

SECTION 270500

COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL REQUIREMENTS

1.1 SUMMARY

- A. This Section includes general construction materials and methods, communications equipment coordination, and common communications installation requirements as follows:
 - 1. Grounding and Bonding for Communications
 - 2. Pathways for communications systems.
 - a. Conduit
 - b. Outlet Boxes
 - c. Pull Boxes
 - 3. Firestopping Systems
 - 4. Access Panels
 - 5. Identification

1.2 RELATED SECTIONS INCLUDE THE FOLLOWING

- A. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations in Division 27 Section "General Communications Requirements"

1.3 CODES, REFERENCES, AND STANDARDS

- A. Follow all applicable codes, references, and standards listed in Division 27 Section "General Communications Requirements".
- B. Follow all guidelines listed in Division 27 Section "General Communications Requirements".
- C. The Contractor is responsible for following the correct revision or printing (UON) of all applicable codes, references, standards, and guidelines.
- D. Follow the additional codes, references, standards and guidelines:
 - 1. ASTM E 814 and ANSI/UL1479 –"Fire Tests Through Penetration Firestops"
 - 2. ASTM E 84 and ANSI/UL 723 "Surface Burning Characteristics of Building Materials"
 - 3. ASTM E 119 and ANSI/UL 263 "Fire Tests of Building Construction Materials"

1.4 DEFINITIONS

- A. Cable Tray System – A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways.
- B. Common Work – all Work specified in this section.
- C. Conditionally Approved - the manufacturer has been found reputable by the Design Consultant, but the Design Consultant has not verified that the product offering by manufacturer meets to all specification and project requirements. Contractor shall adhere to submittal review process for final approval on products.
- D. Conduit Body – A separate portion of a conduit or tubing system that provides access through a removeable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system. Boxes such as FS and FD or larger cast or sheet metal boxes are not classified as conduit bodies.
- E. Conveniently Accessible – Capable of being reached from the floor or via the use of an 8 foot step ladder without crawling or climbing over or under obstacles such as piping, duct work, motors, transformers, pumps, etc.

- F. Firestopping System – Firestopping products that have been specifically tested and rated by a Nationally Recognized Testing Laboratory (NRTL), such as UL, to provide the required flame (F), fire and temperature (T), air and smoke (L), and water (W) containment for a given partition/penetration.
- G. Floor Box Assembly (Floor Box) – An on-grade solution or above grade (with a native fire classification or in combination with an approved Firestopping System) solution for in-floor terminations. The Assembly consists of pour pan (as applicable), Firestopping System (as applicable), floor box (compartment), plate mounting brackets, line voltage divider plates, termination plates, termination connectors, electrical receptacle(s), gang plates (termination cover plates), and access door / cover / lid.
- H. Ground or Grounding – A conducting connection, whether intentional or accidental, between an electrical circuit (e.g. telecommunications) or equipment and the earth, or to some conducting body that serves in place of earth.
- I. IMC – Intermediate Metal Conduit
- J. Plenum – A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
- K. Plenum-rated – A product that is listed by a NRTL as being suitable for installation into a plenum space.
- L. Point of Entrance (Building Entrance) – The point within a building where the Outside Plant (OSP) communications cabling emerges from an external wall, a concrete floor slab, or IMC/RMC. If Communications Point of Entrance isn't identified on the drawings, assume the Main Communications (MDF) also acts as the Point of Entrance.
- M. Poke Through Assembly (Poke-Thru) – An above grade solution with a native fire classification for in-floor terminations. The Assembly consists of pre-pour sleeve (as applicable), Firestopping System, fire resistant conduit stub, poke thru (compartment), plate mounting brackets, line voltage divider plates, termination plates, termination connectors, electrical receptacle(s), gang plates (termination cover plates, as applicable), and access door / cover / lid.
- N. Quality Control Specialist – as it pertains to Work within this section, Quality Control Specialist is the the Project CTS-I, as defined in Division 27 Section “Audio Video Systems”, for Common Work for AV.
- O. RMC – Rigid Metal Conduit
- P. Surface Metal Raceway – A metallic raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors.
- Q. Surface Nonmetallic Raceway – A nonmetallic raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors.
- R. UL – Underwriters Laboratory

