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270741 - Telephone - Data Installation Requirements

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270741 - Telephone - Data Installation Requirements

SECTION 27 0741 - TELEPHONE/DATA INSTALLATION REQUIREMENTS

1.1 GENERAL

- A. UNH-Telecommunications systems shall be installed with strict adherence to all codes, standards, and manufacturers specifications. The following chapters are arranged as a working tool to help guide the installer/ designer of these systems.
- B. The word “shall” will be used in following statements where a topic is mandatory.
- C. The word “should” will be used in following statements of recommendation.
- D. Any variation of codes, standards, or manufacturers specifications shall only be permitted with explicit approval of appropriate approving authority(ies).
- E. All cabling systems installed at the University shall comply with the following Codes and Standards. The cabling system described in this specification is derived in part from the recommendations made in industry standard documents. The list of documents below are incorporated by reference:
 - 1. International Building Code (IBC) – most current adopted edition.
 - 2. National Fire Protection Agency (NFPA) - 70, National Electrical Code (NEC) – most current adopted edition.
 - 3. National Fire Protection Agency (NFPA) – 101, Life Safety Code most current adopted edition.
 - 4. ANSI/TIA/EIA SP-4195 Proposed Addendum No. 5 to TIA/EIA-568-A Additional Transmission Performance Specifications for 4-Pair 100 Ohm Enhanced Category 5 Cabling – most current edition.
 - 5. ANSI/TIA/EIA-568-A Commercial Building Telecommunications Cabling Standard – most current edition.
 - 6. ANSI/EIA/TIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces – most current edition.
 - 7. ANSI/EIA/TIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings – most current edition.
 - 8. ANSI/TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications – most current edition.
 - 9. Building Industries Consulting Services, International (BICSI) Telecommunications Distribution Methods Manual (TDMM) – most current edition.
 - 10. This Technical Specification and Associated Drawings.
- F. If a conflict exists between applicable documents, then the order in the list above shall dictate the order of precedence in resolving conflicts. This order of precedence shall be maintained unless a lesser order document has been adopted as code by a local, state or federal entity, and is therefore enforceable as law by a local, state, or federal inspection agency.
- G. Throughout this document, the following symbols will be used to identify ownership of responsibility:

DTR = Design Team Responsibility.
CR = Contractors Responsibility.
TR = Telecom Responsibility.

PART 2 – PRODUCTS

2.1 OUTSIDE PLANT INFRASTRUCTURE: (DTR/CR)

A. Underground Entrance:

1. Conduit:
 - a. Shall be schedule 40 PVC conduit.
2. End Bells:
 - a. 4 Inch, MFG. By CANTEX INC., PART NO. 5144106.
3. Conduit Plugs:
 - a. 4 Inch, MFG. By JACKMOON USA INC., PART NO.: 40D402U.
4. Cable Rack Channel:
 - a. 18 Support holes, 30 Inch Length, 28-1/2 Inch bolt hole spacing. Hot rolled steel channel, hot dip galvanized.
 - 1) MFG. By CONDUX INTERNATIONAL, INC., PART NO.: 08380200.
5. Manhole:
 - a. MFG. BY: Roberts Precast, Rotondo/Precast, Inc., or American Precast.
 - 1) Heavy duty precast reinforced concrete with internal dimensions of 12 ft. L x 6 ft. W x 8 ft. H in size and have a concrete minimum compressive strength of 5,000 lb. /psi. at 28 days in accordance with ASTM, reinforced in accordance with ASDM of H-20 loading. Precast units shall not have more than two (2) sections. Joints between sections shall have self-aligning V- grooves and asphaltic butyl compound joint sealant. The interior of each manhole shall have bonding inserts, hot dipped galvanized steel hardware that includes 1 inch dia. Eyebolt with 2 inch dia. pulling eyes and struts for heavy-duty adjustable notched channel cable wall racks. Each maintenance hole shall have a sump hole of at least 6 inches deep located directly below, centered on the manhole cover opening and have a cover. (ref. ANSI/TIA/EIA C.6.1.1).
 - b. (Type A) Specifications.

