

# Third Party Design, Construction and Operations on FIU Campuses

## DIVISION OF INFORMATION TECHNOLOGY

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A. List of Applicable Requirements:

Division of IT infrastructure standards APPENDIX "C" (see attachment)

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B. List of Applicable Regulations, Policies, Procedures:

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C. Standard Protocol/Process:

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D. List Applicable Exclusive Contracts (if any):

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E. Other Information:

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**FLORIDA INTERNATIONAL UNIVERSITY  
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**APPENDIX "C" - STANDARDS FOR TELECOMMUNICATIONS FACILITIES FOR NONRESIDENTIAL RESIDENTIAL LIFE BUILDINGS**

The purpose of this standard is to provide for the planning and installation of telecommunications facilities in new buildings and major renovations. This standard has been developed with little knowledge of the telecommunications equipment that subsequently will be installed. Therefore, the definitions included herewith are for generic telecommunications facilities that will support a multitude of rapidly changing telecommunications technologies in a multivendor and variable end user environment.

This standard recognizes three fundamental concepts related to telecommunications and buildings:

- (1) Buildings are dynamic. Renovation, remodeling and upgrading are more the rule than exception. This standard takes into account that change will occur.
- (2) Building telecommunications systems and media are dynamic. As time passes both telecommunications equipment and media change considerably. This standard recognizes this fact and the facilities prescribed herein are capable of supporting a vast array of telecommunications systems and media.
- (3) Telecommunications is more than telephones. Telecommunications is inclusive of a variety of building systems including data systems, environmental control, security, audio, television, sensing, alarms, emergency communications and much more.

Above all, this standard recognizes a fact of fundamental importance: if a building is to be properly designed, built and provisioned for telecommunications systems, it is imperative that the telecommunications design be incorporated during the architectural design phase.

The FIU/UTS Infrastructure Department developed this document in accordance with industry specifications. It is the standard by which the University defines the physical facilities required for the provisioning of telecommunications systems for new buildings and major renovations to existing buildings. These specifications take into account the physical facilities such as the size and provisioning of telecommunications rooms, cable distance limitations, vertical and horizontal cabling considerations, number and size of conduits and numbers and types of information outlets. The general cabling requirements are not addressed, because FIU/UTS is solely responsible for the installation of all the telecommunications wiring in all FIU buildings and campuses.

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

APPENDIX "C" TABLE OF CONTENTS

1.0 GENERAL	C - 3
2.0 CABLE PATHWAYS	C - 3
2.1 INFORMATION OUTLETS	C - 3
2.2 CONDUIT	C - 5
2.3 CABLE TRAYS	C - 6
3.0 TELECOMMUNICATIONS ROOMS	C - 7
3.1 DESCRIPTION/DEFINITION	C - 7
4.0 OUTSIDE PLANT	C - 10
4.1 DEFINITION DESCRIPTION	C - 10
4.2 MANHOLES	C - 11
DRAWINGS	C - 13

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

**1.0 GENERAL**

- 1.1 **RESPONSIBILITY** - It is the responsibility of the project architect/engineer to ensure the inclusion of the standards for building telecommunications facilities into the design and construction documents for new and major renovation projects.
- 1.2 **REFERENCES** - In addition to the specifications included herewith the architect/engineer is encouraged to refer to the following publications for guidance during the design of the communications infrastructure:

Building Industry Consulting Service International (BICSI); Telecommunications Distribution Methods Manual (Latest Edition).

Electronic Industries Association, Telecommunications Industry Association (EIA/TIA) Building Telecommunications Wiring Standards.

NFPA's National Electric Code (NEC).

FIU/UTS Infrastructure Department.

1.3 **COORDINATION** - Prior to the start of any telecommunications related work, the contractor shall coordinate the installation with the UTS/Infrastructure Department ..

**2.0 CABLE PATHWAYS**

**2.1 INFORMATION OUTLETS**

2.1.1 **REQUIREMENTS** - Specific requirements for information outlets for each room and each project must be coordinated with the building occupants at the onset of the design phase of major renovations and new construction projects. The architect/engineer for major renovation and new construction projects is cautioned that the Building Program for the project includes requirements, but may not be all-inclusive regarding communication facilities. Therefore, the project architect/engineer must work closely with the building occupant and the FIU/UTS Infrastructure Department to minimize the need for revisions and changes after the completion of the design phase.

2.1.2 **FLOOR MOUNTED** - The use of floor mounted information outlets is strongly discouraged as it does not allow for flexibility in furniture layout and inhibits future changes to the telecommunications system.