1.5 QUALITY ASSURANCE

- A. Submittals and Shop Drawings for all Common Work Results specified in this section shall, if not created by, be reviewed by the Quality Control Specialist.
 - 1. The Quality Control Specialist shall stamp all relevant submittals for their associated Division 27 sections, which indicates that at a minimum the proposed work has been reviewed by them and found to be in compliance in regards to:
 - a. All applicable codes and industry standards and guidelines referenced in Division 27.
 - b. Being fully-coordinated with all other trades and to be installed per the Construction Documents.
 - c. And installed per manufacturer's direction.
- B. The Quality Control Specialist shall also make weekly inspections during construction to ensure all work installed per this section is correct.

LEE'S SUMMIT HS PAC SOUND SYSTEM IMPROVEMENTS
100% CONSTRUCTION DOCUMENTS PROJECT NO. 1850002492

1. Any deficiencies encountered prior to and during installation shall be corrected by the installing contractor under the direction of the Quality Control Specialist and/or the Design Consultant.

C. Firestopping Systems

1. Firestopping material and systems shall be tested and listed by UL. All firestopping products shall bear this classification marking.
2. Installation technicians shall be by qualified and trained personnel. Acceptable installer qualifications are as follows:
 - a. FM Research, approved in accordance with FM AS 4991.
 - b. Individuals who are trained and certified by the firestopping manufacturer. For Specified Technologies, all installers shall have current FIT Level 1 certification.

1.6 SUBMITTALS

- A. Follow the requirements for submittals in Division 27 Section "General Communications Requirements".

B. Pre-bid

1. Product substitutions

C. Pre-construction

1. Equipment List

2. Manufacturers' cut sheets or catalog cut sheets of each of the pathways not specifically identified by its exact part number:

- a. In addition to Division 27 Section "General Communications Requirements", include the following:

- 1) Size – including physical and loading dimensions
- 2) Maximum span length
- 3) Weight supported
- 4) Type
- 5) Fittings to be used
- 6) Method of attachment to structure

- 7) Firestop system assembly information for each system to be installed:

- a) Documentation from UL catalog for each system proposed. This documentation shall include the following information:

- i) Firestop manufacturer
- ii) UL system number
- iii) F, T, and L Ratings

- iv) The complete description of the firestop system; To include what specific construction the system is intended to pass through such as a wall or floor assembly, the penetrating items allowed to pass through the opening in the wall or floor assembly, and the materials designed to prevent the spread of fire through the openings.

- 8) As well as any additional information required by individual sections of this Division

3. Shop Drawings

- a. Submit for review scaled layout drawings showing the size/routing of all pathways and the size/information/locations of all boxes, pullboxes, firestopping systems, and access panels.

- 1) Each pathway shall be identified by type and size on the drawings.

- a) Example #1: 4" EMT
- b) Example #2: 4" x 12" Cable Tray

- 2) Each grounding conductor shall be identified by size (and insulation):
 - a) Example: #3/0 insulated ground
 - 3) Each firestop system shall be identified by Manufacturer and Product, as well as UL system number for that particular location.
 - a) Example #1 – Firestopping Sleeve:
EZ-Path Series 22, UL System W-L-3255
 - b) Example #2 – Backbox in Fire-Rated Wall:
Specseal Power Shield, UL System QCSN/CLIV.R14288
 - 4) Each pullbox and access panel shall be identified by size and height above finished floor.
 - a) Pullbox Example: Pullbox 8" x 24" x 40" approximately 12' AFF.
- b. Unless otherwise required by these specifications, it is permissible to show pathways systems (conduit, cable tray, auxiliary supports, etc.) on the same shop drawing along with the cabling and system work to be installed through those pathways.
- 1) Division 271000 "Structured Cabling System" and Division 274100 "Audio Video Systems" and their individual pathways shall not be combined into a single shop drawing; shared pathways such as cable tray shall be shown on both shop drawings.