- 1) Each vault shall have termaduct fittings precast into the manhole wall to accommodate (8 each) four inch (4") schedule 40 pvc ducts located on each end wall at the same elevation, opposing each other. Beginning 1 ft. off the sidewall to center of the first core and 3 ft. below top of vault to center of core. From the centerline of core #1, cores 2, 3, 4 shall be 10-inches on center and to the right of the previous. Core #5 begins a second tier at 1 ft. off the sidewall to center of the core #5 and 10-inches below the centerline of core #1. From the centerline of core #5, cores 6, 7, 8 shall be 10-inches on center and to the right of the previous.
- c. (Type J) Specifications.
 - 1) Each vault shall have termaduct fittings precast into the manhole wall to accommodate (8 each) four inch (4") schedule 40 pvc ducts located on each end wall at the same elevation, opposing each other. Each side wall shall have termaduct fittings precast into the manhole wall to accommodate (5 each) four inch (4") schedule 40 pvc ducts located at the following elevations, and directly across from each other. Beginning 1 ft. off the end wall to center of the first core and 1 ft. below top of maintenance hole to center of core. From centerline of core #1, core #2 shall be 10-inches on center and to the right of core #1. Cores 3, 4 shall be 10-inches on center directly below the previous. Core #5 shall be 10-inches directly below core #3.
6. Frames and Covers: (CR)
 - a. MFG. BY: East Jordan Iron Works, Inc. or Owner approved equal.
 - b. Frame: Catalog no. V-1610-6, Product no. 41610610.
 - c. Cover: Catalog no. V-1610-6, Product no. 41610641.
 - d. Each manhole shall have a cover that is cast iron heavy-duty type, suitable for H-20 street loading and have machined bearing surfaces. Telephone manholes shall have a minimum clear opening of 32 inches round. The word "COMMUNICATIONS" shall be cast on the upper side of each cover.

2.2 INSIDE PLANT INFRASTRUCTURE: (DTR/CR)

A. Horizontal Pathways:

1. Conduit:
 - a. New construction shall be EMT conduit. Only exception is in existing wall construction, GREENFIELD may be installed.
2. Surface Raceway:
 - a. Shall be WIREMOLD systems.
 - b. Device Mounting Bracket; G4050*
 - c. End Plate: part number CM-EPLA*
 - i. * (Add "G" suffix for gray finish).

- d. Open System Module: part number CM2-U2ATT*
 - e. Open System Module: part number CM2-BL*
 - i. *(Add -WHwhite,-GR=lt.gray,BK=black,-G=gray)
3. Cable Support System:
- a. Shall be Cable tray, ladder, basket or J-hooks installed to meet all related codes, standards, and manufacturers specifications.
4. Paint:
- a. All exposed conduits/raceways shall be painted to match existing surfaces.
 - b. All equipment back boards intended for Telecommunications shall be painted grey.
 - i. MFG. BY: SHERWIN WILLIAMS.
 - ii. PART NO.: SW 7016.
5. Busbar Kit, Wall-Mount:
- a. MFG. BY: CHATSWORTH PRODUCTS, INC., PART NO.: 10622-010.
6. Poke-Thru work box:
- a. Shall be WIREMOLD WALKER Poke –Thru Systems compatible with Avaya/SYSTIMAXmodules.
 - b. RC7ATCAB: provides 2 data ports
 - i. Comes with open system module adaptors for Lucent Avaya/SYSTIMAX.
 - ii. Requires a 3 INCH CORE HOLE.
 - iii. Flooring type and color of finish must be confirmed.
 - c. RC3ATCAB: provides 4 data ports:
 - i. Comes with open system module adaptors for Lucent Avaya/ SYSTIMAX.
 - ii. Requires a 4 INCH CORE HOLE.
 - iii. Flooring type and color of finish must be confirmed.
7. Floor Box:
- a. Shall be WIREMOLD 880 Omnibox series floor boxes.
 - b. Cover Plate: part number 828GFITC (color and floor covering dictate part number).
 - c. Activate Bezel: part number CM-MAB.
 - d. Open System Module: part number CM2-U2ATT*.
 - e. Open System Module: part number CM2-BL*.
 - i. *(-WHwhite,-GR=lt.gray,BK=black,-G=gray)

PART 3 – EXECUTION

3.1 OUTSIDE PLANT INFRASTRUCTURE: (OSP)

A. OSP Infrastructure (Underground Entrances Conduits)
Reference: ANSI/TIA/EIA-569-A ANNEX C (normative)

1. General (CR):

- a. Shall be provided and installed in accordance with attached site plans or information herein.

2. Conduit (DTR/CR):

- a. A total of (8) 4-inch schedule 40 PVC Conduit encased in (3,500 psi), concrete will be provided for the **main** distribution between maintenance holes. Conduit couplings shall be staggered so that couplings on adjacent conduits do not lie on the same transverse plane. All conduits shall be terminated in termaduct fittings precast into the manhole walls. All concrete duct banks shall be doweled to the manholes walls, and foundation walls with rebar to prevent shearing.

