

STATE UNIVERSITY CONSTRUCTION FUND

PROGRAM DIRECTIVES

DIRECTIVE 27-1

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COMMUNICATION SYSTEMS

1. General
 - a. When programmed in the scope of work, provide the following:
 - 1) Design of the complete pathway infrastructure for the communications systems required for the project by the Campus.
 - 2) Design of the communications system or components required for the project by the Campus.
 - 3) Communications systems may include cabling, equipment, etc. required for data, voice, cable, internet, integrated audio / video and distributed communication systems. Distributed communication systems include public address, security, intercom, sound, signage, clock and other electronic communication systems required by the Campus for the project.
 - b. The system designer shall be a Registered Communications Distribution Designer (RCDD). Submit qualifications for review and approval.
 - c. The pathway infrastructure shall be shared by the communication system(s) programmed for the project. Do not provide separate pathway infrastructure for data & voice or other communications systems unless specifically requested by the Campus and authorized by the Fund. Design adequate physical infrastructure for current and future needs. Infrastructure includes riser systems, conduit, cable trays and utility closets and must be designed into all new and renovated structures.
 - d. Public Address (P.A.) Systems shall be included as Group I Equipment (In Contract) when programmed for buildings such as Physical Education, Student Activities, and Campus Schools. Central clock systems shall be included as Group I Equipment when programmed by the Campus; primary voltage systems are not covered by this Directive.
 - e. Provide an isolated grounding system for the data and communications systems. Provide a ground conductor in all raceway segments.

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2. General Layout

- a. Typically the equipment required for communications service on any floor is to be located in Communication Services Room(s) on that floor. General equipment serving the entire building is to be located in the Communications Services Room on the floor through which the communications service conduits enter the building (usually the basement). However, certain systems such as video and data network distribution may require the main service equipment to be located in secondary utility closets.
- b. Equipment and interconnection hardware will not be located in ceiling spaces or other concealed or difficult to reach locations.
- c. Space within the pathway infrastructure shall be sufficient for the programmed communications systems and allow additional space for at least 100% spare capacity.

3. Specific Requirements

The following communications infrastructure will be required in new or renovated buildings.

a. Utility Entrance

- (1) The duct bank from the most convenient communications manhole or vault will typically consist of six 4" PVC or steel conduits encased in reinforced concrete. The exact number will depend upon the size and usage of the building. These conduits may be used for all communication systems serving the building. See Directive 2-3 for more specific site work requirements.
- (2) Service to a building should not be fed via another building unless specified by the local Campus.
- (3) Service conduits will penetrate the foundation wall of the building so that cables can be pulled directly into the Communication Services Room (CSR) on that floor without splicing.

b. Communications Service Rooms (CSR)

- (1) The communications service rooms (CSR) in each building must be designed to accommodate permanent electronic communications

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equipment as well as building distribution cables and in some cases to terminate all service cables to the building. This means that appropriate power and environmental controls must be provided. This room may be shared by all non-power utilities, such as telephone, data, video, alarm, monitoring, and access control, provided that the design ensures sufficient space, environmental support and access exists for the Campus needs.

- (2) There must be a CSR within 295 cable feet of any communications outlet location. Measure this distance along the actual cable pathway. If this requirement can not be met, additional CSRs will be required on any such floor.
- (3) The minimum recommended size is 10' x 10', but may need to be larger to accommodate all the services to be housed. Minimum recommended door size is 3'6" x 7'0" and it should swing out into a public space. All walls of the CSR shall be covered with 3/4 inch painted AC fire retardant plywood attached so that it is capable of supporting 50 lbs per linear foot of wall space. Dedicated 120 VAC, 20 amp, double duplex outlets shall be provided for each communications service (see following sections for details). In addition, a separate 120 VAC, 20 amp circuits shall be provided for temporary equipment (e.g. test equipment) with duplex outlets every 6 feet along the CSR walls. All outlets are to be located approximately 12" above the finished floor and clearly labeled with the breaker and panel number from which it is fed. Lighting shall be provided to ensure a minimum of 50 foot candles, measured 3' above the finished floor. A 3/4" conduit and ground wire shall be provided between the CSR and the location of the main building isolated grounding electrode.
- (4) The HVAC system for the CSR shall be designed to maintain an environment appropriate for the intended equipment, including maintaining ambient temperature at or below that recommended by the equipment manufacturer and minimizing dust accumulation.
- (5) No piping shall be run in the CSR except for sprinkler piping serving the space.

c. Riser Systems

- (1) Ideally, the Communications Service Rooms (CSRs) would be stacked so that all that is required is conduit nipples between floors.