D. Project Completion

1. Record Drawings:

- a. Based on the work prints kept on the jobsite and official changes to the Contract Documents (such as Change Orders, District's Supplemental Instructions, and Design Change Directives), create final drawings incorporating any minor and approved changes to the submitted Shop Drawings. Submit this set in accordance with the Record Drawings requirements of Division 27 Section "General Communications Requirements".
- b. The Quality Control Specialist is to review the installation and Record Drawings for the Common Work Results required for their scope of work and to stamp the final Record Drawings with their CTS-I stamp before submission. By stamping the Record Drawings, the Quality Control Specialist indicates that the Common Work Results have been installed per the Contract Documents and all associated codes, standards, and guidelines, and any minor changes or official changes to the drawings have been incorporated into the Record Drawings.

1.7 COORDINATION

A. Coordinate arrangement, mounting, and support of communications equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To allow right of way for piping, ducts, and other systems installed at required slopes and/or elevations.
3. So connecting raceways, cables, and wireways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed.

D. Coordinate testing of electrical, mechanical, and Architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

- B. Fire-Rated Pathway Device – for sleeves through a single penetration (wall or floor)
 - 1. Specifications
 - a. Minimum performance requirements: Shall meet testing requirements of ASTM E-814 or U.L. 1479; Shall be installed in accordance with the NRTL. Provide fire stop systems appropriate for the specific application and in accordance with manufacturer's instructions.
 - b. Shall meet or exceed the ratings of the wall or floor that it penetrates.
 - c. Shall be a pre-fabricated and zero-maintenance solution which requires no action to activate the fire and smoke protective characteristics of the device.
 - d. Allows the installation and removal of cables without the need to remove or add any materials.
 - e. Used to seal penetrations of cables through fire rated partitions
 - f. Not subject to the single manufacturer requirement
 - 2. Manufacturer shall be:
 - a. EZ-Path family of products by Specified Technologies Inc.
 - b. Hilti Firestop Speed Sleeve CP 653 Series
 - c. Wiremold Flamestopper
- C. Firestopping for Backboxes in Fire-Rated Walls
 - 1. Specifications
 - a. Used to seal backboxes in fire rated partitions.
 - b. Minimum performance requirements: Shall meet UL testing requirements of UL 263 and classified as Wall Opening Protective Material (QCSN or CLIV); Shall be installed in accordance with the NRTL. Shall meet or exceed the ratings of the wall or floor that it is located in.
 - c. Provide fire stop systems appropriate for the specific application and in accordance with manufacturer's instructions.
 - 2. Manufacturer shall be:
 - a. Hilti CP 617 or CFS-P PA
 - b. Specified Technologies Inc., SpecSeal Power Shield
 - c. Or equivalent from Conditionally Approved manufacturer.
- D. Firestopping for Thru-Wall (or Floor) Conduit Penetrations and Other Applications
 - 1. For fire-rated penetrations where the conduit pathway extends beyond a single fire-rated partition/floor, and other required firestopping applications not previously addressed in this specification.
 - 2. Specifications:
 - a. Shall be UL listed for the specific application; Shall meet or exceed the ratings of the wall or floor that it penetrates.
 - 3. Manufacturer shall be:
 - a. Hilti – submit UL System documentation for each floor/wall type and product cutsheets for all Hilti materials to be utilized
 - b. Specified Technologies Inc. – submit UL System documentation for each floor/wall type and product cutsheets for all STI materials to be utilized
 - c. Or equivalent from Conditionally Approved manufacturer.