1) (ref. ANSI/TIA/EIA C.5.1.1.2).

- b. A total of (5) 4 inch schedule 40 PVC Conduit encased in (3,500 psi), concrete will be provided for the **branch** distribution between a maintenance hole and building entrance terminal of a building. Conduit couplings shall be staggered so that couplings on adjacent conduits do not lie on the same transverse plane. All conduits shall be terminated in termaduct fittings precast into the manhole walls. All concrete duct banks shall be doweled to the manholes walls, and foundation walls with rebar to prevent shearing.

1) (ref. ANSI/TIA/EIA C.5.1.1.2)

- c. Each Conduit shall have a non-corrosive pull-rope or pull-tape installed in each of them.

1) (ref. ANSI/TIA/EIA C.5.1.4.6)

- d. Each Conduit shall be proved by the use of an appropriately sized mandrel to ensure inside diameter conformity from beginning to end.

3. Bends (DTR/CR):

- a. The total number of bends in a conduit section run shall not exceed two 90-degree bends or equivalent of sweeps and radius bends. Each bend

shall have a minimum radius in accordance with existing standards. All offsets greater than 30 degrees shall be (RGC) rigid galvanized conduit elbows and offsets. All (RGC) rigid galvanized fittings buried below finish grade shall be field coated with asphaltum or shall have an additional outside factory coating of polyvinyl chloride or a phenolic resin epoxy material.

1) (ref. ANSI/TIA/EIA C.5.1.3.1.1, .2,.3)

4. Separation (DTR/CR):

a. Separation from other utilities, structures, and depth of coverage shall be provided per applicable codes.

1) (ref. ANSI/TIA/EIA C.5.1.4.3)

5. Drain Slope (DTR/CR):

a. Should be installed such that a slope exists at all points of the run to allow drainage and prevent the accumulation of water. A drain slope of not less than 100 mm per 30 meters (4 in. per 100 ft.) is desirable.

1) (ref. ANSI/TIA/EIA C.5.1.4.4)

6. Termination (DTR/CR):

a. When terminating in a vault, hand hole or building foundation wall, the conduit(s) shall be cut and terminate with an end bell installed as flush to the wall surface as possible. When terminating at a pole, clamp the conduit(s) rigidly to the field side of the pole at a 90-degree separation from power. In all scenarios the conduit(s) shall be reamed, bushed, plugged with mechanical-type seals to ensure foreign matters do not enter the space.

1) (ref. ANSI/TIA/EIA C.5.1.4.5)

7. Encasement (DTR/CR):

a. All underground conduits shall be encased in concrete minimum 3" cover top, bottom and sides. Provide reinforcement rods where the concrete envelopes connect to manhole walls and building foundation. Reinforcing rod shall extend 5" into concrete on the manhole wall or foundation wall to minimize shearing.

B. OSP Infrastructure (underground Manholes)
Reference: ANSI/TIA/EIA-569-A ANNEX C (normative)

1. General:

a. Shall be provided and installed in accordance with attached site plans or information herein. The installation of manholes shall begin with all

exterior surfaces of the manhole and 10'-0" portion of ductbanks being waterproof coated with coal tar epoxy bitumastic. The excavated area shall be free of obstructions for a minimum 12 inches around outside perimeter, with a 6-inch compact gravel base of uniform thickness and level. The preparation of the base shall ensure no settlement. Backfill shall consist of good compactable material, such as pea gravel, sand or clean earth fill. Backfilling should be done progressively from bottom to top surface. Minimum earth cover from roof of manhole to finished grade shall be 8 inches. In paved areas, set top of frame and cover flush with finished surface. In unpaved areas, set top of frame and cover approximately 1/2 inch above finished grade. Precast concrete extension collar lined with mortar with full bearing under frame shall be installed as necessary. Set height in field per final grade elevations. Install per manufacturer's instructions.

2. Location and Spacing (DTR):

- a. When determining manhole locations, consideration should be given to ground topology, access, building location, splicing and soil conditions. Manholes should be placed when a conduit or duct section length exceeds 150 m (500 ft).

- 1) (ref. ANSI/TIA/EIA C.6.1.5)

3. Cable Support System (CR/TR):

- a. Each manhole shall have racking installed in all channels and adequate hooks and related hardware to support installed cable. Splices shall be properly supported on both sides of the splice. Cable rack arms or brackets shall be provided by cable installer as required to support installed cables.

