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<td>Bob Moya, 10/22/03</td>
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1.0 PURPOSE

This document describes the Stanford Communications Interior Pathways Standard (SCIPS) of methods and procedures for placing inside plant facilities including but not limited to conduit, cable trays, and cable hangers on the Stanford University Campus.

2.0 GENERAL

2.1 All labor, materials apparatus, tools, equipment, transportation, temporary construction, and special or occasional services shall be provided as required to make a complete communications utilities installation as shown on the drawings and described in the specifications.

2.2 This section describes the requirements for the building communications pathways in University buildings specified under this division and includes, but is not limited to:
   • Conduit
   • Cable Trays
   • Cable Hangers
   • Horizontal Pathways
   • Vertical Pathways

2.3 Related Stanford University –Facilities Design & Construction Guidelines
   • Section 16050: Basic Electrical Material and Methods
   • Section 17000: Telecommunications
   • Section 01310: Environmental Health and Safety

2.4 Others shall perform cable pulling in communications conduits/ducts at the conclusion of the substructure work.

2.5 The SIPS applies to all Stanford University Communications and Networking Services Project Engineers, other support personnel and Contractors involved in the design, construction and maintenance of campus interior communications pathways.

2.6 References – Most current versions of each
   • American Society for Testing and Materials (ASTM)
   • National Fire Protection Association (NFPA): National Electric Code (NEC)
   • National Electric Manufacturers Association (NEMA)
2.7 Submittals

- **Design Drawings**: The Design Consultant shall provide detailed design drawings to the Stanford University Communications and Networking Project Engineer that show the interior communications conduit/pathways layout, and shall provide details of all cable trays, j-hooks, junction boxes, cans, etc. that show the exact locations of conduit(s) entry points on each wall.

- **Shop drawings and Project Data**: The Contractor shall submit six (6) copies of shop drawings, manufacturers data, and materials list to the Stanford University Communications and Networking Services Project Engineers for compliance review before purchase of such materials. All material and equipment shall be new and shall bear the manufacturer's name, stamp and rating. If the contractor proposes to use substitute materials for an item where a particular manufacturer's product is specified followed by the phrase “or approved equivalent”, the Contractor must submit six (6) copies of the manufacturer's product data for the proposed substitution.

2.8 Quality Control

- **Materials**: All materials shall be new and the best of their respective kinds, free from all defects and as specified on the plans and the specifications or as accepted by the Stanford University Communications and Networking Services Project Engineers. Whenever, under the contract, it is provided that the Contractor shall furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the best grade in quality and workmanship obtainable on the market.
from firms of established good reputation, or if not ordinarily carried in stock, shall conform to the usual standards of first-class materials or articles of the kind required, with due consideration of the use to which they are to be put. In general, the work performed shall be in full conformity and harmony with the intent to secure the best standard of construction and equipment of the work as a whole or in part.

- Manufacturer’s recommendations: Whether specifically mentioned or not in the Specifications, all materials, equipment, devices, etc., shall be installed in a manner meeting the approval of the manufacturer of the particular item. The Contractor shall obtain all installations manuals, brochures, and procedures that the manufacturer issues for the equipment and materials. The particular manufacturer shall certify any reason for deviation from the manufacturer’s recommendations in writing. The Contractor shall be held responsible for all installations contrary to the accordance with the manufacturer’s recommendations, the Contractor shall make all necessary changes and revisions to achieve such compliance.

2.9 Site Conditions

- General: Horizontal and vertical pathways are used to conceal, protect, distribute, support and provide access to horizontal cabling between the Telecommunications Services Outlets (TSO’s) and the Telecommunications Room(s) (TR’s). These TR’s were formerly known as Main Distribution Frames (MDF’s) and Intermediate Distribution Frames (IDF’s). Pathway implementation involves both the cable pathway (e.g., cable tray) as well as related spaces (e.g., pull boxes, splice boxes and transition point/consolidation point locations that provide access to cable and connecting hardware). Horizontal and vertical pathways are the “container” for the horizontal and vertical cabling.

- Physical pathways such as conduit and cable trays used for containment of telecommunications cabling.

- Non-physical pathways such as the space between open-top cable supports (J-hooks) through which cable is placed between physical support or containment components.

- Asbestos: Above ceiling spaces, crawlspaces, attics, and wall cavities or areas not designated for continuous occupancy may contain asbestos or asbestos debris in hazardous condition. The Contractor shall not access, explore or perform work in such areas without clearance from the Environmental Health and Safety – Asbestos Program.
• Salvage: The Contractor shall take care when removing salvageable material to avoid damaging the material itself or the adjacent or adjoining structures that are to remain.

• Existing Facilities: Any known existing facilities are shown on the plans to help the Contractor avoid damage to essential utilities, which must remain in service. The Contractor shall determine the exact location of all existing facilities prior to doing work that may damage such facilities. If the Contractor discovers existing facilities not indicated on the plans or in a location different from what is indicated on the plans, the Contractor shall protect such facilities, notify the Owner’s Representative and the Stanford University Communications and Networking Services Project Engineers immediately, and record actual conditions found onto the record drawing.