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

- 2.1.3 ELECTRICAL BOXES - Locations for information/wireless outlets must be equipped with a 4 in. X 4 in. X 2.5-in. electrical box equipped with a mudring sized for the installation of a standard duplex outlet.
- 2.1.3.1 WATERPROOF BOXES- Outdoor wireless antenna, outdoor paging horns , and outdoor security cameras locations must be equipped with a 4 in. X 4 in. X 2.5-in waterproof box with blank cover.
- 2.1.4 MOUNTING HEIGHT - Electrical boxes installed for information outlets must be placed at the same level as the adjacent duplex electrical receptacles or at least fifteen (15) inches above the finished floor.
- 2.1.4.1 Electrical boxes installed for information outlets located above counters equipped with a splash back must be placed at 6 in. above the top of the counter. (Measure to the center of the outlet.)
- 2.1.4.2 Electrical boxes installed for information outlets located above counters not equipped with a splash back must be placed at 12 in. above the top of the counter. (Measure to the center of the outlet.)
- 2.1.4.3 Electrical boxes installed for emergency phones in classrooms/lecture halls/auditoriums/labs/lounges/conference rooms/ shall be mounted 48 in. above finished floor.
- 2.1.4.4 Electrical boxes installed for indoor wireless access points information outlets shall be located above drop ceiling spaces or alternate location that is determined by UTS after site survey is completed.
- 2.1.4.5 Waterproof boxes for outdoor wireless antennas and emergency paging horns installation heights will be provided to contractor after a site survey of building is conducted by UTS.
- 2.1.4.6 Electrical boxes installed for emergency call buttons in all Residential Life building apartments shall be mounted 48 in. above finished floor by entrance.
- 2.1.4.7 Electrical boxes installed for indoor security cameras outlets shall be located above drop ceiling spaces or alternate location that is determined by UTS and Facilities after site survey is completed.

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

- 2.1.5 FACULTY/ADMINISTRATIVE OFFICES must have a minimum of one (1) information outlet per designated occupant, however two (2) are recommended for furniture relocation of additional staff.
- 2.1.6 CLERICAL/STAFF OFFICES shall have a minimum of one (1) information outlet per designated occupant plus one (1) information outlet for every two (2) additional occupants.
- 2.1.7 SECRETARY/ADMINISTRATIVE ASSISTANT OFFICES shall have a minimum of one information outlet per designated occupant plus two (2) outlets per office or two (2) extra outlets per five (5) people.
- 2.1.8 CLASSROOM/LECTURE HALLS/Auditoriums shall have a minimum of one (1) information outlet for emergency phone, and one (1) to four (4) information outlets for data depending on occupancy size:

Classroom Size (Student Occupancy)	Minimum Number of Outlets
1-50	1
51-100	2
101-200	3
201 or more	4

- 2.1.8.1 The recommended location priority relationship for the information outlets must be: chalkboard/dry eraser board, lectern, projection booth/rear wall and remaining sides. The recommended location for emergency phone must be: next to chalkboard/dry erase board or teaching station podium.
- 2.1.9 GRADUATE STUDENT OFFICES shall have a minimum of one (1) information outlets per designated occupant.
- 2.1.10 LABORATORIES shall have a minimum of one (1) information outlet per room; actual number may be more depending on function and occupant requirements.
- 2.1.11 CONFERENCE ROOMS shall have a minimum of one (1) information outlet per room. Rooms with more than 500 ft<sup>2</sup> shall have a minimum of two (2) information outlets installed.
- 2.1.12 STORAGE AREAS shall have a minimum of one (1) information outlet for rooms over 500 ft<sup>2</sup> and one (1) additional outlet for each additional 2000 ft<sup>2</sup>.

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

- 2.1.13 INDOOR WIRELESS AREAS shall have a minimum of one (1) information outlet location per access point which will be located above ceiling.
- 2.1.14 OUTDOOR WIRELESS AREAS shall have a minimum of one (1) information outlet location per access point, to be located above ceiling on the inside of the outside wall of building.
- 2.1.15 OUTDOOR EMERGENCY PAGING HORNS shall have a minimum of (1) information outlet location per horn, to be located on the outside wall of building.
- 2.1.16 RESIDENTIAL LIFE APARTMENTS shall have a minimum of (1) information outlet location, in each bedroom, and common area.

