

SECTION 27 05 33
CONDUIT AND BOXES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes specific requirements for conduits and boxes within the Communications Pathway System as defined in Division 27 Specification Section *Basic Communications Requirements*. General requirements are covered in Division 27 Specification Section *Electrical Technology - General Requirements*.

1.02 RELATED SECTIONS

- A. The requirements of Division 27 Specification Section *Electrical Technology - General Requirements* shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.
- B. Division 27 Specification Section *Electrical Technology – Underground Ducts and Raceways*.

1.03 SUBMITTALS

- A. Comply with the Submittal portion of Division 27 Specification Section *Basic Communications Requirements*. Provide submittal information for the following:
1. Product Data

1.04 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. RMC: Rigid Metal Conduit.
- C. RNC: Rigid Nonmetallic Conduit.
- D. IMC: Intermediate Metal Conduit.
- E. Back Box: A pre-manufactured metallic or non-metallic box mounted within a floor, wall or ceiling and used to hold Communications Systems outlets/connectors, transition devices or equipment.
- F. Device Boxes: Device boxes are Back Boxes that serve as a support point and/or an enclosure for various Communications Systems (Audiovisual Systems, Communications Cabling (Telecom) System, Low-Voltage Systems and Security Systems) devices. Device boxes for Communications Systems devices other than Communications Cabling System devices typically have manufacturers' specific requirements that are identified elsewhere in the Construction Documents.
- G. Outlet Box(es): Outlet box is another term used for Device Box.

PART 2 - MATERIALS

2.01 GENERAL

- A. Part Numbers: Refer to the Equipment Schedule(s) for specific manufacturers and part numbers. If no part number is provided, then any part meeting the manufacturer and requirements specified is acceptable.
- B. Refer to all of the Communications (Technology) System Details on the Communications Construction Drawings for additional requirements including, but not limited to Outlet Box size, Mud Ring gang size, conduit size and quantity and conduit routing. The Outlet Box size, Mud Ring gang size, conduit size and quantity and conduit routing requirements in the Details supersede the general Outlet Box size, Mud Ring gang size, conduit size and quantity and conduit routing requirements listed in this specification.

2.02 CONDUIT

- A. Conduit types:
1. EMT shall be steel, hot-dipped galvanized or electro-galvanized, with an inner coating to protect cables and aid pulling, UL listed, and meeting the requirements of UL 797 and ANSI C80.3.

2. RMC shall be steel, hot-dipped galvanized inside and outside with factory threaded ends full cut and galvanized after threading, UL listed, and meeting the requirements of UL 6 and ANSI C80.1.
 3. RNC shall be PVC Schedule 40 rigid plastic unless otherwise noted on the Drawings, shall be rated for use with 90 degree C wire, and shall conform to UL 651, WC-1094C and NEMA TC 2.
 4. Flexible (flex) conduit: Flex conduit is not approved and not acceptable. Where, in rare instances, flex conduit is the only remaining viable raceway option, the Contractor shall notify the Engineer and await the Engineer's direction prior to procurement and installation.
 5. Condulets (LB's): Condulets (LB's) are not approved and are not acceptable.
- B. Fittings:
1. Provide fittings as follows:
 - a. EMT fittings shall be steel compression type with a nylon insulated throat for rain-tight and concrete-tight applications, steel set screw type or steel compression type for all other connections. Conduit ends shall be fitted with bushings – bushings shall be threaded type for RMC and IMC, set screw type for EMT, and have a nylon insulated throat.
 - b. RMC fittings shall be threaded galvanized steel. Conduit ends shall be fitted with bushings – bushings shall be threaded and have a nylon insulated throat.
 - c. RNC fittings shall be of same material and manufacturer as the conduit, shall be UL listed and conform to UL 514. Cement shall be as recommended by manufacturer.
 2. Expansion fittings shall be provided across structural joints, shall be of a design to compensate for expansion and contraction, and shall be sealed to prevent entrance of water and moisture, and shall safely deflect and expand up to twice the distance of the structural movement. Expansion fittings shall be approved for grounding duty.

2.03 JUNCTION BOXES

- A. Junction boxes shall be provided to serve as a transition point between pathways/raceways. Junction boxes shall be galvanized stamped steel, deep drawn one piece (without welds or tab connections), with knockouts for conduit entrances, meeting NEMA OS 1.
- B. Junction boxes shall not be used to support Communications System equipment.
- C. Junction boxes shall not be placed in walls or non-accessible ceiling locations unless specifically shown on the Communications Construction Drawings or approved in writing by the engineer prior to rough-in and installation.
- D. Junction boxes in locations other than walls shall be sized according to the NEC.
- E. Junction boxes in walls:
 1. Unless otherwise shown on the Drawings, junction boxes shall be 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep with blank cover, and knockouts pre-manufactured to support the conduit size serving the junction box.
 2. Size according to the NEC and provide the larger of the minimum size mentioned above or the NEC requirements.