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- (2) A minimum of three 4" diameter conduits, or equivalent raceway cross section, must be provided between the CSRs on adjacent floors.
 - (3) If the CSRs are not aligned vertically above one another, the conduits interconnecting them will have horizontal offsets. There shall be no more than two 90° bends in any such conduit run. Any bend must have an inside radius 10 times the diameter of the conduit (typically 40"). If these conditions can not be met, then intermediate pull boxes accessible from public space must be used wherever a non-standard transition is required. This pull box must be at least 20" x 20" in the plane of the attached conduits, and 6" deep. All conduits other than simple nipples between floors must be fitted with a continuous 1/4" nylon pull rope.
 - (4) Where fire-stopping is required by code, choose a system that permits simple modifications when cables are added or modified in the future.
- d. Horizontal Distribution Infrastructure
- (1) This infrastructure normally will be installed in the ceiling space of corridors. It is essential that this infrastructure be flexible and accessible, such as cable tray. Ceiling type shall provide easy and convenient accessibility. Above non-accessible ceilings, cable tray is still preferred, although metal raceway systems are acceptable when flexibility and accessibility limitations are mitigated. Provide sectional views of the space above typical corridors showing coordination of the cable tray with other MEP systems. Show all offsets and elevation changes required.
 - (2) A typical cable tray will be 12" wide by 4" deep with partitions or posts separating the width into 2 or 3 sections (this tray may be shared by all non-power utilities). Alternatively, the tray may be sized to provide 1 square inch of cross section for every 100 square feet of floor area served.
 - (3) If the cable tray traverses an inaccessible ceiling area, such as gypsum board or plaster an equivalent cross section of conduit or enclosed wire tray will be provided to span the inaccessible area. Branch conduits shall not terminate at inaccessible sections of the tray or conduit.
 - (4) Raceway shared by more than two cables must be at least 4" by 6" and mounted so that top or side cover is removable at any point.

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e. Communications Outlet Distribution

- (1) Outlets should be located near where it is anticipated that service will be required. Each device should have its own station cable. "Daisy chaining" of devices is not allowed.
- (2) Typically conduit should be installed from just above the cable trays through the walls and ceiling spaces to a standard electrical fixture box. Within a room, surface metal raceway might be used where a large number of communications outlets are anticipated.
- (3) If conduit is to be used it must be EMT if concealed or RGS if exposed. Ideally there will be a separate conduit for each outlet. In no case may an outlet service conduit serve more than 2 outlet locations. Wherever a change of direction occurs, radius bends must be used. The inside radius of bends must be 10 times the diameter of the conduit. There may be no more than two 90° bends in any unbroken run. All installed conduit must include a fish tape or pull cord. If a run must be broken with a pull box, it shall be placed in an exposed manner and location, and readily accessible.
- (4) If cable tray is used for the main horizontal distribution, the work space conduit must extend to a point just above the near side of the tray. If raceway is used, the work space conduit must penetrate the raceway with a standard conduit connector. Conduits shall be clearly labeled at both ends designating the outlet location(s) served.
- (5) In some cases, especially in remodeling existing structures, it may be impractical to install conduit between the cable tray and the outlet locations. Surface mounted raceway, or other alternative measures, can be considered but must be reviewed with Fund and Campus.
- (6) At each outlet location provide an appropriate metal electrical box. Unless it is known that service will be established at a particular box, each box is to be finished with a plain solid cover plate.

4. Review Requirements

- a. Determination of the project requirements for communication infrastructure should be initiated as early as possible with the relevant Campus service units. Locations of CSRs & major distribution routes and description of the applicable reference standards should be included in the Schematic Design Phase Report.

