - Inside and outside fiber
7. Low voltage cabling for other systems such as access control, CCTV, or parking readers will be provided by other UA departments or vendors.

8. All designs should include a complete low voltage raceway system that connects all outlet locations to the designated TC and connects TCs to each other. The raceway system should include outlet boxes, conduits, sleeves, risers, cable tray (preferred) or appropriately spaced j-hooks. All of this infrastructure should be installed by the electrical contractor.
9. All designs should include an appropriate grounding infrastructure for all TCs that meets current applicable codes. Installation of this infrastructure will be within the scope of the electrical contractor.

B. Design and Construction Drawings

1. All design and construction drawings will have a communications riser diagram which illustrates all components of the building communications distribution system. Appropriate notes will be provided to describe the size of conduit and other special instructions to the contractor. In addition, electrical drawings for each floor will illustrate components of the floor distribution system and communications outlet locations.
2. Prior to the 60% drawing review stage, provide OIT with CAD files showing reflected ceiling plans and all electrical auxiliary plans. OIT will provide the design for the wireless internet devices layout and submit it to the designer to incorporate into the final design.
3. Provide zoning on floor plans to indicate what parts of each floor are served by each TC.
4. Engineer shall advise if cavity above ceilings is plenum space or not. This information is needed to determine if the structured cabling needs to be plenum-rated.
5. Pathway for OIT service entrance conduits into buildings shall be clearly shown on drawings with appropriate details. Consult with OIT for specific requirements for each project.

C. Outside Plant System

1. Underground Conduit Banks: The campus outside plant distribution system is an underground system consisting of conduit duct banks and concrete manholes.
 - Extensions of duct banks shall be as instructed by OIT, but shall be no less than two 4" PVC schedule 40 conduits. Duct banks should have concrete reinforcement with red dye and require a minimum of 36" ground cover. If 36" depth cannot be met, OIT will work with the contractor to determine acceptable alternatives.
2. Manholes: The interior dimensions for a standard manhole are 7' long, 7' wide and 7' high. Manhole covers should be 36" diameter iron, rated for traffic duty, and stamped with "COMMUNICATION" on top. Manholes must include racks for cable, grounding buss bar, sump drain, pulling irons, hook lift anchors and expansion plugs installed in non-used conduits. Telecommunications will require lockable manhole covers (confirm model/part during design). Grounding and Bonding shall conform to NEC Article 250 and TIA/EIA-607 using a minimum conductor size of 6 AWG. Distance between manholes/handholes shall not exceed 300 feet unless instructed by OIT. All new ducts installed must have expandable rubber plugs at all ends.



3. Quazite Boxes: Quazite boxes are not to be used unless expressly specified by OIT. In some locations, a pull box will be an acceptable alternative to a manhole. In such cases, specify a Hubbell Quazite open-bottom box with minimum dimensions of 36" x 60" x 36" deep (see Hubbell PN: PG3660BA36). An extra heavy duty lid (Hubbell PN: PG3660HHDO) with counter bore design that allows for the installation of LockDown- LockDry handhole locking device. Cover logo shall be "COMMUNICATIONS".
4. Building Entrance: For academic buildings and administrative buildings, there will be two separate conduit entrances, encased in concrete with red dye, for communications into a building. There will be a minimum of two 4" diameter conduits for each of the entrance conduit runs. Conduit runs shall be comprised of schedule 40 PVC in 20' sections for straight runs. Factory- made sweeps for turns shall be used with 36" to 48" radius. Conduit under pavement shall be schedule 80 PVC. Typically, no more than two 90 degree bends between the manhole and the building will be permitted. Each conduit shall be left clean and dry and also left with Jet Line or similar pull line securely tied off at each end. The Contractor or Contractors are responsible for establishing with OIT representatives, the location to which the conduit will be placed for connection to the OIT Manhole System. LB's or elbows must not be used for conduits entering into buildings. Appropriately sized pull boxes or sweeping 90 degree bends shall be used for conduits entering the building.
 - a. Conduits entering buildings shall enter on the ground level and have either a small, dedicated, closet to serve as a fiber entrance, or a suitably sized pull box. Conduits should extend from this location to the nearest TC.