2.04 DEVICE BOXES

- A. General: Unless otherwise shown on the Drawings or specified herein, device boxes shall:
 1. Be galvanized stamped steel, deep drawn one piece (without welds or tab connections), with knockouts for conduit entrances, meeting NEMA OS 1, and equipped with extension rings to suit construction and application.
 2. Have knockouts pre-manufactured to support the conduit size serving the outlet box.
- B. Device Box Types:

1. Device Box: Typically installed as an empty box with blank faceplate, conduit and pull string for future use, unless specifically noted otherwise on the Communications Construction Drawings.
 - a. Shall be a minimum 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep capable of accepting a minimum of (2) 1 inch conduits.
 - b. Shall be equipped with a minimum single-gang mud ring unless otherwise noted on the Drawings.
 - 1) Mud ring depth shall be sized according to the depth of the wall surface per the Architectural Construction Documents.
 - c. Provide a blank faceplate to match the material, style and color being used on the Electrical Wiring Devices.
2. Outlet Box: Outlet boxes shall be provided to house Communications System equipment/outlets/connectors. Unless otherwise noted in the Communications (Technology) System Details on the Communications Construction Drawings the typical Outlet Box(es) shall be as follows:
 - a. Communications Cabling System:
 - 1) Shall be a minimum 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep capable of accepting a minimum of (2) 1 inch conduits
 - 2) Shall be equipped with a single-gang mud ring unless otherwise noted on the Drawings or specified as follows:
 - a) Mud ring depth shall be sized according to the depth of the wall surface per the Architectural Construction Documents.
 - b) Wireless Access Point: Provide a cover plate in lieu of single-gang mud ring.
 - b. Public Address System:
 - 1) Refer to Communications (Technology) System Details on the Communications Construction Drawings and Manufacturers requirements. Coordinate with Low Voltage contractor prior to rough-in. Receive written directions as to device box requirements for each location.
 - c. Security:
 - 1) Refer to Communications (Technology) System Details on the Communications Construction Drawings and Manufacturers requirements. Coordinate with Security contractor prior to rough-in. Receive written directions as to device box requirements for each location.
 - d. AudioVisual:
 - 1) Refer to Communications (Technology) System Details on the Communications Construction Drawings and Manufacturers requirements. Coordinate with AudioVisual contractor prior to rough-in. Receive written directions as to device box requirements for each location.
 - 2) Shall be a 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep capable of accepting a minimum of (2) 1-1/4 inch conduits and a double-gang mud ring.

2.05 PULL BOXES

- A. Pull Boxes shall be code gauge sheet metal/fabricated steel continuously welded at seams and painted after fabrication. Boxes shall be complete with covers, trim, etc.
- B. Minimum pull boxes sizes shall be as follows:

CONDUIT	PULL BOX SIZE			FOR EACH ADDITIONAL CONDUIT INCREASE
	WIDTH	LENGTH	DEPTH	WIDTH
1"	4"	16"	3"	2"
1-¼"	6"	20"	3"	3"
1-½"	8"	27"	4"	4"
2"	8"	36"	4"	5"
2-1/2"	10"	42"	5"	6"
3"	12"	48"	5"	6"
3-1/2"	12"	54"	6"	6"
4"	15"	60"	8"	8"

- C. Pull Boxes for conduits sized larger than shown in the table above shall be provided as shown on the Drawings.