4. Cable Tags (TR):

- a. Every cable passing through a maintenance hole or entering a building shall have a permanently affixed, non-corrosive identification tag with the cable number and identified cable count clearly legible.

5. Fiber Tags (TR):

- a. Every fiber passing through a manhole or entering a building shall have a permanently affixed, non-corrosive identification tag with the fiber originating point, terminating point and identified fiber count clearly legible.

6. Grounding/Bonding System (DTR/CR):

- a. Shall be designed so overall resistance to ground is less than 25 ohms. A single bare copper-grounding conductor shall wrap the vault at a height of above 6 ft. and have a bonding ribbon (#6 AWG min.) permanently

bonded with an exothermic weld. The bonding ribbon shall be permanently bonded with an exothermic weld to the grounding electrode conductor. The grounding electrode conductor shall be centered on the vault sidewall. Provide a complete ground grid around the exterior of each manhole consisting of (4) 5/8-inch by 8'-0" long ground rods located at each corner of manhole. Interconnect the ground rods with a minimum of #4 AWG Bare Stranded copper conductor. Provide a #4 AWG Bare Stranded Copper Wire leads into manhole with a #4 AWG Bare Stranded Copper Wire loop attached around the perimeter of the interior wall of the manhole. The #4 AWG Bare Stranded Copper ground wire shall be connected to the ground rods by using exothermic weld type connectors.

- C. OSP Infrastructure (Aerial Entrances): (DTR/CR/TR)
Reference: ANSI/TIA/EIA-569-A ANNEX C (normative)
1. Shall be provided and installed in accordance with attached site plans or information herein.
 2. The pole to building span shall be no greater than 30 m (98 ft.), with the following minimum clearances:
 - a. 102 cm (40 inches) below power at the pole.
 - b. 31 cm (12 inches) below power at mid span (under cable sag conditions).
 - c. 11 cm (4 inches) horizontally at the building attachment.
 - d. 31 cm (12 inches) vertically at the building attachment.
 - e. 2.7 m (15.5 feet) vertically above street or driveway.
 - f. 3 m (10 feet) vertically above pedestrian traffic.
 - g. 2.5 m (8 feet) vertically above rooftops.
 - h. 7.4 m (23.5 feet) vertically above railroad tracks.
 - i. 1.9 m (6 feet horizontally from roof conductors (antennas, etc.).
 3. Riser poles shall have an appropriately sized pole guard installed over the cable, so there is no exposed cable from ground level to 10 ft. above ground level.
 4. The cable(s) shall extend through the exterior wall using either a cable mast or sleeve through wall sloping downward toward the outside of the building 1/4 inch per foot.
 5. Point of Demarcation: In this context, the point in which Outside Plant Infrastructure is terminated, grounded and effectively identified.

3.2 INSIDE PLANT INFRASTRUCTURE: (ISP)

- A. ISP Infrastructure (Telecommunications Spaces): (DTR/CR)
Reference: ANSI/TIA/EIA-569-A.

1. General:
 - a. Office spaces shall have two (duplex wall-plate) information outlets provided, each located on opposing walls of the room. If modular furniture

is specified for a space and its placement prohibits the accessibility of an information outlet, the telecommunications cables shall be extended continuously into the furniture and terminated in an accessible location. Coordination of furniture installation and cable installation is critical to prevent damage to furniture or cable and unnecessary labor costs.

- b. Public areas shall have information outlets provided as needed for vending, laundry, wireless access points, courtesy phones, entrance phones and area of refuge phones.
 - c. Classrooms shall have a duplex wall plate located on the wall considered to be the front and back wall of the classroom.
 - d. Computer clusters/ labs shall be configured so no computer is located further than 25 ft. from an information outlet. Power outlets supporting the computers should be isolated ground type.
 - e. Telecommunications equipment rooms shall be defined as any space utilized explicitly for the installation of Telecommunications infrastructure such as network edge devices, equipment racks with rack mounted hardware for the termination and distribution of copper/fiber optical backbone cable, horizontal station cable. A space, which Telecommunications infrastructure terminates for the purpose of grounding and transitioning to interior rated cable, is not considered to be a Telecommunication space. In the initial design phase of a future building, consideration shall not only be made to provide the minimum space requirements for present telecom design needs, but more importantly for maximum potential growth. The minimum size will increase proportionally to the area it is intended to serve and if CATV is also distributed from the same space. If an existing buildings design, usage or current technologies change requiring the installation, termination and distribution of telecommunications infrastructures anywhere other than an existing telecommunications space, a new space will be provided meeting the same minimum requirements. Please reference the following information for specific design requirements.
2. Telecommunications spaces and pathways shall be designed so that no horizontal distribution distance exceeds 90 m (295 ft.).
 3. All penetrations through a fire rated floor, walls or ceiling of a telecommunications space shall have an appropriately rated UL tested fire stop assembly installed restoring the surface to the original fire rating.
 4. Telecommunications spaces shall be located (stacked) on each floor as close as possible to the center of the area served and accessible from a common area.
(ref. ANSI/TIA/EIA 7.1.2)
 5. All applicable codes shall be observed for the design of telecommunications spaces.
(ref. ANSI/TIA/EIA 7.1.3)
 6. Specifications for related facilities shall accommodate the applicable seismic zone requirements.
(ref. ANSI/TIA/EIA 7.1.5)