D. Building Service

5. Underground Conduit Banks: The campus outside plant distribution system is an underground system consisting of conduit duct banks and concrete manholes.
 - b. Extensions of duct banks shall be as instructed by OIT, but shall be no less than two 4" PVC schedule 40 conduits. Duct banks should have concrete reinforcement with red dye and require a minimum of 36" ground cover. If 36" depth cannot be met, OIT will work with the contractor to determine acceptable alternatives.
6. Manholes: The interior dimensions for a standard manhole are 7' long, 7' wide and 7' high. Manhole covers should be 36" diameter iron, rated for traffic duty, and stamped with "COMMUNICATION" on top. Manholes must include racks for cable, grounding buss bar, sump drain, pulling irons, hook lift anchors and expansion plugs installed in non-used conduits. Telecommunications will require lockable manhole covers (confirm model/part during design). Grounding and Bonding shall conform to NEC Article 250 and TIA/EIA-607 using a minimum conductor size of 6 AWG. Distance between manholes/handholes shall not exceed 300 feet unless instructed by OIT. All new ducts installed must have expandable rubber plugs at all ends.
7. Quazite Boxes: Quazite boxes are not to be used unless expressly specified by OIT. In some locations, a pull box will be an acceptable alternative to a manhole. In such cases, specify a Hubbell Quazite open-bottom box with minimum dimensions of 36" x 60" x 36" deep (see Hubbell PN: PG3660BA36). An extra heavy duty lid (Hubbell PN: PG3660HH00) with counter



bore design that allows for the installation of a LockDown - LockDry handhole locking device. Cover logo shall be "COMMUNICATIONS".

8. Building Entrance: For academic buildings and administrative buildings, there will be two separate conduit entrances, encased in concrete with red dye, for communications into a building. There will be a minimum of two 4" diameter conduits for each of the entrance conduit runs. Conduit runs shall be comprised of schedule 40 PVC in 20' sections for straight runs. Factory-made sweeps for turns shall be used with 36" to 48" radius. Conduit under pavement shall be schedule 80 PVC. Typically, no more than two 90 degree bends between the manhole and the building will be permitted. Each conduit shall be left clean and dry and also left with Jet Line or similar pull line securely tied off at each end. The Contractor or Contractors are responsible for establishing with OIT representatives, the location to which the conduit will be placed for connection to the OIT Manhole System. LB's or elbows must not be used for conduits entering into buildings. Appropriately sized pull boxes or sweeping 90 degree bends shall be used for conduits entering the building.
 - c. Conduits entering buildings shall enter on the ground level and have either a small, dedicated, closet to serve as a fiber entrance, or a suitably sized pull box. Conduits should extend from this location to the nearest telecommunications closet.

Building Service

1. Number: A building will have a minimum of one Telecommunications Closet (TC) for housing voice and data communications equipment. A floor rack is required for every 288 data drops served by a closet. A typical floor rack will require 32" width & 24" depth and 3' space on front, back, and one side.

Minimum room sizes

- For closets serving 288 or less data drops, the absolute minimum dimensions shall be 8'x6'.
 - For closets serving more than 288 data drops, the absolute minimum dimensions shall be 9'x11'.
2. Location: TCs shall be centrally located and vertically stacked as needed. Closets shall be located such that vertical cable installations are limited to two floors either above or below. Closets shall be conveniently located for delivery and/or removal of equipment. Closets shall open to common corridor. Avoid areas of electromagnetic interference; not located near areas subject to water or steam infiltration or in a corrosive atmosphere.
 3. Placement: TCs must be no further than 90 meters (295'), via the wiring route, from the most distant outlet/connection served by that TC.
 4. Dedicated Space: The only equipment or permitted use of the closet will be network, telephone, action card, digital signage, emergency PA, and access control equipment and wiring. No other building services shall share the space. Any other equipment installed in the TC must be approved by OIT. If non-telecommunications equipment is installed in the TC, it must be removed immediately and the cost for that removal will be incurred by the contractor.