2.06 FLOOR BOXES

- A. Floor boxes shall provide the space required for power, communication and/or audio/visual cabling and interface devices at floor level. For slab-on-grade floors, the floor box must be suitable for installation in “on-grade” conditions. Floor boxes shall be flush style, shall exceed UL scrub water exclusion requirements for tile and carpet floors, and shall be complete with covers, brackets and hardware to support installation as shown on Drawings.
1. Floor boxes may be combined for use by both power and communications where shown on the Drawings. When combined, provided metal dividers separating power from communications and provide separate conduits for power and communications.
 2. Floor boxes shall be complete with brackets, cover plates, and/or other means to support power, communications, and/or audio-visual type connectors shown on the Drawings or called for in the Specifications.
- B. Floor Box Types:
1. Single-Service Round Floor Box: Floor boxes shall be stamped steel, deep single-service. Covers shall accept a minimum of a 2-5/8” threaded opening.
 2. Raised Floor Shallow Floor Box (2-gang): Floor boxes shall be shallow.
 3. Shallow Floor Box (4-gang): Floor boxes shall be shallow.
 4. Floor Box (4-gang): Floor boxes shall be in a recessed box, shall be adjustable before concrete pour, and shall be complete with brackets to support power, communications, and/or audio/visual type connectors as shown on the Drawings and specified in Specifications.
 5. Deep Floor Box (6-gang): Floor boxes shall be in a recessed box, shall be adjustable before concrete pour, and shall be complete with brackets to support power, communications, and/or audio/visual type connectors as shown on the Drawings and specified in Specifications.
 6. Deep Floor Box (8-gang): Floor boxes shall be in a recessed box, shall be adjustable before concrete pour, and shall be complete with brackets to support power, communications, and/or audio/visual type connectors as shown on the Drawings and specified in Specifications.

7. Deep Floor Box (9-gang): Floor boxes shall be in a recessed box, shall be adjustable before concrete pour, and shall be complete with brackets to support power, communications, and/or audio/visual type connectors as shown on the Drawings and specified in Specifications.
 8. Deep Floor Box (10-gang): Floor boxes shall be in a recessed box, shall be adjustable before concrete pour, and shall be complete with brackets to support power, communications, and/or audio/visual type connectors as shown on the Drawings and specified in Specifications.
 9. Deep Floor Box (11-gang): Floor boxes shall be in a recessed box, shall be adjustable before concrete pour, and shall be complete with brackets to support power, communications, and/or audio/visual type connectors as shown on the Drawings and specified in Specifications.
 10. Floor Box (Flexible Conduit): Floor boxes shall be in a recessed box, shall be adjustable before concrete pour, and shall be complete with pans and brackets to support power, communications, and/or audio/visual type connectors as shown on the Drawings and specified in Specifications. Floor boxes shall be equipped with flexible conduit as required to interface into furniture. Floor boxes shall be approximately 7.5 inches x 7.38 inches by 3.5 inches deep, not including PVC riser. Pour pans shall be provided as required. Floor boxes shall be UL listed. Covers for floor boxes shall be included and shall support flexible conduit to furniture, as required. Covers shall be coordinated with Architect.
- C. Floor Box Covers: Covers shall be provided for each floor box, shall support carpet/floor trim to match surrounding floor area, shall be UL listed to safety standards for tile, carpet and wood floor installation, and shall prevent water, dirt, and debris from entering power/communication/audio/visual outlets. Covers shall incorporate floor box manufacturer's protection to prevent water, dirt, and debris from entering the power and communication devices, and shall meet or exceed UL scrub water exclusion requirements for tile and carpet floors. Coordinate color with Architect and Owner. Cover type shall be:
- a. Cast aluminum

2.07 POKE-THROUGHS

- A. Poke through devices shall provide the interface for power, communication and/or audio/visual cabling in an above grade floor and the workstation location where power, communication and/or audio/visual outlets are required. Poke-through assembly shall be flush style, shall exceed UL scrub water exclusion requirements for tile and carpet floors, and shall be complete with brackets and hardware to support installation as shown on Drawings.
- B. Poke-thru may be combined for use by both power and communications where shown on the Drawings. When combined, provided metal dividers separating power from communications and provide separate conduits for power and communications.

2.08 WALL BOXES

- A. Wall boxes shall provide the interface for power, communication and/or audio/visual cabling within walls. Wall boxes shall be flush style and shall be complete with covers, brackets and hardware to support installation as shown on Drawings.
 1. Wall boxes may be combined for use by both power and communications where shown on the Drawings. When combined, provided metal dividers separating power from communications and provide separate conduits for power and communications.
 2. Wall boxes shall be complete with brackets, cover plates, and/or other means to support power, communications, and/or audio-visual type connectors shown on the Drawings or called for in the Specifications.

2.09 OTHER BOX TYPES AND REQUIREMENTS

- A. Provide as required according to the Equipment Schedules, Notes and Communications Details on the Communications Construction Drawings.