2.4 ACCESS PANELS

- A. Access Panels

LEE'S SUMMIT HS PAC SOUND SYSTEM IMPROVEMENTS
100% CONSTRUCTION DOCUMENTS PROJECT NO. 1850002492

1. Where pullboxes are required above inaccessible ceiling spaces, or for other required conditions, provide an appropriately-sized access panel. The following manufacturers are Conditionally Approved.
 - a. Activar/J.L Industries www.activarcpg.com
 - b. Acudor Products www.acudor.com
 - c. Alfab/Barco www.alfabinc.com
 - d. Elmdor Products www.elmdorproducts.com
 - e. Karp Associates, Inc. www.karpinc.com
 - f. Milcor www.commercialproductsgroup.com
 - g. Nystrom Building Products www.nystrom.com
 - h. Williams Brothers www.wbdoors.com
 - i. Wind-lock www.wind-lock.com
 - j. Or Approved Substitution (submitted and accepted in the "pre-bid" phase)
2. Specifications:
 - a. Steel Access Doors and Frames: Factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation.
 - b. Joints and seams: continuously welded steel, with welds ground smooth and flush with adjacent surfaces.
 - c. Frames: 16-gauge steel, with a 1 inch (25.4 mm) wide exposed perimeter flange for units installed in unit masonry, pre-cast, or cast-in-place concrete, ceramic tile, or wood paneling:
 - 1) For installation in masonry, concrete, ceramic tile, or wood paneling: 1-inch-wide-exposed perimeter flange and adjustable metal masonry anchors.
 - 2) For gypsum wallboard or plaster: perforated flanges with wallboard bead.
 - 3) For full-bed plaster applications: galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.
 - d. Flush Panel Doors: 14-gauge sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees; factory-applied prime paint.
 - e. Fire-Rated Units: Insulated flush panel doors, with continuous piano hinge and self-closing mechanism.
3. Locking Devices: Where indicated, provide 5-pin or 5-disc type cylinder locks, individually keyed; provide 2 keys.
4. Indicate proposed size and locations on pre-construction shop drawings. No access panels shall be installed without District and Design Consultant approval.

2.5 IDENTIFICATION FOR COMMON WORK FOR COMMUNICATIONS SYSTEMS

A. Labels

1. The following manufacturers are Conditionally Approved for generic labeling requirements for conduits, pullboxes, and equipment racks.
 - a. Brady www.bradycorp.com
 - b. Brother www.brother-usa.com
 - c. Dymo www.dymo.com
 - d. HellermannTyton www.hellermannntyton.com
 - e. Panduit www.panduit.com
 - f. Or Approved Substitution (submitted and accepted in the "pre-bid" phase)
2. Specifications:
 - a. Refer to additional requirements in Part 3 – Execution.

- b. Refer to individual sections for additional identification requirements for specific work.

2.6 KEYS

- A. Supply two copies of every key as required for pullboxes, junction boxes, and access panels.

PART 3 - EXECUTION

3.1 PATHWAYS FOR COMMUNICATIONS

A. General

1. All supports shall be specifically designed to support the required cable weight and volume. Field manufactured supports will not be accepted.
2. Install a pull cord in each pathway (empty or not) for installation of new wires or cables. Use polypropylene or monofilament plastic line with not less than 200 lb (90.7 kg) tensile strength. Leave at least 12 inches (304.8 mm) of slack at each end of pull cord.
3. Unless otherwise noted, pathway routing shown on the Drawings is illustrative only and meant to indicate the general configuration of the work. Install pathways so that adequate clearances and offsets between pathways and other trades are provided. Coordinate all pathways with other trades prior to installation.
4. All pathways shall include empty space for a minimum of 25% growth beyond initial installation of cabling.
5. Cables shall be rigidly supported by cable pathways as indicated on the drawings. Cables shall be physically supported at intervals not to exceed 5 feet (1.52 m).
6. Store and keep dry all products in original container in a climate controlled environment until installation is to occur
7. Install all communications pathways:
 - a. So that cables are allowed to be pulled in accordance with referenced standards and guidelines.
 - b. So that cables are allowed to be pulled without damage to conductors, shield, armor, or jacket.
 - c. So that cables are not forced or allowed to exceed minimum allowed bend radius by manufacturer or referenced standards and guidelines.
 - d. So that the maximum allowable pulling tension is not exceeded.
 - e. To meet the requirements of the structure and the requirements of all other Work on the Project
 - f. To clear all openings, depressions, ducts, pipes, reinforcing steel, and so on.
 - g. Within or passing through the concrete structure in such a manner so as not to adversely affect the integrity of the structure. Become familiar with the Architectural and the Structural Drawings and their requirements affecting the raceway installation. If necessary, consult with the District.
 - h. Parallel or perpendicular to building lines or column lines.
 - i. When concealed, with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
8. Cables shall remain unattached to pathways or other cables and shall simply lay at rest on the supports provided by its pathway (including cable trays, wire basket, j-hooks, conduit, etc.). Wire ties, velcro straps, electrical tape or other methods shall **not** be used to attach cables to cable supports; UON.
 - a. Except when supported by ladder racking within each Telecommunications room, UON.
9. Provide adequate communications pathways so that cabling is not forced to attach, be supported, or use other pathways not specifically designed and provided for communications cabling purposes. Any deviation from this will not be accepted.