**2.2 CONDUITS**

- 2.2.1 A 1 inch EMT conduit must be installed from each information outlet electrical box including indoor/outdoor wireless access point, emergency call buttons, security cameras, EMS, and emergency paging horn location and "stubbed" up above the ceiling level to cable tray. (Please see attached drawing, Fig. 2.2.1-A)
- 2.2.2 If fixed ceilings are installed cable trays cannot be used and conduit from information outlets must be "homerun" to the telecommunications room or nearest cable tray.
- 2.2.3 The open ends of conduits and/or sleeves must be equipped with bushings to avoid damage to cable sheaths and must be readily accessible and not concealed within walls.
- 2.2.4 Telecommunications rooms contain the vertical cable riser space. Conduits and/or sleeves must be used to interconnect telecommunications rooms. The open ends of conduits and/or sleeves must be located a maximum of 3 in. from the wall and extend a minimum of 1 in. above the finished floor.
- 2.2.5 REQUIRED NUMBER - The minimum number of conduits, and/or sleeves interconnecting the telecommunications rooms must be determined as follows:

<u>Building Total (Square Footage)</u>	<u>Quantity of Conduits</u>	<u>Size of Conduit</u>
Up to 50,000 ft <sup>2</sup>	3	4"
50,001 ft <sup>2</sup> to 100,000 ft <sup>2</sup>	4	4"
100,001 ft <sup>2</sup> to 300,001 ft <sup>2</sup>	5-8	4"
300,001 ft <sup>2</sup> to 500,000 ft <sup>2</sup>	9-12	4"

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

- 2.2.6 PULL BOXES - A pull box must be installed in sections of conduit longer than 100 ft. or containing more than two 90-degree bends or if there is a reverse bend in the run.
- 2.2.7 Minimum requirements for installed conduit, such as support, end protection, and continuity, are found in appropriate electrical codes.
- 2.2.8 The inside radius of a bend in conduit must be at least 6 times the internal diameter. When the conduit size is greater than 2 in. the inside radius must be at least 10 times the internal diameter of the conduit.
- 2.2.9 PULL CORDS - All conduits must have a fish tape or pull cord, rated for 200 lbs. of pull force, and installed end-to-end.
- 2.2.10 ELEVATOR – A ¾” conduit must be installed from each elevator equipment room to the nearest telecommunication room or cable tray.
- 2.2.11 EMS – A 1” conduit must be installed from each mechanical room “homerun” back to the nearest telecommunication room or cable tray.
- 2.2.12 FIREALARM - A ¾” conduit must be installed from the fire alarm panel to the nearest telecommunication room or cable tray.

Note: (1) Under **no** circumstances will flexible metallic conduit be used for any telecommunication wiring.  
(2) Under **no** circumstances will any conduits be “daisy-chained” together.

### 2.3 CABLE TRAYS

- 2.3.1 Cable trays are rigid structures for the containment of telecommunications cables.
- 2.3.2 GROUNDING - Cable trays must be installed and grounded in accordance with the National Electric Code (NEC) and local requirements. (Please see attached drawing, Fig. 2.3.2-A)
- 2.3.3 TYPE - Cable trays must be of the 12 to 18-in. ladder type, equivalent to Wiremold, Part No. A060612, unless otherwise specified by the UTS Project Manager.
- 2.3.4 Cable trays must be installed above false ceilings and run down hallways and corridors providing a pathway for telecommunications cable from the information outlets to the respective telecommunications closet.



**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

- 2.3.5 Cable tray installation must be coordinated with all work of other trades to avoid any interference. Cable trays must be installed such that they are not obstructed by other trades equipment, i.e. air conditioning ducts, electrical conduit etc. Cable trays must be easily accessible for the installation of cables and, future changes to telecommunications systems.
- 2.3.6 A minimum of 3-in. clear vertical space must be available between the top of the ceiling tiles and the bottom of the cable tray. A minimum of 12 in of clear horizontal space on each side of the cable tray must be available. Also, minimum of 6 in of clearance must be available between the top of the cable tray and any other utilities.
- 2.3.7 Under **no** circumstances, shall any other utilities pass within the distances specified in 2.3.6
- 2.3.8 To avoid electromagnetic interference, all cable pathways must provide clearances of at least:
- 4 ft. from large motors or transformers.
  - 1 ft from conduit and cables used for electrical power distribution.
  - 5 in. from fluorescent lighting. Pathways should cross perpendicular to fluorescent lighting and electrical power cables or conduits.

### 3.0 TELECOMMUNICATIONS ROOMS

#### 3.1 DESCRIPTION/DEFINITION

- 3.1.1 Telecommunications rooms must be dedicated to the telecommunications function and related support facilities. Telecommunications rooms must not be shared with janitorial facilities or other trades especially with electrical installations other than those required for telecommunications systems.
- 3.1.2 Telecommunications room refers to any room where telecommunications facilities terminate and telecommunications system equipment is housed.
- 3.1.3 The term building Intermediate Cross Connect (IC) is used to indicate the telecommunications room where the campus backbone facilities enter the building.
- 3.1.4 The term Telecommunications Rooms (TR) is used to designate the telecommunications room required for the distribution of facilities to adjoining floors and areas exceeding distance limitations.

