

## SECTION 277420 - STRUCTURED CABLING SYSTEM

### PART 1 – GENERAL

#### 1.01 DESCRIPTION OF SYSTEM

- A. The Structured Cabling System (SCS) is to include all equipment, materials, and labor as required to provide, install and test a complete SCS as described herein. Provide residential Category 5e cabling in accordance with EIA TIA/EIA-570-B for residential units. Provide commercial category 5e cabling in accordance with EIA TIA/EIA-568.

#### 1.02 SYSTEM TO INCLUDE BUT NOT BE LIMITED TO

- A. SCS Wiring: Complete from SCS Equipment to each outlet using cable and termination hardware as specified. Conform to TIA/EIA-570-B for residential and TIA/EIA-568 for commercial.
- B. Outlets: Complete as specified.
- C. Raceways, outlet boxes, cabinets, identification, etc.: Conform to applicable sections in these specifications. Provide/install complete with all required basic materials.
- D. Terminal backboards and/or cabinets
- E. Equipment cabinets/racks
- F. Coaxial cable
- G. Unshielded twisted-pair horizontal cables
- H. Terminal blocks
- I. Media modules
- J. Cross connect cables and patch cords
- K. Terminations
- L. Fireproofing

#### 1.03 SPECIAL REQUIREMENTS FOR CABLE ROUTING AND INSTALLATION

- A. The majority of the SCS wiring in this building will be installed above ceilings. All communications cabling material including ty-raps used throughout this project shall comply with the requirements as outlined in the National Electrical Code (NEC) Article 800. All cabling shall bear the appropriate markings for the environment in which they are installed.

- B. Sealing of openings between floors, through rated fire and smoke walls, existing or created by this contractor for cable pass through shall be the responsibility of the SCS Contractor. Sealing material and application of this material shall be accomplished in such a manner, which is acceptable to the local fire and building authorities having jurisdiction over this work. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the SCS Contractor's work. Any openings created by or for this Contractor and left unused shall also be sealed as part of this work.
- C. The SCS Contractor shall be responsible for any damage to any surfaces or work disrupted as a result of his work. Repair of surfaces, including painting, shall be included as necessary.
- D. Coordinate all work with other trades and the local telephone company and local cable television company.

#### 1.04 SUBMITTALS

- A. Shop Drawings: Submit typical outlet wiring diagram, plan of building(s) and site showing pathways with cable noted.
- B. Product Data: Submit for wiring, outlets, devices, and accessories.
- C. Qualifications: Submit qualifications of system installer.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Contractor shall submit test reports, manufacturer's specification sheets and any other information necessary to determine compliance with material and equipment specifications described herein.

#### 1.05 OPERATIONS AND MAINTENANCE DATA

- A. Test Data: Record of results for all cables/cable runs tested.

#### 1.06 PROJECT RECORD DOCUMENTS

- A. Record actual locations and sizes of pathways, outlets, terminal boards, etc.
- B. Record actual type and size of cables installed.
- C. Record "to and from" locations coordinated with cable labeling for all cables at each terminal board or cabinet.
- D. Cross-connects "to and from location" terminations for each SMC.

## 1.07 QUALIFICATIONS

- A. The SCS Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of optical and metallic SCS and have personnel who are adequately trained in use of such tools and equipment.
- B. Company or person installing system must specialize in installing premises wiring with minimum three years documented experience.

## PART 2 – PRODUCTS

### 2.01 GENERAL

- A. Provide all components, equipment, parts, accessories and associated quantities required for complete installations. All components may not be specified herein or identified in the drawings; however, the Contractor is responsible for a complete and functional system.
- B. All devices/components/products shall be suitable for use intended, and meet all stated performance requirements for SCS configurations specified in this section.