LEE'S SUMMIT HS PAC SOUND SYSTEM IMPROVEMENTS
100% CONSTRUCTION DOCUMENTS PROJECT NO. 1850002492

- a. At no point shall cables come in contact with, be supported by, or attach to other trades equipment or supports. UON
- b. At no point shall cables come in contact with, be supported by, or attach to building structures or supports; UON
10. Provide appropriately sized sleeves where cables are required to pass through non-rated full-height partitions. Where allowed, sleeves shall extend a minimum of **3 inches (76.2 mm)** beyond the partition surface on both sides, and shall be rigidly supported to support the weight of cables. Sleeves shall be sized so that no more than 50% of the cross-sectional area is utilized by the cabling to be installed. The minimum inside diameter of each sleeve shall be nominal **2 inches (50.8 mm)**.
11. Suspended cables shall be installed with at least **3 inches (76.2 mm)** of clear vertical space above the ceiling tiles and support channels (T-bars).
12. Waterproofing
 - a. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls, and the like. If such penetration is necessary, make penetration prior to the waterproofing and furnish all sleeves or pitch-pockets required. Advise the District and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the Drawings.
 - b. Restore waterproofing integrity of walls or surfaces after they have been penetrated without additional cost to the Owner.
13. Cutting and Patching
 - a. Where cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support or anchorage of conduit or other equipment, layout the work carefully in advance. Repair any damage to the building, piping, equipment or defaced finished plaster, woodwork, metalwork, etc. using skilled tradespeople of the trades required at no additional cost to the Owner.
 - b. Do not cut, channel, chase or drill masonry, tile, etc., unless permission from the District is obtained. If permission is granted, perform this work in a manner acceptable to the District.
 - c. Patch around all openings to match adjacent construction.
 - d. Where conduit or equipment is mounted on a painted finished surface, or a surface to be painted, paint to match the surface. Cold galvanize bare metal whenever support channels are cut.
 - e. Provide slots, chases, openings and recesses through floors, walls, ceilings, and roofs as required. Where these openings are not provided, provide cutting and patching to accommodate penetrations at no additional cost to the Owner.
 - f. After the final waterproofing membrane has been installed, roofs may be cut only with written permission by the District.
14. Mounting Heights
 - a. Mounting heights for equipment and devices requiring operational access shall conform to ADA requirements.
 - 1) Wall mounted devices requiring operational access shall be mounted a minimum of 15 inches above finished floor to bottom of device and a maximum of 48 inches above finished floor to top of device.
 - b. Mounting heights shall be from floor to center of device, unless otherwise noted. Verify exact locations and mounting heights with the District before installation.
 - c. Typical mounting heights shall match nearest adjacent typical electrical outlet mounting height UON or as directed by the District.
15. Painting