PART 3 - EXECUTION

3.01 CONDUIT

A. General:

1. Run conduit in the most direct route possible, parallel and perpendicular to building lines.
2. Route conduits as close to structure as possible.
3. Do not route conduit through areas in which flammable material may be stored, or over or adjacent to boilers, incinerators, hot water lines, or steam lines.
4. Conceal all conduit unless indicated otherwise, within finished walls, ceilings, and floors.
5. Keep conduits at least 6-inches away from parallel runs of flues and steam or hot water pipes.
6. Install conduits level and square and at proper elevations.
7. For conduit runs exceeding more than 100 feet in length, provide pull boxes (see *Part 3 – Execution, Pull Boxes* herein) so that no conduit segment between end points/pull boxes exceeds 100 feet.
8. For conduit runs which require more than two 90 degree bends, install pull boxes (see *Part 3 – Execution, Pull Boxes* herein) so that no conduit segment between end points/pull boxes contains more than two 90 degree bends or a total of 180 degrees of bends including offsets and kicks.
9. Ream all conduits to eliminate sharp edges. Conduits shall be reamed after threads are cut.
10. Joints shall be cut square and shall butt solidly into couplings.
11. Terminate all metal conduits with metallic threaded insulated throat bushings, PVC conduit with PVC bushings.
12. Metallic conduits entering communication rooms shall be equipped with grounding lugs.
13. Prevent foreign matter from entering conduits by using temporary closure protection. After cable installation, cap each unused conduit with a mechanical-type seal (tape is not acceptable).
14. Conduits shall be installed in such a manner as to keep exposed threads to an absolute minimum and in no case shall more than three threads be left exposed.
15. Install expansion fittings where conduit crosses an expansion joint in structure or is in an environment where temperature changes combined with conduit run length may produce expansion or contraction stress. Provide a flexible bonding jumper at least three times the nominal width of the joint.
16. Terminate conduits that protrude through a floor 1 to 3 inches above the surface of the floor.
17. Conduits shall be cleaned and dried prior to the installation of cables.
18. Route conduit through roof openings for piping and ductwork wherever possible. Where not possible, provide and route through roof jack with pitch pocket for waterproofing. Empty conduits passing through roof penetrations shall be capped and sealed weather tight.
19. Conduits passing through exterior walls and floors below grade shall be made watertight with duct plugs. Pipe sleeves and wall collars shall extend all around the conduit or entrance seals and be specifically manufactured for that purpose.
20. When using RNC, transition to RMC for all bends, stub-ups, and penetrations through foundation walls.
21. The inside radius of a bend in a conduit shall be at least 10 times the internal diameter of the conduit, regardless of size. All bends in conduits shall be done in a sweeping manner.
22. Building codes require a bushing to be placed at each end of any conduit that is used for placing communications wiring. The purpose of these bushings is to protect the cabling as it is being placed. The Contractor will be required to ensure these bushings are in place prior to pulling wiring and not place them after the fact.
23. Double-gang wall boxes that will be used in conjunction with single-gang faceplates shall include a single gang P-Ring reducer plate.

24. Outdoor WAP Surface Mount - 1 ½ inch conduit sleeve with bushings not to exceed 2' total length. Conduit cannot have any bends.
 - a. If surface or flush mount box is installed on exterior, EMT box must be weather proof with 1 ½ inch knockout facing ground.
 - b. Must have 2'x2'x2' obstruction free circumference around cable in order to mount WAP.
- B. Conduit Schedule:
1. Buried or below grade level slab: RNC
 2. Embedded in concrete slab: RNC
 3. Through foundation walls: RMC
 4. Corrosive/Hazardous Areas: RMC
 5. Exposed or subject to mechanical injury: RMC
 6. All other areas (unless otherwise noted): EMT
- C. Minimum Conduit Sizing, where not shown on the Drawings,:
1. Junction Boxes in walls: 1 inch.
 2. Device Boxes: 1 inch.
 3. Pull Boxes: Provide per the Drawings.
 4. Floor boxes: Provide per the Drawings. Where not shown, coordinate with the other Trades who will make use of the floor box and provide per their requirements. Conduits shall be provided per the manufacturer's requirements and recommendations for the specified floor box.
 5. Poke-thru: The size of the conduit feeding the poke-through shall be the same size as the conduit stub of the poke-through.
- D. Conduit bends:
1. A conduit bend shall not exceed 90 degrees and shall not be constructed in such a way as to reduce the effective diameter of the conduit.
 2. Conduit bends (other than bends in OSP Conduit Ductbank) shall be sweeping, shall conform to TIA/EIA 569 bend radius requirements, and shall be a minimum of no less than 6 times the internal diameter of the conduit for conduits 2-inches or less and a minimum of no less than 10 times the internal diameter of the conduit for conduits greater than 2-inches.
 3. For conduits larger than 1-1/4 inch, bends shall be factory-manufactured. Bending conduit larger than this in the field using manual or mechanical methods is not acceptable. 1 inch and 1-1/4 inch bends shall be made in an approved bending machine or shall be factory-manufactured.
 4. The contractor shall test each conduit with a mandrel to prove compliance with TIA/EIA and cable manufacturer bend radius requirements throughout the conduit run and shall provide evidence of such testing immediately upon request of the Engineer.
 5. The sum total of conduit bends for a conduit segment between end points/pull boxes shall not exceed 180 degrees, except one additional bend of up to 90 degrees is acceptable if the bend is located within 12 inches of the cable feed end.
 6. 90 degree condulets (LB's) are not acceptable.
- E. Conduit Stubs:
1. From boxes in partition walls: Conduit stubs shall extend a minimum of 6-inches above top of partition wall and shall be angled 30 degrees toward the nearest raceway/pathway for horizontal cabling.