7. Telecommunication spaces shall be used specifically for telecommunications purposes only. Controlled access to prevent accidental damage, vandalism, or theft of costly network devices is essential.
(ref. ANSI/TIA/EIA 7.2.1.1)
8. Equipment not related to the support of the telecommunications closet (e.g. piping, ductwork, pneumatic tubing, etc.) shall not be installed in, pass through, or enter the telecommunications closet.
(ref. ANSI/TIA/EIA 7.2.1.3)
9. Voice backbone cable entering the Building Entrance Terminal (BET) shall have lightning protection mounted directly on 4' x 8' x .75" plywood painted with two coats of a non-conductive fire-retardant overcoat (**gray** in color), unless otherwise noted in drawings, at the nearest practical location to the point of entry in the room.
10. Size and Spacing:
 - a. There shall be a minimum of one (4 ft. D x 8 ft. W) telecommunications closet per floor. "The minimum space allocation of 32 SF must measure a minimum of 4' x 8' of unobstructed area (not 32 SF of lesser dimensions) and the T/D room doors should swing outwards. If the door must swing inward, the size of the room must be increased to accommodate the door swing."
 - b. Exceptions may be approved by UNH Telecommunications where conditions warrant. Additional closets may be necessary when floor area exceeds 10,000 sq.ft. Under no circumstances will horizontal distribution distance exceeds 90 m (295 ft).
 - 1) (ref. ANSI/TIA/EIA 7.2.2.1)
11. Closet Linkage:
 - a. Multiple closets shall be interconnected with four 4-inch EMT conduits, terminating, reamed and bushed, 3-inches from any surface from which it emanates within the telecommunications closet.
(ref. ANSI/TIA/EIA 7.2.2.2)
12. Walls:
 - a. Left, Right, and Back walls shall have 4 FT. X 8 FT. X ¾ inch AC grade plywood mounted vertically with the A side exposed up. The plywood shall begin at floor level, be continuous to a height of 8 FT. AFF, and anchored a minimum of every 2 feet directly to drywall or masonry wall. Plywood shall be painted with two coats of a non-conductive fire-retardant overcoat (**gray** in color). All other wall surfaces shall be painted with a light colored paint.
(ref. ANSI/TIA/EIA 7.2.4.1)
13. Lighting:

- a. Fixture height shall be a minimum of 8.5 ft. above the finished floor and mounting location to be field coordinated during construction. Light intensity shall be at least 500 lux (50 foot-candles) at 1 m (3.3 ft.) above the finished floor. The light switch shall be located on the right side wall. Lighting fixtures should not be powered from the same electrical distribution panel as the telecommunications equipment in the telecommunications closet.
(ref. ANSI/TIA/EIA 7.2.4.2)
14. False Ceiling:
- a. Shall not be provided. (ref. ANSI/TIA/EIA 7.2.4.3)
15. Door(s):
- a. Double-doors shall be fitted with a lock, have no threshold or center post, and open into the hallway or other common area. Both doors shall be sized 91 cm (36 inches) W x 2 m (80 inches) H. (ref. ANSI/TIA/EIA 7.2.4.4)
 - b. Doors for Building Entrance Terminal (BETs) shall be a single door fitted with a lock, have no threshold, and shall be sized at (91 cm (36 inches) W x 2 m (80 inches) H).
16. Floor:
- a. Shall be static free using asphalt/linoleum tile, or painted to eliminate dust.
(ref. ANSI/TIA/EIA 7.2.4.5)
17. Power:
- a. Shall include a minimum of two dedicated 120volt, 20-ampere duplex outlets on separate branch circuits for equipments power. The location of these outlets shall be field coordinated during construction. There shall also be a minimum of one 120volt; 20-ampere convenience outlet located 16" to 18" AFF anywhere within the room.
(ref. ANSI/TIA/EIA 7.2.4.6)
18. Equipment Racks
- a. Shall be properly anchored and grounded.
19. Climate Control:
- a. Shall be kept between 18 degrees C (64 degrees F) and 24 degrees C (78 degrees F), with relative humidity maintained within the range of 30 to 55 %. A BTU sheet will be provided to the Design team for each Telecom space.
- B. ISP Infrastructure (Horizontal Pathways): (DTR/CR/TR)
Reference: ANSI/TIA/EIA-569-A