LEE'S SUMMIT HS PAC SOUND SYSTEM IMPROVEMENTS
100% CONSTRUCTION DOCUMENTS PROJECT NO. 1850002492

- a. Paint exposed ferrous surfaces, including, but not limited to, hangers, equipment stands and supports using materials and methods as specified under individual Sections; colors shall be as selected by the District.
 - b. Re-finish all field-threaded ends of galvanized conduits and field-cut ends of galvanized supports with a cold-galvanizing compound approved for use on conductive surfaces. Follow closely manufacturer's instructions for pre-cleaning surfaces and application.
 - c. Factory finishes and shop priming and special finishes are specified in the individual equipment Specification sections.
 - d. Where factory finishes are provided and no additional field painting is specified, touch-up or refinish, as required by, and to the acceptance of, the District and Design Consultant, marred or damaged surfaces so as to leave a smooth, uniform finish. If, in the opinion of the District or Design Consultant, the finish is too badly damaged to be properly re-finished, replace the damaged equipment or materials at no additional costs to the Owner.
 - e. Provide touch-up paint as required by Specification Sections in this Division.
16. Fastenings
- a. Fasten equipment to building structure in accordance with the best industry practice.
 - b. Where weight applied to the attachment points is 100 pounds or less, conform to the following as a minimum:
 - 1) Wood: Wood screws.
 - 2) Concrete and solid masonry: Bolts and expansion shields.
 - 3) Hollow construction: Toggle bolts.
 - 4) Solid metal: Machine screws in tapped holes or with welded studs.
 - 5) Steel decking or sub-floor: Fastenings as specified below for applied weights in excess of 100 pounds.
 - c. Where weight applied to building attachment points exceeds 100 pounds, but is 300 pounds or less, conform to the following as a minimum:
 - 1) At concrete slabs provide 24 inch x 24 inch x ½ inch steel fishplates on top with through bolts. Fishplate assemblies shall be chased in and grouted flush with the top of slab screed line, where no fill is to be applied.
 - 2) At steel decking or sub-floor for all fastenings, provide through bolts or threaded rods. The tops of bolts or rods shall be set at least one inch below the top fill screed line and grouted in. Suitable washers shall be used under bolt heads or nuts. In cases where the decking or sub-floor manufacturer produces specialty hangers to work with his decking or sub-floor such hangers shall be provided.
 - d. Where weight applied to building attachment points exceeds 300 pounds, coordinate with and obtain the approval of District and conform to the following as a minimum:
 - 1) Provide suitable auxiliary channel or angle iron bridging between building structural steel elements to establish fastening points. Bridging members shall be suitably welded or clamped to building steel. Provide threaded rods or bolts to attach to bridging members.
 - e. For items, which are shown as being ceiling mounted at locations where fastening to the building construction element above is not possible, provide suitable auxiliary channel or angle iron bridging tying to the building structural elements.
 - f. Wall mounted equipment may be directly secured to wall by means of steel bolts. Groups or arrays of equipment may be mounted on adequately sized steel angles, channels, or bars. Prefabricated steel channels as manufactured by Kindorf or Unistrut are acceptable.

17. Areas identified as noise critical spaces shall have all penetrations sealed to minimize sound transmission between adjacent spaces. Install Acoustical Pathway(s) through walls of noise critical spaces
- B. Access to pathways and associated equipment
1. Locate all cable trays, open hanger cable supports, j-hooks, pull boxes, junction boxes and fire stopping systems so as to provide easy access for operation, service inspection and maintenance.
 2. Provide an Access Panel where equipment or devices are located above inaccessible ceilings. Where access doors are necessary but not shown on the plans, coordination type and location with District and Design Consultant through an RFI.
 - a. Pathways requiring access such as open hanger cable supports, j-hooks, and cable trays shall have an access door or other means of direct access at a minimum of **10 feet (3 m)** intervals.
 - b. Cables or cable pathways requiring access such as open hanger cable supports, j-hooks, and cable trays may not change directions above an inaccessible ceiling unless complete access to the change of direction in pathway or cable route is within arms reach **3 feet (0.9 m)** from adjacent accessible point.
 3. Maintain all code required clearances and clearances required by manufacturers.
- C. Cable distribution
1. Provide pathways for Audio Video Systems to allow cabling to be installed in the following manner:
 - a. For typical new walls:
 - 1) Homerun method: Conduit from outlet/box location all the way back to the AV Rack identified on the drawings.
 - b. For existing walls:
 - 1) For stud walls - "Ring and String": Mud ring for faceplate, cabling run in hollow cavity of the wall and then j-hooks are utilized back to the nearest cable tray or serving Telecommunications Room/Space
 - 2) For masonry or inaccessible walls – Surface-mounted raceway.
 - c. See drawings for clarification.
- D. Conduits
1. Adequate access shall be available where cables enter conduits
 2. Bond and ground all metallic conduits and boxes in accordance with national or local requirements and with TIA-607B – "Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
 3. Install conduits in the most direct route possible, running parallel to building lines
 4. Ream all conduit ends and fit them with an insulated bushing to eliminate sharp edges that can damage cables during installation or service.
 5. Conduits which enter Telecommunications rooms shall extend **3 inches (76.2 mm)** AFF or through the wall.
 6. Conduits which enter Entrance Facilities shall extend **4 inches (101.6 mm)** AFF or below the finished ceiling (if exists).
 7. Flexible conduits may only be used where specifically allowed by these contract documents.
 - a. Flexible conduit sections Shall be less than **20 feet (6.1 m)** in length.
 8. No continuous section of a conduit may exceed **100 feet (30.5 m)** without a pullbox.
 9. No more than (2) **90°** bends, or equivalent will be allowed between pullboxes.
 - a. Each and any offset shall be considered a **90°** bend.
 - b. A pullbox is required wherever a reverse bend is installed.