2. To cable tray: Terminate conduits 2 to 4 vertical inches above the tray and within 2 horizontal inches of the edge of the tray. Conduits shall not extend over the edge of the cable tray.
 3. Through floor slabs: Arrange so curved portion of bend (if any) is not visible above finished slab.
- F. Conduit/duct runs under slab: Coordinate with other trades (electrical, plumbing, etc.) prior to trenching and installation. Communications conduit/duct runs under slab shall not share a trench with conduit/duct runs from other trades.
- G. Conduits embedded in slab: Not acceptable unless otherwise shown on the Drawings.
- H. Pull String for horizontal and systems cable:
1. Equip all conduits over 3 feet long with plastic or nylon pull strings with printed footage indicators and a minimum test rating of 200 pounds. Extend pull string a minimum of 3 feet from each end. Pull strings shall be secured to avoid losing the pull string within the conduit by either securing tying the end of each string in place, or by tying the end of each string to a washer with a diameter larger than the conduit diameter.
 2. Label each pull string in a clear manner by designating, at each end of the pull string, the location of the far end of the pull string (i.e. room name, communications closet name, pull box identifier, cable tray, station identifier, etc.). Indicate pull string length on the label.
- I. Bushings: The Contractor is solely responsible for ensuring that bushings (insulated throat for metallic conduit, PVC for PVC conduit) are installed at conduit end(s) prior to cable installation. Where cable is installed prior to the installation of bushings, the Contractor shall remove the cable, install the bushing, and re-install the cable at no additional cost to the Owner.

3.02 JUNCTION AND DEVICE BOXES

- A. General:
1. Unless otherwise indicated, boxes shall be recessed. Set boxes plumb, level, square and flush with wall. Do not exceed more than 1/16 inch tolerance for each condition. Recess outside edge and trim plates from finished surface in accordance with NEC.
 2. Boxes shall be supported independently of the conduit system. Supports shall be noncombustible and corrosion resistant. Suspended boxes shall be supported with threaded rod hangers and galvanized steel clamps, or trapeze hangers such as Unistrut.
 3. DoTs approval is required to move box locations shown on the drawing.
 4. Install additional straps or cross-bracing to ensure a rigid installation in a steel stud system.
 5. Boxes on opposite sides of fire rated walls and partitions shall be separated by a horizontal distance of at least 24 inches.
 6. Unused knockouts in boxes shall be left sealed.
 7. For acoustical purposes, boxes on opposite sides of a wall shall not be located back-to-back.
 8. For boxes to be installed in brick, masonry or concrete, offsets shall be provided to provide for proper adjustment to finished surfaces. Exposed mortar is not acceptable around device plates.
 9. In the event of discrepancies between box locations shown on the Communications drawings and any other drawings in the Construction Documents, the Contractor shall notify the Engineer and await the Engineer's direction prior to installation.
- B. Device Box Types
1. Device Box:
 - a. Unless specifically noted otherwise on the Drawings, Device Boxes shall be dedicated to Communications Systems and shall not be shared with power.
 - b. Provide with blank faceplate and pull string.