### 2.02 PATHWAYS

- A. All pathways (conduit, raceways, wire-ways, pull boxes, outlet boxes, etc.) shall comply with applicable requirements of sections within Division 16 of these specifications.
- B. All outlet boxes, junction boxes, pull boxes, etc. shall comply with applicable section of these specifications.
- C. Boxes shall be sized as required by TIA/EIA and NEC for cables, conduit and/or device installed.
- D. Junction/pull boxes shall not be mounted more than ten (10) feet above the floor and must be mounted in such a way as to make them readily accessible.
- E. Junction/pull boxes shall not be placed in a fixed false ceiling space unless immediately above a suitably fire rated, marked, hinged panel.

### 2.04 TERMINATIONS CABINETS

- A. Terminal cabinets are to comply with applicable sections of these specifications.

## 2.05 SYSTEMS AND LOCAL GROUND BUS

- A. Bus to comply with applicable sections of these specifications.

## 2.09 COMMUNICATIONS OUTLETS

Modular Jacks. (General requirements for each jack).

- A. The modular jack inserts (except those used with special adapters) shall be of a type that can be:
  - 1. Field installed.
  - 2. Replaced with new or different type of modular insert.
  - 3. Removed and covered with blank
- B. All modular jack inserts except those used with special adapters shall have insulation displacement terminals (e.g., 110 termination), to terminate a single four pair cable and follow TIA/EIA-568-B color coding and pin/pair assignments as follows:
- C. Each modular jack shall be 8 pin/8 conductor type.
- D. Each modular jack insert must meet TIA/EIA TSB 40 and TIA/EIA-568 specifications.
- E. Each modular jack shall be U.L. listed and labeled.
- F. Each jack shall be 8-position non-keyed (TIA/EIA T568B) jack.
- G. Each modular jack shall be certified to meet Level 5e (UL) or certified to perform to Category 5e per TIA/EIA TSB-36 and TSB-40 standards.
- H. Basis of Design is Leviton Category 5e Jacks. Color to be determined by Owner.

Faceplates.

- A. Typically each outlet shall provide for installation of up to two (2) jacks. Provide one (1) jack for residential telephone outlets. Each of the unused jack positions shall be blank.
- B. Basis of Design is Leviton. Color to be determined by Architect/Owner.
- C. Floor Outlets.
- D. Each respective floor outlet shall have jack, plate, etc. as called for above for specific outlet type.
- E. Mount in floor outlet specified in applicable section of these specifications.

## 2.10 WIRE AND CABLE

### A. Horizontal Copper Cable.

1. Four (4) pair copper unshielded twisted pair cable (4 pair, Level 5e, UTP) for communications Outlets (C.O.)
2. Shall be certified to UL Level 5e or TIA/EIA Category 5e and TIA/EIA TSB-36.
3. Shall meet TIA/EIA 568 specifications.
4. The cable shall have surface markings: "Category 5e".
5. Cable shall bear the CMR or CMP marking as required by code and meet NFPA 262-1985 and UL-910 standards.
6. The quantity of 4 pair cables to each work area outlet is indicated on the drawings.
7. Cable jacket shall be blue in color.

### B. Coaxial Cables.

1. Cable shall bear the CMP marking as required by code and meet NFPA 262-1985 and UL-910 standards.
2. Underground and/or exterior cables shall be gel filled rated for underground, wet conditions.
3. Shall be RG-6 18 gauge copper.
4. Cable Characteristics: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 21 dB maximum from 5 to 3000MHz, and shall be listed to comply with NFPA 70, Articles 810 and 820.

## 2.10 TERMINATION BLOCKS

### General:

- A. 110 type cable termination components shall meet TIA/EIA 568 and TIA/EIA TSB-40 Category 5e specification on all pins for connecting hardware.
- B. Provide 110 support brackets and termination strip mounting hardware to mount onto terminal backboard. Include necessary grounding termination lugs and legs.
- C. Unit shall be fire retardant.
- D. 110 Standalone Wiring Block:
  1. 100 or 300 pair as required.
  2. Fire retardant molded plastic.
  3. For terminating 20-AWG through 26-AWG cable.
  4. Provide with legs.