Telecommunications pathways shall be designed and installed to minimize number of bends and length. No pathway shall exceed 90 m (295 ft.). Pathways traversing areas considered not reenterable upon completion of construction shall have EMT or ENT installed to span the distance. All Telecommunication pathways shall be dedicated for Telecommunications use only. Considerations must be given to minimum clearances, sources of EMI, temperature, maximum fill ratio and overall functionality of these pathways.

1. Minimum requirements for the installed conduits, such as support, end protection, and continuity, are found in appropriate sections of the NEC. (ref. ANSI/TIA/EIA 4.4.2.1)
2. No section of conduit shall be longer than 30 m (100 ft.) between pull points. (ref. ANSI/TIA/EIA 4.4.2.2)
3. No section of conduit shall contain more than two 90-degree bends or the equivalent of 180 degrees cumulative between pull points. If there is a reverse (U-shaped) bend in the section, 180 degrees or 100 ft is exceeded, a pull box shall be installed. All pull boxes shall be accessible as required by the NEC. (ref. ANSI/TIA/EIA 4.4.2.3.1)
4. The inside radius of a bend in the conduit shall be at least 6 times the internal diameter. Bends in the conduit shall not contain any kinks or other discontinuities that may have a detrimental effect on the cable sheath during cable pulling operations. (ref. ANSI/TIA/EIA 4.4.2.3.2)
5. Cable support systems shall originate in the telecommunications closet and extend the entire length of all main hallways on that floor.
6. Cable tray/raceways shall not be filled greater than the NEC maximum fill for the particular raceway type, and shall be incrementally increased from the furthest outlet box to the Telecommunications closet. (ref. ANSI/TIA/EIA 4.4.2.5.2)
7. A minimum of 1-inch EMT shall be used to serve a double-gang workbox with a single gang reducer ring.
8. From the first workbox to the second, the EMT may be reduced to ¾-inch.
9. Conduits shall be installed so they feed opposing offices in a back to back fashion. There shall be no more than 2 workboxes fed from any one EMT run.
10. Conduits shall be appropriately sized so the cable's minimum bend radius and maximum pulling tension shall not be exceeded.
11. A minimum ¾-inch conduit shall be provided from the telecommunications closet and terminate in a back box mounted 45" OC AFF to serve each wall mounted public phone (including area of refuge and building entrance phone locations),

(ref. ANSI/TIA/EIA 4.4.2.7)

12. A minimum 3/4-inch conduit shall be provided from the telecommunications closet and terminate in the Fire Alarm Control Panel.
13. A minimum 3/4-inch conduit shall be provided from the telecommunications closet and terminate in the elevator control panel.
14. Conduits shall be reamed and bushed at the point of termination.
(ref. ANSI/TIA/EIA 4.4.3.1)
15. Conduits shall have pull strings installed and be identified as tel. /data.
(ref. ANSI/TIA/EIA 4.4.3.3)
16. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of four-foot intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.
17. Cables shall not be attached to ceiling grid or lighting support wires. Where light support for drop cable legs is required, the contractor shall install clips to support the cabling.
18. Cable pathways passing through a fire rated surface, shall have an appropriately rated UL listed fire stop assembly installed restoring the wall to the original fire rating.
19. Flex conduit (Greenfield) shall not be used as a substitute for EMT in new construction. Flex conduit shall not be used for offsets.

C. ISP Infrastructure (Horizontal Cable Installation): (TR)
Reference: ANSI/TIA/EIA-568-A

1. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.
2. Cables shall be installed in continuous lengths from origin to destination (no splices).
3. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
4. Cable shall be installed above fire-sprinkler systems, and shall not be attached to the system or any ancillary equipment or hardware. The cabling system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
5. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