10. The minimum bend radius for conduits is
 - a. (6) times the inside diameter for **2 inches (50.8 mm)** conduits or less.
 - b. (10) times the inside diameter for conduits greater than **2 inches (50.8 mm)**.
11. Any single conduit run may not serve more than (1) outlet location unless expressly indicated on the drawings.
12. Conduits shall contain no electrical condulets (also known as LBs).
 - a. Exception: Pre-approved (by the Design Consultant) condulets specifically manufactured for communications cabling and will maintain minimum bend radius for cabling to be installed. These locations are to be called out on the shop drawings.

E. Outlet boxes

1. No outlet boxes shall be located back-to-back in a wall cavity.
 - a. Where possible offset to next stud cavity, with a minimum of **6 inch (152.4 mm)** separation.
2. Outlet boxes shall be within **3 feet (0.9 m)** of nearest electrical outlet.
3. Outlet boxes located in fire-rated walls are to have the appropriate firestopping for backboxes. These locations are to be identified on shop drawings.
4. Where cabling enters a backbox directly (not via conduit), provide black rubber grommet on knockout.

F. PullBoxes

1. Pullboxes shall be placed in Conveniently Accessible locations.
2. Coordinate the location and installation of all pullboxes to ensure adequate access is provided.
3. Pullboxes above an accessible ceiling shall:
 - a. Be aligned directly over the ceiling grid to allow access
 - b. Be installed with a minimum of **3 inches (76.2 mm)** clearance to ceiling grid and tiles
4. No directional changes shall be allowed in pullboxes. Conduit Shall continue in the same direction as it enters and then change direction via an appropriately sized bend in the conduit.
5. Size pullboxes according to the following chart (all sizes are minimums):

Conduit Trade Size	Width	Length	Depth	Width Increase for Additional Conduit (of same size)
¾" or smaller	4"	4"	2-1/8"	Not applicable
1"	4"	16"	3"	2"
1-1/4"	6"	20"	3"	3"
1-1/2"	8"	28"	4"	4"
2"	8"	36"	4"	5"
2-1/2"	10"	42"	5"	6"
3"	12"	48"	5"	6"
4"	16"	60"	8"	6"

3.2 LABELING

A. Labeling Installation

1. Labels that are to be secured by adhesive. They shall have a type of adhesive that is appropriate for the particular surface upon which the label is to be installed. The mounting surface shall be free of dust, dirt, oil, etc. that would impede the adhesion of the labels.