2. Outlet Box:
 - a. General:
 - 1) Unless specifically noted otherwise on the Drawings, Outlet Boxes shall be dedicated to Communications Systems, and shall not be shared with power.
 - 2) The contractor shall install the box and mudring such that the face of the mudring is flush with the face of the wall. Refer to the Architectural Construction Documents (Drawings and Specifications) for Wall Types, Materials and Installation Details.
 - 3) The use of dividers to divide a single box into “separate” sections for Communications Systems and power (or another function) is not acceptable.
 - b. Communications Cabling System:
 - 1) Outlet boxes shall be located within 3 feet of an electrical power receptacle. Where conditions are such that this is not possible, promptly notify the Engineer and await the Engineer’s direction prior to rough-in of the box.
 - c. Public Address System:
 - 1) Refer to drawings and Manufacturers requirements.
 - 2) Coordinate with Low Voltage contractor prior to rough-in.
 - d. Security System(s):
 - 1) Refer to drawings and Manufacturers requirements.
 - 2) Coordinate with Security contractor prior to rough-in.
 - e. AudioVisual System:
 - 1) Refer to drawings and Manufacturers requirements.
 - 2) Coordinate with AudioVisual contractor prior to rough-in.

3.03 PULL BOXES

- A. Install pull boxes in an exposed location, readily accessible both at time of construction and after building occupation. Pull boxes shall not be installed in interstitial or otherwise non-accessible building spaces.
- B. If mounting a pull box on ceiling structure above ceiling grid, do not mount higher than 4 feet above grid (mount on wall instead).
- C. Install pull boxes such that conduit enters and exits only from opposite ends of the box (i.e. only two sides of a box may be used for conduit entry and those two sides must be opposite one another).
- D. Do not install conduits into pullboxes in such a manner as to obstruct the installation of future feeder conduits into or out of the pullbox.
- E. A pull box shall not be substituted for a 90 degree bend.
- F. Do not exceed one pull box per total conduit run between outlet box and termination point in a communications closet, unless otherwise shown on the Drawings. Where field conditions necessitate the use of additional pull boxes notify the Engineer and await the Engineer's direction prior to procurement and installation.
- G. Pull boxes shall be rigidly mounted. Unused knockouts shall be plugged with suitable blanking devices.
- H. Labels: Label each pullbox with a unique identifier. Identifiers shall be of the form “RN-YY” where “RN” is the room name of the room closest to (or containing) the pull box, and “YY” is the sequential number of the pull box for each “RN”. For example: The second pull box in the vicinity of room “201” would have the label “201-02”.

3.04 FLOOR BOXES

- A. Set boxes plumb, level, square and flush with floor. Do not exceed more than 1/16 inch tolerance for each condition.
- B. Floor boxes shall have been tested for use in fire-resistance-rated assemblies applicable to the condition(s) present in Project, and shall be installed in accordance with the instructions included in the listing.
- C. For floor boxes installed in concrete slab:
 - 1. Coordinate floor boxes with slab/concrete topping depth. Where depth of floor box conflicts with slab depth notify the Engineer and await the Engineer's direction prior to procurement and installation.
 - 2. Adjust box prior to and after concrete pour.
- D. Covers shall be installed per manufacturer's recommendations.
- E. For floor boxes with combined power and communications circuits, install metal dividers for separation of circuits and provide separate conduits for power and communications.

3.05 POKE-THROUGHS

- A. Poke-thru shall be installed per manufacturer's requirements and recommendations.

3.06 WALL BOXES

- A. Set boxes plumb, level, square and flush with floor. Do not exceed more than 1/16 inch tolerance for each condition. Recess outside edge and trim plates from finished surface in accordance with NEC.
- B. Boxes shall be supported independently of the conduit system. Supports shall be noncombustible and corrosion resistant. Suspended boxes shall be supported with threaded rod hangers and galvanized steel clamps, or trapeze hangers such as Unistrut.
- C. DoTs approval is required to move box locations shown on the drawing.
- D. Install additional straps or cross-bracing to ensure a rigid installation in a steel stud system.
- E. Boxes on opposite sides of fire rated walls and partitions shall be separated by a horizontal distance of at least 24 inches.
- F. Unused knockouts in boxes shall be left sealed.
- G. For acoustical purposes, boxes on opposite sides of a wall shall not be located back-to-back.
- H. For boxes to be installed in brick, masonry or concrete, offsets shall be provided to provide for proper adjustment to finished surfaces. Exposed mortar is not acceptable around device plates.
- I. In the event of discrepancies between box locations shown on the Communications drawings and any other drawings in the Construction Documents, the Contractor shall notify the Engineer and await the Engineer's direction prior to installation.
- J. Covers shall be installed per manufacturer's recommendations.
- K. For wall boxes with combined power and communications circuits, install metal dividers for separation of circuits and provide separate conduits for power and communications.

END OF SECTION 27 05 33