3.0 COMMUNICATION CONDUIT

3.1 All communication conduit/duct shall be;

3.1.1 Rigid Metallic Conduit: Industry standard UL6, heavy-wall hot-dipped galvanized steel. Couplings and fittings shall be threaded. All materials shall conform to ANSI C80.1 and UL standards.

3.1.2 Rigid Non-metallic Conduit: PVC Schedule 40 for use at building entrance facilities but not into the building.

3.1.3 Electrical Non-metallic Tubing (E.M.T.): Conduit shall be formed from cold-rolled steel, and shall meet ANSI and UL specifications. Fittings in dry locations may be screw type, with insulated bushings.

3.1.4 Rigid conduit shall be used at building entrances. Threaded couplings shall be used and all joints shall be made tight. Running threads are not acceptable. Below grade rigid conduits shall be wrapped. E.M.T. may be used in all other above grade locations.

3.1.5 Flexible conduit is NOT recommended. The Stanford University Communications and Networking Project Engineer must approve in writing any location where flexible conduit is proposed. At these locations, if approved, the flexible conduit must be one trade size larger than the original rigid conduit specified and must be strapped every 2-feet.

3.1.6 Non-metallic orange bushings shall be installed at all terminations, both freestanding and within boxes, enclosures, and cabinets.

3.1.7 Pulling eyes shall be installed in the Main TR. The Stanford University Communication and Networking Services Project Engineer shall determine the location(s).

3.2 All Conduit Runs shall include:
3.2.1 Factory manufactured bends shall be used where change in direction is required.

3.2.2 All bends shall be at least ten (10) times the internal diameter of the conduit size.

3.2.3 All cuts shall be made square. All burrs shall be reamed out after threading and prior to installation.

3.2.4 No communication conduit shall have more than one (1) reverse (180 degree) of bends or more than two (2) each, ninety (90) degree of bends.

3.2.5 All communications conduit shall be run in the most direct route possible.

3.2.6 All communications conduit shall not exceed continuous lengths of 100 feet. If the conduit runs are greater than 100 feet, than pull boxes shall be installed. The location(s) of these pull boxes must be shown on the construction drawings and labeled.

3.2.7 Communications conduit shall not contain any condulets.

3.2.8 All communications conduit shall be bonded to ground on one or both ends, in accordance with requirements (ANSI/TIA/EIA-607).

3.2.9 All conduit runs shall have a nylon type pull line installed from the Telecommunications Services Outlet (TSO) to the Main Telecommunications Room (MTR) or Telecommunications Room (TR). All conduit runs between MTR and TR(s) shall have a nylon type pull line installed. All conduit runs between pull boxes, cans, or enclosures shall have a nylon type pull line installed. This pull line must have a minimum test rating of 200 lbs.

3.2.10 Where metallic pipe is used, it shall not come in contact with reinforcing rods or other conductive material in the building walls and ceilings.

3.2.11 All communications conduits, pull boxes, cans and enclosures must be labeled with their origination and termination points.

3.2.12 Conduit for vertical cable risers may be cored from one floor to another. All conduits required to connect one telecommunication room to another shall penetrate the floor a minimum of 4” or enough to permit installation of a bushing and cap.

3.2.13 All communications conduits, pull boxes, cans and enclosures must be placed in accessible spaces.

3.3 Minimum Conduit Requirements:

3.3.1 A minimum of two (2) 4” conduits/sleeves shall be installed between telecommunication rooms (MTRs/TRs). The Stanford University Communications and Networking Services Project Engineer shall determine the exact number required for each project.

3.3.2 A minimum conduit size of 1” is required for all Telecommunications Services Outlet (TSO). No more than two (2) TSO’s may be daisy-chained. The first TSO shall require a
minimum of 1 ¼" conduit. A minimum 1” conduit shall be placed between the first and second TSO.

3.4 Minimum Pull Box requirements having one conduit each in opposite ends of the box:

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3.5 Building Entry Boxes shall be eighteen (18) gauge, galvanized steel, waterproof boxes with gasket, screw down covers as detailed on the drawings, Hoffman or approved equivalent. The Contractor shall provide galvanized or cadmium plated nails, screws, clips or other means of securely anchoring boxes to buildings or other structures as required for a complete installation. Adequate provisions shall be taken to prevent dielectric action between dissimilar metals. Building entry boxes shall be painted as follows:

- First coat: Zinc dust – zinc oxide primer house and trim paint.
- Second coat: Type and color to match existing building walls and/or trim where applicable.

3.6 Telecommunication Service Outlet (TSO) Box Requirements:

3.6.1 A two-gang plaster ring, or if conduit is specified, a single four (4) inch by four (4) inch by 2 ¾” deep quad plex box equipped with a two-gang ring at all TSO.

4.0 SLEEVES

4.1 The approved pathway through walls up to 8” thick and floor penetrations is the E-Z Path by STI for all sleeves. The E-Z Path provides a 4-hour fire-stopping rating. Currently there is a 3” x 3” version that comes in a single, double and triple application. Currently there are wall and floor systems available. A 1 ½” version is in
production. The Stanford University Communications and Networking Project Engineer shall pre-approve the size, quantity and location(s) of the pathways.