5. HVAC: TC HVAC shall be available on a 24 hours-per-day, 365 days-per-year basis. A stand-alone unit should be considered for telecommunication closets. The system shall be operable regardless of outdoor temperature and controlled independently of other parts of the building. A hard-wired thermostat should be located in the closet. If a standby power source is available in the building, consideration should be given to also connecting the HVAC system serving the TCs to the standby supply. The temperature and humidity shall be controlled to provide continuous operating ranges of 18 °C (64 °F) to 24 °C (75 °F) with 30% to 55% relative humidity. The ambient temperature and humidity shall be measured at a distance of 1.5 m (5 ft.) above the floor level, after the equipment is in operation, at any point along an equipment aisle centerline. Ventilation shall accomplish one air change per hour (minimum). Filtration systems are required to reduce airborne particulates. Filter systems shall ideally be accessible from outside of the room. For initial programming assume an equipment heat load per room of 12000 BTU per hour. Confirm projected heat loads during design phase; some rooms may have a much higher heat load.
6. Backboard: Provide a 3/4" inch plywood backboard on all walls. The backboard must be painted gray with fire retardant paint designed for such purposes. Alternatively, fire rated plywood with regular paint may be used; in this case, at least one fire retardant stamp shall be left exposed on each sheet of plywood. The backboard should start at the floor and be 8' high and cover the perimeter of the TC.
7. Electrical: Provide a single-circuit plug-mold for each wall, mounted 24" AFF and running the full length of the backboard, with outlets 12" on center for powering equipment. Circuit draw shall be less than 20 A.
 - a. For initial programming, assume two NEMA L5-30 outlets in addition to the plug-mold listed above. These circuits should be powered from a power system that has stand-by power capability, if it is available in the building. Each of these outlets should be on a dedicated circuit. These outlets shall be installed on the same wall as the equipment racks. Confirm final power requirements with OIT during design phase.
 - b. Install a contiguous intra-building grounding and bonding system, in compliance with NEC Article 250 and TIA/EIA-607, using a minimum conductor size of 6 AWG to be located on one plywood backboard with ground bus bar as directed.
8. Telecommunications Main Grounding Bus Bar: 0.25" thick solid copper bar x 4" high x 20" long and shall meet requirements of ANSI/EIA/TIA-607 standards. Bus bar shall be installed on the same wall as the equipment racks at 18" AFF.
9. Structure: The rated distributed floor loading shall be 100 lb - ft/ft². The rated concentrated floor loading shall be 250 lb-ft/ft².
10. Flooring: The TC must have a hard floor (e.g., concrete or tile). Carpeting is not acceptable. Vinyl composition tile (VCT) is the standard. Alternates must be approved by OIT.
11. Ceiling: The ceiling in the TC will be open (no false/suspended ceilings) so that there is easy access to the conduit, raceways, cables, etc. entering the room.



12. Fire rating: Contractor shall be required to restore all walls and floors to their original fire ratings using EZ Path materials after penetrating walls or slabs with any type of horizontal or vertical raceway.

13. Wall Sleeves: To determine the number of wall sleeves required, use the following guidelines:

- Maximum number of Cat 5e cables (maximum .225" diameter) allowed to be installed in EMT conduit:

3/4"	5
1"	8
1-1/2"	20
2"	33
2-1/2"	58
3"	89
3-1/2"	116
4"	147

- Maximum number of coax cables (maximum .307" diameter) allowed to be installed in EMT conduit:

3/4"	2
1"	4
1-1/2"	11
2"	18
2-1/2"	31
3"	47
3-1/2"	62
4"	79

14. Lighting: Lighting shall be a minimum of 50 foot candles, measured three (3) feet off of the floor, with non-EMI generating lights on a separate switch inside the TC. Coordinate the placement of fixtures with room layouts supplied by OIT for each project. Temporary lighting may be required during the project.

15. Smoke Detector: The TC must have a smoke detector.

16. Water: Designs should not include water sources (with exception of sprinklers required by code) near the TC, particularly in the ceiling area above the TC. In cases where this cannot be avoided, an acceptable preventative system (e.g. drip pan, rubber membrane) must be approved by OIT. No other utilities shall pass through the TC, except for building sprinkler systems.

17. Key: The TC door must be keyed with a DC-3 Key and a card reader. The door should be equipped with an electric strike. Before equipment is installed in the TC, a lockable door must be installed. A temporary door may be used until a permanent door arrives. OIT must be given keys for access.