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

3.1.5 NUMBER OF ROOMS. There must be a minimum of one telecommunications room per floor and centrally located in the building, unless otherwise specified by the UTS Project Manager. Additional telecommunications rooms must be provided when:

- (1) The floor area to be served exceeds 10,000 ft<sup>2</sup>, or
- (2) The horizontal distribution distance to the workstation exceeds 295 ft. ,

3.1.6 SIZING OF ROOMS. Telecommunications rooms must be sized as follows:

Serving Area (net bldg. ft <sup>2</sup> )	Room Size
10,000 ft <sup>2</sup>	10 ft. X 11 ft.
8,000 ft <sup>2</sup>	10 ft. X 9 ft.
5,000 ft <sup>2</sup> - less	10 ft. X 7 ft.

10 ft. X 7 ft. is the minimum size for telecommunications rooms.

3.1.7 Telecommunications rooms must be stacked vertically to provide for the installation of telecommunications facilities between floors. Telecommunications rooms must be interconnected as specified in section 2.2.5.

3.1.8 BACKBOARDS – All four walls must be covered with rigidly fixed 3/4 in. x 4 ft. X 8 ft. A-C plywood, preferably void free, capable of supporting attached equipment and painted with black fire retardant paint.

3.1.9 LIGHTING - Lighting must be a minimum of 50-ft. candles measured 3 ft. above the finished floor, mounted 8.5 ft. minimum above finished floor.

3.1.10 CEILINGS - False ceilings are not allowed in any Telecommunication Room.

3.1.11 DOORS - The door must be a minimum of 36 in. wide and 80 in. high, without doorsill, hinged to open outward and fitted with a lock.

3.1.12 KEYING - Access to all telecommunication rooms will be through one uniform master key system. Facilities Management will establish the lock type to be used.

3.1.13 TREATMENT - Floors, walls, and ceiling must be treated to eliminate dust. Floors must be sealed.

3.1.14 ELECTRICAL REQUIREMENTS - Two dedicated 30 A, 110 or 208 V AC electrical outlets (L5-30R/120, L6-30R/208), each on separate circuits, must be provided for equipment power, unless otherwise specified by UTS Project Manager. In addition,

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

a third 20A, 110 V AC circuit shall feed duplex outlets, which must be placed at 6 ft. intervals around the perimeter wall, at a height of 18 in above the floor. In addition, all dedicated outlets in IC's and TR's **must** be connected to the emergency power system (generator). All dedicated circuit outlets must be readily identifiable by using a different color outlet.

3.1.15 GROUNDING - Each telecommunications room must have direct attachment to the closest point in the building's electrical service grounding electrode system. A Number 6 AWG solid conductor cable must be placed between the ground source and a bus bar of the type: Chatsworth Products, Inc. part number 13622-010 or equivalent.

3.1.15.1 A #6 THW ground cable shall be installed for each Outdoor Wireless Access Point location from the nearest Intermediate Closet (IC) or Telecommunications Room (TR).

3.1.16 SLEEVES/CONDUIT - Sleeves or conduit passing through the telecommunications room floor should be adjacent to the door with a minimum of 1 in. exposed above the finished floor. Sleeves and conduit must be no more than 3 in. away from the wall. Sleeves and conduit shall not be left open except during cable installation and must be properly fire stopped per the applicable codes.

3.1.17 FIRE PROTECTION - Fire protection of the telecommunications rooms, if required, must be provided as per applicable code. All conduits and cable trays penetrating any Telecommunications Rooms must be properly sealed with the appropriate fire stopping material, as per NEC and local fire codes.

If used, fire sprinklers shall not be water based. An optional gaseous system must be used.

3.1.18 AIR CONDITIONING - HVAC must be provided on a 24 hours per-day, 365-days-per-year basis. If the building system cannot assure continuous operation for large equipment applications, a stand-alone unit must be provided for the equipment room.

3.1.19 TEMPERATURE - The temperature and humidity must be controlled to provide continuous operating ranges of 64 degrees F to 75 degrees F with 30% to 55% relative humidity.

3.1.20 COLLOCATION OF OTHER TRADES - No water, sewer etc. pipes must be placed within or pass through the telecommunications rooms.