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- Outlet locations should be shown in the Design Manual Report. Document the results of review and design approval by the relevant Campus service units in accordance with Directive 1C-11.
- b. Construction documents should include plans and schematic riser diagrams of all communication systems and infrastructure. Where communications cabling and equipment is included in the bid documents, provide a T series of Technology Drawings showing backbone information, drop locations, and rack and backboard elevations for all CSRs. Drawings may include the following:
- 1) System and pathway drawings at the site perspective.
 - 2) Layout of the complete building per floor. Drawings indicate the locations of serving zones, CSRs, access points, pathways from the complete building perspective.
 - 3) Layout of the serving zones showing drop locations, CSRs, access points and details of congested areas.
 - 4) Layout of CSRs showing technology layout (racks, ladder racks, etc.), mechanical and electrical layout for coordination, and elevations of racks and backboards.
 - 5) Detailed drawings showing typical faceplate labeling, faceplate types, recommended installation procedures and details of racks, raceways, etc.
 - 6) Schedules coordinating integration of this project into the Campus cable plant management database.
- c. Project Manual should consolidate the communications related specifications into a separate Division, such as the Division 26 proposed by CSI. Review the need for the following sections with the Campus Facilities Management Office and technology contacts:
1. Communications General
 - i. Communications Life Cycle Activities
 - ii. Common Materials & Methods for Communications
 - iii. Communications System Commissioning
 - iv. Structured Cabling and Enclosures
 - v. Communications Equipment Room Work
 - vi. Interior Communications Pathway Requirements
 - vii. Exterior Communications Pathway Requirements
 - viii. Backbone Communications Cabling
 - ix. Horizontal Communications Cabling
 - x. Connections Cords, Devices and Adapters

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2. Data Systems

- i. Data Systems Life Cycle Activities
- ii. Common Data Systems Materials & Methods
- iii. Data System Commissioning
- iv. Data System Network Equipment
- v. Data System Hardware
- vi. Data System Security
- vii. Peripheral Data Equipment
- viii. Data System Software
- ix. Data System Programming and Integration Services

3. Voice Systems

- i. Voice systems Life cycle activities
- ii. Common voice systems material and methods
- iii. Voice system commissioning
- iv. Voice system instrumentation and control
- v. Switching and routing equipment
- vi. Telephone sets, faxes and modems
- vii. Voice messaging systems
- viii. Dedicated 911 systems / TTY equipment
- ix. Call accounting
- x. ACD / Call center

4. Audio Video Communication Systems

- i. Audio Video systems Life cycle activities
- ii. Common voice systems material and methods
- iii. Audio Video system commissioning
- iv. Internet Access
- v. Cable Service
- vi. Audio Video Systems Instrumentation and Control
- vii. Systems and Equipment
- viii. Production, Presentation and Conferencing Systems
- ix. Architecturally Integrated Audio Video Equipment
- x. Portable Audio Video Equipment
- xi. Intercom Systems
- xii. Dictation Equipment
- xiii. Paging Systems
- xiv. Public Address
- xv. Other systems

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- xvi. Sound Masking
 - xvii. Electronic/Digital Signage Systems
 - xviii. Tracking Systems
 - xix. MATV and CATV
 - xx. Internal Cellular
 - xxi. Healthcare communications Systems.
 - xxii. Nurse Call, patient monitoring
 - xxiii. Hospitality and Entertainment Systems
 - xxiv. Clock Systems
 - xxv. Coordination with Elevator monitoring systems
 - xxvi. Coordination with Door controls systems
 - xxvii. Coordination with Security, detection and alarm systems
- d. Where communications systems are installed by the contractor, the specification should require that installers be Building Industry Consulting Services International (BICSI) registered cabling technicians, National Institute for Certification in Engineering Technology (NICET) registered.
- e. System commissioning should include testing of 100% of all cabling, devices, equipment etc. Testing may occur in the presence of the relevant Campus service unit. Require a separate package of record drawings, operating instructions, approved shop drawings, etc. for the Campus telecommunications service unit.
- f. If the Campus is contracting independently for cabling and equipment, add the following to Division 1, General Requirements:
- a) The Campus will contract independently to install telecommunications and data systems for the building. Cooperate with them and their contractors for access to the work as follows:
 - 1. Telecommunications cable trays, conduits and raceways throughout the building and electrical power wiring, door hardware, and other construction within the signal rooms and closets shall be substantially complete as of six months ahead of the substantial completion date for the Building, at which time the Campus may begin delivery and installation of their wiring and equipment.
 - 2. An initial assessment and walkthrough of the telecommunications distribution system for compliance with the requirements of Division 25 shall be performed by the Consultant's RCDD one month prior to the date in the previous

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paragraph, and the Contractor shall perform all corrective work noted by the substantial completion date above.

3. Lay in acoustical panels specified in Division 9 shall not be installed until three months after the date specified in paragraph 1 above.

The Campus' contractors will be given the opportunity to review and comment on the coordination drawings prepared by the Contractor.

4. Storage of materials by the Campus' contractors within the contract limit lines shall be limited to the signal rooms and closets on each floor and to 400 SF on each floor on an as needed basis.
5. The Campus' contractors shall provide insurance similar to that required by Article V of the Agreement listing this Contractor as a named insured.

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