6. Cables shall be identified by a self-adhesive label, in accordance with the System Documentation Section of this specification. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.
 7. Unshielded twisted pair cable shall be installed so that there are no bends less than four times the cables outside diameter (4 X cable O.D.) at any point in the run.
(ref. ANSI/TIA/EIA 10.6.3.2)
 8. Pulling tension on 4-pair UTP cables shall not exceed 25-pounds for a single cable or cable bundle.
(ref. ANSI/TIA/EIA 10.6.3.2)
- D. Telecommunications Grounding and Bonding Infrastructure (TR/CR)
Reference: ANSI/TIA/EIA-607
1. A Telecommunications bonding backbone (TBB) conductor shall be installed by the electrical contractor from the main electrical grounding bus bar to the Telecommunications main grounding bus bar (TMGBB). The bonding conductor shall be a minimum of no. 6 AWG, insulated green in color and terminate at the (TMGBB) with a double bolt lug connector. The lug connector shall be through bolted to the copper grounding bus provided by the electrical contractor.
 2. The Telecommunications main grounding busbar (TMGBB) shall be the same specified under Part 2 PRODUCT of this document and installed by the electrical contractor in the location specified on the construction documents.
- E. ISP Infrastructure Cable System Labeling (TR)
1. Labeling System:
 - a. The labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
 2. Labels:

- a. All label printing will be machine generated using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.
3. Terminal Block & Wall Plate:
 - a. The cable labeling system shall be a numeric system. Each end shall be clearly labeled with a unique number, which is identical on both ends and corresponds to the self-laminated cable label. In ascending order from the lower most floor to top most floor, a block of 200 numbers per floor shall be reserved. If more or less numbers are required, the block of numbers shall be increased/ decreased by increments of 100.
 4. UTP Station Cable:
 - a. The cable labeling system shall be a numeric system. Each end shall be clearly labeled with a unique number, which is identical on both ends and corresponds to the terminal block and wall plate labels. Each 4 pair in a multi-port wall plate will have a sub-numeric number corresponding to the position it serves. In ascending order from the lower most floor to top most floor, a block of 200 numbers per floor shall be reserved. If more or less numbers are required, the block of numbers shall be increased/ decreased by increments of 100.
 5. Exception:
 - a. Resident hall labeling system will correspond to the room number. When multiple wall plates are located in a room, the first plate will have the room number and a sub-numeric number corresponding to the position it serves. The additional wall plates shall have the same room number and sub-numeric numbers in ascending order starting where the previous left off.
- F. ISP Infrastructure Construction Documents (DTR)
1. A riser diagram reflecting the Telecommunications closet linkage shall be provided.
 2. UNH Tel/Data General notes shall be incorporated and read as follows:
TEL/DATA NOTES:
 - a. TELECOMMUNICATIONS PATHWAYS SHALL BE DESIGNED SO THAT NO HORIZONTAL DISTRIBUTION DISTANCE EXCEEDS 90 M (295 FT.)
 - b. ALL CONDUIT RUNS INTENDED FOR INSTALLATION OF TELECOMMUNICATIONS WIRING SHALL BE A MINIMUM OF 1" EMT, RUN IN THE MOST DIRECT PATH, WITH THE MINIMUM AMOUNT OF BENDS POSSIBLE AND TO THE NEAREST ACCESSIBLE POINT.