18. Door: The door shall be 7 feet high by 3 feet wide, lockable, and opens outward (unless prohibited by code). Doors and frames shall be designed and equipped with conduit for door alarms or future electric locksets and access control system readers.
19. Wall Outlets: The Contractor is to provide voice and data communications outlet boxes at locations shown on the project drawings. For voice and data connections totaling less than four, a double-gang box with a single-gang plaster ring should be used. For voice and data connections greater than four in a single box, a triple-gang box with a double-gang plaster ring should be installed. From each outlet box a 1" conduit should be run to above an accessible ceiling area and within 1 foot of cable tray. For outlet boxes terminating more than four connections, two 1" conduits should be used. Blank box covers should be installed on boxes not to be immediately used. Conduits must have bushings installed at both ends.
20. Floor Boxes: All floor boxes installed should be capable of supporting data, AV, and electrical in the same box. Floor box requirements should be carefully reviewed with OIT networking and AV solutions during the design phase.
21. Wiring Trays: The building should be designed with a cable-tray system in the hallways to be provided by the contractor. Appropriately sized conduit paths should be provided across areas with hard ceilings and within risers.
 - Conduit pathways built for telecommunication cabling have more stringent bending and pull box requirements than electrical cabling. These conduit pathway requirements must be adhered to (i.e. a telecommunications conduit can have no more than 180 degrees of cumulative bends between pull points where as a conduit installed for electrical wiring may have 360 degrees of cumulative bends between pull points).

E. Project Schedule

The General Contractor will create a project plan, noting OIT timelines and milestones. The project schedule must be submitted to OIT to OIT as required by contract.

Change Process: OIT will not deviate from plans without written notice from the UA project manager. Estimated costs for proposed changes will be communicated to the project manager for final approval.

F. Certification / Acceptance

All facilities will be inspected by the UA or UA's agent. A list of facilities failing to meet specification will be provided to the Contractor for correction. Only after all failures have been corrected and re-inspected by UA or UA's agent, and certified within specifications, will all facilities be accepted.



Section 27 32 50 – Two-Way Communications

A. General

A two-way communication device shall be installed at each elevator landing on each floor that is one or more stories above or below the level of exit discharge.

UA Dispatch shall serve as the Central Control Point as referenced in IBC 1009.8.1. The utilization of UA dispatch as the Central Control Point eliminates the need for a central base station to be located within the building. Protocols are in place so that the location of the caller is readily available and an appropriate response can be coordinated between UA dispatch and the responding agency. This arrangement has been approved by the City of Tuscaloosa Fire Marshal.

B. Device Requirements

Two-way communication devices must be independent from all other systems and shall be equipped with/include the following features:

- Device shall include a hands-free speakerphone with an LED that indicates the status of the call.
- Device shall be flush mounted with stainless steel finish.
- Device wording and markings shall include “Emergency” or “Help”, the International Phone Symbol, and raised Braille lettering.
- Device shall be fully phone line powered, requiring no external power supply.
- Device shall be capable of functioning as indicated below.

C. Sequence of Operation

The two-way communications device shall provide both audible and visual communication between the device and UAPD dispatch.

The device is activated by means of a user pushing the activation button. Once the button has been pushed, the call can only be terminated by the UAPD dispatcher. When the device is activated:

- The led indicator lamp will illuminate.
- An automatic call to UAPD dispatch will be immediately initiated by the device.
- UAPD will receive visual caller ID information that indicates to the dispatcher “#Building Name#, #Location in Building#, Area of Rescue”.
- After the call is received by the UA dispatcher, the device microphone will be automatically enabled, as to allow voice or audible communication between the caller and dispatcher.
- UA dispatchers will then relay the activated device location and any other pertinent information to the appropriate responding agency.



D. Products

Rath 2400-808NSS or prior approved equal.

Talkaphone ETP-100EB or prior approved equal.

E. Execution

- Installations must comply with the 2015 IBC and ADA requirements for accessible height, reach, and clear floor area.
- A separate, dedicated POTS line shall be connected to each two way communication device.
- Power and communications circuiting must be installed in conduit.
- The data closet where the communications circuit originates must be provided with emergency power through a generator or battery backup.
- Video camera coverage shall be provided at each device through the building camera system. There shall be no interconnection between two-way communication devices and camera systems.
- Directions for use of the two-way communication device shall be posted adjacent to the device. Signage shall comply with ICC A117.1 requirements for visual characters.
- Do not install a central base station in the building.

Section 27 53 13 – Clock System

A. General

The University will be operating a Primex Wireless GPS Synchronized Clock System.

B. Requirements

New system clocks shall be manufactured by Primex or be operational on the Primex Wireless GPS Synchronized System.

- End -