B. Labeling Requirements

1. Labels are to be installed on:

- a. All firestopping systems. For wall and floor penetrations, label on both sides. See Firestopping later in this section.
- b. All pathways (e.g., conduit, innerduct, etc.) installed under this work.
 - 1) Label all conduit and innerduct with "TELECOM" or "AV" according to the intended system/use of the installed (or future) cabling. Conduit labels shall utilize text readable from a standing position on the finished floor. Conduit sleeves which pass through a single wall or floor need not be labeled.
 - a) For wall stub-up locations, label overhead only.
 - b) For conduits greater than 10', label both ends of conduit with far end location and Room/Number.
 - i) Example – "AV to AV Rack R01".
 - c) For conduits that stub directly up or into a Communications Room, label both ends of conduit.
 - i) Example: underslab conduit from Telecom Room 1A to the Floor Box in Conference Room 101A shall be labeled as follows:
 - (1) Conduit stub-up location in Telecom Room 1A – "Telecom to Conf. Rm 101A Floorbox"
 - (2) Bottom of floorbox, immediately adjacent to serving Telecom conduit – "Telecom to Telecom Room 1A"
 - 2) All pullboxes and junction boxes for Communications shall be labeled "AV JUNCTION BOX" on the cover, such that the text is of sufficient size to be readable from a standing position on the finished floor.
 - a) Conduits entering and exiting all pullboxes and junction boxes shall be labeled with their destination/room number – ie "To AV Box A01 in Control Rm 212".
- c. In general, the label is to be provided and installed by whomever installed the item that is being labeled.
- d. Refer to individual Division 27 Communications sections and to the drawings for additional information on labeling requirements.

3.3 FIRESTOPPING

A. General

1. Provide fire-resistant materials of a type and composition necessary to restore fire ratings to all wall, floor or ceiling penetrations; including membrane penetrations. All materials shall be classified or listed as a complete system by UL (or an approved NRTL by the Design Consultant and AHJ) and meet NEC and local codes. The use of partial systems or components of systems is not allowed unless specifically identified in the documents.
2. All penetrations through fire rated floors and walls shall be sealed to prevent the passage of smoke, flame, toxic gas or water through the penetration before, during or after a fire. The fire rating (F and T) of the penetration seal shall be at least that of the floor or wall into which it is installed, so that the original fire rating of the floor or wall is maintained as required by referenced building codes.
 - a. Assume all floors are fire-rated, unless otherwise noted.
 - b. Also install fire stops at any other locations indicated in the Specifications or Drawings.
3. Provide a label on both sides of fire rated assembly at all fire stop locations indicating:
 - a. Fire stop Manufacturer
 - b. Installer and company
 - c. Date installed
 - d. UL system number with all relevant ratings indicated

LEE'S SUMMIT HS PAC SOUND SYSTEM IMPROVEMENTS
100% CONSTRUCTION DOCUMENTS PROJECT NO. 1850002492

4. Include labels in each telecom room in which one or more fire rated walls is installed. Provide a 2" block letter stencil label on the inside of the telecom room to indicate rating for each barrier.
 5. Provide systems as identified on the drawings and specified herein. At locations where the cabling routing encounters a fire-rated barrier provide an adequately sized fire stop device for the quantities and types for all cables to be installed plus 25% growth.
- B. Penetration Sealant – Conduits
1. Provide listed system to seal around openings between wall, floor or partition around conduits in accordance with system listing and manufacturer's instructions.
- C. Penetration Sealant – Voids, Cavities, and Openings
1. Install fire stop materials in the framed openings through fire rated partitions per the District's drawings and in accordance with the NRTL listed system instructions.
 2. Fire stop all voids, cavities, and openings left by the removal of cabling, conduits, conduit sleeves, cable trays or other equipment related to the communications systems not to be reused.
 3. Install the fire stop system in accordance with the manufacturer's instructions and local codes.
- D. Fire-Rated Pathway Device
1. Provide fire-rated pathway device anywhere cables are required to pass through fire-rated walls, floors or partitions.
 2. Devices shall be installed in locations where required by the Contract Drawings, arranged individually or appropriately ganged.
 3. Install the devices in strict accordance with the approved shop drawings and the equipment manufacturer's recommendations.
 4. Apply the factory supplied gasketing material (where required) prior to the installation of the wall plates.
 5. Secure wall plates (where required) to devices per the equipment manufacturer's recommendations.

END OF SECTION 270500