- c. ALL CONDUIT RUNS IN EXCESS OF 100 FEET OR HAVING GREATER THAN 180 DEGREES IN BENDS, SHALL HAVE AN ADEQUATELY SIZED PULL BOX INSTALLED IN A CONVENIENT AND ACCESSIBLE LOCATION. ALL SUCH LOCATIONS SHALL BE SHOWN ON THE CONTRACTOR'S "AS-BUILT RECORD DRAWING". PULL BOXES SHALL BE SUPPORTED INDEPENDENT OF THE ASSOCIATED CONDUIT. ALL PULL BOXES INSTALLED AT THIS PROJECT SHALL BE ACCESSIBLE AFTER THE COMPLETION OF THIS BUILDING.
- d. ALL CONDUIT RUNS SHALL TERMINATE WITH A NYLON BUSHING, BE PROVIDED WITH A NYLON PULL STRING AND BE IDENTIFIED AT BOTH ENDS WITH BRADY TAGS INDICATING THE LOCATION OF THE OPPOSITE END.
- e. ALL WORK BOXES SHALL NOT BE INSTALLED BACK-TO-BACK BUT THEY SHALL BE STAGGERED.
- f. ALL WORK BOXES SHALL BE SECURELY ATTACHED TO STUDS.
- g. ALL WORK BOXES SHALL BE A DOUBLE-GANG METAL WORKBOX WITH A SINGLE GANG REDUCER UNLESS OTHERWISE NOTED.
- h. ALL WORK BOXES AND PULL BOXES DESIGNATED FOR THE INSTALLATION OF TELECOMMUNICATIONS SHALL HAVE THE INSIDE BACK SURFACE LABELED "TEL/DATA" OR WITH THE SYMBOL OF A TRIANGLE IN PERMANENT TYPE MARKER.
- i. NO MORE THAN TWO (2) WORK BOXES PER 1" BRANCH DISTRIBUTION CONDUIT.
- j. ALL PENETRATIONS INTO AND OR THROUGH FIRE RATED ASSEMBLIES SHALL BE IN ACCORDANCE WITH THE 1996 BOCA CODE, CHAPTER 7, SECTION 1014.0. IT SHALL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE LOCATION OF ALL FIRE SEPARATION ASSEMBLIES WITH THE ARCHITECT PRIOR TO THE ROUGH-IN OF ANY ELECTRICAL WORK.
- k. ALL PENETRATIONS OF FIRE-RATED ASSEMBLIES BY THE ELECTRICAL CONTRACTOR SHALL BE FIRESTOPPED AS REQUIRED. THE CONTRACTOR SHALL INSTALL 3M OR HEAVY-DUTY/NELSON FIRE STOPPING MATERIAL IN ACCORDANCE WITH THEIR RESPECTIVE MANUFACTURER'S DETAILS.
- l. FIRE STOPPING REQUIRED WITHIN ALL TELECOMMUNICATIONS CONDUITS AND SLEEVES SHALL BE THE RESPONSIBILITY OF UNH'S COMMUNICATIONS DEPARTMENT.
- m. ALL INTERIOR COMMUNICATIONS CONDUITS SHALL BE INSTALLED TO EXTEND 6" ABOVE FINISHED FLOOR OR ANY SURFACE FROM WHICH THEY EMANATE, BE REAMED, BUSHED AND HAVE PULL STRINGS INSTALLED.
- n. ALL COMMUNICATION ENTRANCES OUTSIDE PLANT CONDUITS SHALL BE CUT, REAMED AND TERMINATE WITH AN END BELL INSTALLED AS FLUSH TO THE WALL SURFACE AS POSSIBLE. ALL CONDUITS SHALL BE PROVIDED BY THE APPROPRIATE SIZED MANDREL. ALL CONDUITS SHALL HAVE A 3/8" NYLON PULL ROPE INSTALLED.

3. UNH Tel/Data Symbols Legend shall be incorporated and read as follows.

AS-BUILT DRAWINGS (TR)

- a. The installation contractor, typically UNH Telecom, will be provided with 2 sets of D size drawings at the start of the project. One set will be designated for as the central location to document all as-built information as it occurs throughout the project. The central set will be maintained by the Contractor's Foreman on a daily basis, and will be available to the Owner's Technical Representative upon request during the course of the project. Anticipated variations from the build-to drawings may be for such things as cable routing and actual outlet placement. No variations will be allowed to the planned closet termination positions of horizontal and backbone cables, and grounding conductors unless approved in writing by the Owner.
- b. The Contractor shall provide the central drawing set to the owner and or the project Architect. The marked up drawing set will accurately depict the as-built status of the system including termination locations, cable routing, and all administration labeling for the cable system. In addition, a narrative will be provided that describes any areas of difficulty encountered during the installation that could potentially cause problems to the telecommunications system. The project Architect will incorporate all changes in the projects final As-Built Drawings.

G. Area of Refuge Phones

1. New construction

- a. The area of refuge shall be provided with a two-way communication system for communication between the area of refuge and a central control point. The door to the stair enclosure or the elevator door and the associated portion of the area of refuge that the stair enclosure door or elevator door serves shall be identified by signage. (See 7.2.12.3.5.)
- b. Each area of refuge shall be sized to accommodate one wheelchair space of 760 mm x1220 mm (30 in. x48 in.) for every 200 occupants, or portion thereof, based on the occupant load served by the area of refuge. Such wheelchair spaces shall maintain the width of a means of egress to not less than that required for the occupant load served and to not less than 915 mm (36 in.).
- c. Each area of refuge shall be identified by a sign that reads as the follows:
 - 1) The sign shall conform to the requirements of ICC/ANSI A117.1, *American National Standard for Accessible and Usable Buildings and Facilities*, for such signage and shall display the international symbol of accessibility. Signs also shall be located as follows:
 - a) At each door providing access to the area of refuge
 - b) At all exits not providing an accessible means of egress, as defined in 3.3.136.1
 - c) Where necessary to indicate clearly the direction to an area of refuge

END OF SECTION 27 0741