4.2 For walls thicker than 8” the use of metallic conduit shall be approved. Metallic conduit sleeves shall be 4” minimum. The Stanford University Communications and Networking Project Engineer shall pre-approve the size, quantity and location(s) of the pathways.

5.0 ALTERNATIVE COMMUNICATIONS CABLING PATHWAYS

5.1 String and Ring – In lieu of conduit from the TSO to the MTR/TR the contractor may place a double gang mud ring with a pull string or wire to the accessible ceiling space above the TSO. This method is prohibited in walls that are rated, insulated or by other means deemed inaccessible.

5.2 Cable Tray

5.2.1 Communications pathway within the building may be specified to be placed in a cable tray. The minimum cable tray dimensions shall be twelve inches (12”) wide by four inches (4”) deep. A minimum of 1-foot of clearance must be maintained on all sides of the cable tray. In non-continuous cable trays the section between two (2) cable trays must be bridged with conduits of appropriate size and quantity as specified by the Stanford University Communications and Networking Services Project Engineer. All communications conduits shall stub into the cable tray and shall be mechanically fastened. In addition, EMT shall have a box connection fitting with a bushing installed at the cable tray to prevent damage to the wiring. The cable tray shall be supported at spacing according to the load and span per industry and manufacturers standards as well as all local, state and federal codes for a proper installation.

5.2.2 Acceptable types of cable trays are:

5.2.2.1 Ladder
5.2.2.2 Ventilated Trough
5.2.2.3 Ventilated Channel
5.2.2.4 Solid Bottom
5.2.2.5 Spine

5.2.3 All appropriate fittings such as; elbows, reducers, crossovers, tees, etc. shall be included.

5.2.4 All accessories may include some, all or none of the following; covers, hold-down devises, dropouts, conduit adapters, dividers, etc.

5.3 J-hooks

5.3.1 Communications pathway within the building may be specified to be placed in J-hooks. J-hooks shall be placed a minimum of 2’
on center and a maximum of 5’ on center. The Stanford University Communications and Networking Services Project Engineer shall determine the path and distance specifications on a per project basis if this method is to be deployed.

5.3.2 The minimum size of J-hooks shall be 2”. The Stanford University Communications and Networking Services Project Engineer shall determine the necessary size on a per project basis if this method is to be deployed.

5.4 Surface Mounted Raceways

5.4.1 If TSO’s are to be mounted in the raceway a minimum depth of 3 and 9/16” (G6000). The electrical and communications outlets must be offset as well. The Wiremold part number for single gang outlets is G4007C-1. The Wiremold part number for double gang outlets is G6007C-2. All surface mounted raceways must be installed to all codes, etc.

5.4.2 Panduit brand raceway

5.4.2.1 LD 10 (white) is the most typical plastic style used. Consult the Stanford University Communication and Networking Services Project Engineer for project specific design and alternate sizes and color.

5.4.3 Wire Mold brand raceway

5.4.3.1 G4000 or G6000 are the most typical metallic style used. Consult the Stanford University Communication and Networking Services Project Engineer for project specific design and alternate sizes.

6.0 CONDUIT INSTALLATION

6.1 When working above suspended ceilings all ceiling tiles must be replaced after work is complete on a daily basis. Any damaged ceiling tiles shall be replaced in kind. The contractor shall be responsible to do a pre-construction survey of the existing ceiling tile condition prior to any work to identify any existing damage. Failure to do so could result in the contractor replacing tiles damaged prior to their work.

6.2 Suspended ceilings that are air plenums or are fire rated must be closed immediately upon completion of work in the area. Do not leave ceiling open over night, on weekends, or when not in the work area.

6.3 The contractor shall keep their hands clean and remove any fingerprint or other damage to any surface caused by the installation.

6.4 Exposed surface mount raceways, i.e. Wiremold or Panduit, shall be installed in a craftsperson like manner. Lines shall follow building lines and only use manufactured fittings for changes in direction. Any
deviations from the design must be pre-approved in writing by the Stanford University Communications and Networking Services Project Engineer.

7.0 INSPECTION AND TESTING

7.1 All work and materials covered by these specifications shall be subject to inspection at all times by the Stanford University Communications Project Engineer. Any work concealed before the Stanford University Communications Project Engineer has inspected shall be re-opened or uncovered and any required corrective modification made to that portion shall be at the Contractor’s expense.

8.0 REFERENCED DRAWINGS

• Drawing CM-03: Conduit Stubs Non-Accessible Ceilings – Single TSO
• Drawing CM-04: Conduit Stubs Non-Accessible Ceilings – Multiple TSO’s
• Drawing CM-05: Conduit Stubs Accessible Ceilings – Single TSO
• Drawing CM-06: Conduit Stubs Accessible Ceilings – Multiple TSO’s
• Drawing CM-08: Typical Vertical Sleeves
• Drawing CM-09: Typical Horizontal Sleeves
• Drawing CM-10: Wall Phone TSO