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

3.1.21 PLENUM AIR SPACE - All Telecommunications Rooms must be completely separated from Plenum air space in accordance with NEC and BICSI standards. (Please see 1.2 reference)

3.1.22 LOCATION OF ROOM - All Telecommunications rooms must be accessible at all times. The IC (building main telecommunications room) must be designed to be adjacent to an outside wall in order to facilitate the addition of entrance conduits if needed, unless specified by UTS Project Manager.

**4.0 OUTSIDE PLANT**

**4.1 DEFINITION DESCRIPTION**

4.1.1 All new building construction planning must provide for connection of the building to the campus communications infrastructure.

4.1.2 CONDUIT SIZE - All direct buried conduits used to connect to the University Telecommunications infrastructure must be 4" PVC, Schedule 40.

4.1.3 NUMBER REQUIRED - The minimum number of conduits connecting the building IC to the campus MC must be at least four four-inch (4 - 4") conduits. Note: More entrance conduits might be needed depending on the size and utilization of the building.

4.1.4 DEPTH - The top of the conduit bank must be buried at least 30 inches below the ground surface and separated from other service structures as required for fiber optical cable under EIA/TIA specifications.

Separation of telecommunications conduits from other utilities shall meet the following guidelines:

<b>Separation of Telecommunications Conduits from Other Utilities</b>
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<b>Structure</b>	<b>Minimum Separation</b>
Power or other conduit	3 inches in concrete 4 inches in masonry 12 inches in earth
Pipes (gas, oil, water)	6 inches when crossing pipe 12 inches when parallel to pipe

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

Power conduit terminated on poles	Separate poles, if possible. If on same pole, 180 degree separation Preferable, but not less than 90 degrees.
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The conduits must be placed in accordance with the requirements specified in the FIU building manual. In particular, bidders must pay special attention to the Telecommunications requirements specified in Appendix C.

4.1.5 DUCT BANK PROTECTION - Conduit must be encased in concrete when:

- (1) Minimum conduit depth of 30 inches cannot be attained.
- (2) Conduits pass under roads, driveways, or railroad tracks.
- (3) Bend points are subject to movement.

Note: A detectable warning tape must be placed 18 inches above all duct banks (detectable: containing metallic tracings).

4.1.6 SLOPE - Underground conduit must be installed such that a slope exits at all points of the run to allow drainage and prevent the accumulation of water. A drain slope of no less than .125 in. per foot is desirable.

4.2 MANHOLES (MAINTENANCE HOLES)

4.2.1 DESCRIPTION - A manhole (maintenance hole) is used to pull in and splice cables in an underground, concealed manner. Manholes must be equipped with a sump, corrosion resistant pulling iron, cable racks, and manhole ladders. Concrete used for manholes must be of at least 3500 lb./in<sup>2</sup> strength. All manholes must be properly grounded as required by BICSI. (Please refer to 1.2)

4.2.2 SIZE - Manholes must be sized at 6-ft. width X 12-ft. length X 7-ft. height, unless specified by the UTS Project Manager. All manholes must be equipped with a round ring and cover, clearly labeled "TELECOM" or "TELEPHONE". (Please see attached drawing, Fig. 4.2.2-A)

4.2.3 WHERE REQUIRED - Manholes must be placed when the conduit section length exceeds 500 ft, whenever a cable splice will be required, when bends exceed a total of 180 degrees or two bends, or the section length of conduit requires the pulling in of cable in two segments.

4.2.4 HANDHOLES are not an acceptable alternative to manholes described in section 4.2.1, 4.2.2. Handholes can only be used in place of manholes after consultation

**FLORIDA INTERNATIONAL UNIVERSITY  
BUILDING STANDARDS  
REVISED AS OF FEBRUARY 2012**

with and receipt of written approval from the UTS/Infrastructure Department.  
(Please see attached drawing, Fig. 4.2.4-A)

4.2.5 PULL POINTS - Wherever distances between manholes exceeds 200 feet or there are more than two 90 degree bends in the conduit run, a 4' x 4' x 4' pull box must be placed. The number of conduits going in and out of the pull box shall not exceed six. Under no circumstances shall a pull box replace a manhole. (Please see attached drawing, Fig. 4.2.5-A)

4.2.6 POSITIONING OF CONDUITS IN MANHOLE - Conduits entering a manhole shall do so only through the manhole walls designed for conduit penetration. Under no circumstances shall the structural integrity of the manhole be compromised.

Note: Conduits being added to a manhole must be placed as deep as possible in order to accommodate future expansion of ductbanks and guarantee maximum utilization of the manhole.