## PART 3 – EXECUTION

### 3.01 INSTALLATION

#### General:

- A. Install equipment in accordance with manufacturer's instructions.
- B. Install equipment, cables, raceways and outlets as required to comply with all applicable requirements of the references and/or regulatory requirements called for under PART 1 of this section of specifications, as a minimum installation requirement. Exceed this minimum requirement when called for herein.
- C. Install all electrical basic materials per applicable sections of these specifications.
- D. Install system cabinets in locations shown; arrange to provide adequate ventilation and access.
- E. Coordinate locations of equipment with drawings and all equipment provided by Owner and other trades.
- F. Properly ground system per applicable sections of these specifications.
- G. Support raceways, backboards, and cabinets as required by manufacturer's instructions.
- H. Install SCS wiring and/or raceways away from any surface that may become hot, including and not limited to, hot water piping and heating ducts.
- I. Install SCS system wiring with at least 12 inches of separation from line voltage power wiring on parallel runs. Wiring crossing power circuits shall be at right angles. For metal enclosed electric light or power or Class 1 circuits, separation may be reduced as described in 2011 NEC Article 800. Increase separation if so required to comply with TIA/EIA referenced standards.
- J. Special Requirements for Cable Routing and Installation:
  - 1. The majority of SCS wiring within buildings will be installed above ceilings. All cabling used throughout this project shall comply with the requirements outlined in the National Electrical Code (NEC) Article 800. All cabling shall bear appropriate markings for the environment in which they are installed.
  - 2. Sealing of openings between floors, through rated fire and smoke walls, existing or created by this contractor for cable pass through shall be the responsibility of the SCS system contractor. Sealing material and application of this material shall be accomplished in such a manner, which is acceptable to the fire and building authorities having jurisdiction over this work. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the SCS system contractor's work. Any openings created by or for this contractor and left unused shall also be sealed as part of this work.

3. The SCS system contractor shall be responsible for any damage to any surfaces or work disrupted as a result of his work. Repair of surfaces, including painting, shall be included as necessary.
4. Maintain proper separation between SCS system cables and all power and/or unshielded cables, as required to prevent noise, crosstalk, etc.
5. Each SCS outlet shall have splice-free cables homerun to the respective TEL/DATA patch panels in associated IDF or SMC as indicated on the drawings.

### 3.02 OUTLETS

- A. General: Install outlets for SCS where indicated on the drawings. Install devices/inserts in outlets so that same orientation is used throughout project.
- B. Outlets: Install per applicable section of these specifications (i.e., outlet boxes, indoor service poles, floor boxes, etc.).
- C. Wall Plates: Install wall plates with all inserts specified.

### 3.03 PATHWAY

- A. Where acceptable to authority having jurisdiction and all applicable codes/standards, cables above ceilings may be run without raceways provided complete installation complies with all applicable codes/standards. Proper cable type, sleeves, firestopping, and support hardware must be utilized.
- B. Power or any other electrical wiring that is not part of the low voltage SCS systems shall not share raceway. SCS wiring may be installed in underground pull boxes with other low-voltage systems provided:
  1. Installation meets/complies with all applicable codes and standards.
  2. SCS cables are separated by at least 12 inches from any non-shielded wire/cable.
- C. Properly support cables/wires not installed in raceways.
- D. Fire Stop
  1. Where conduit and or cable penetrates a fire rated wall, floor, etc., firestopping shall be provided.
  2. Provide permanent firestopping seals after cable installers have pulled risers and distribution cables.
  3. Meet all requirements for UL assembly involved. Provide firestopping UL listed for assembly, conduit, and/or cable involved.

### 3.04 HORIZONTAL CABLE PATHWAY

#### A. Sleeves

1. Install conduit sleeves with bushings on both ends at penetration of all walls above ceilings. Stub-out each side of wall a minimum of 12 inches.
2. Install firestopping at sleeves and all rated firewall/smoke wall penetrations. Stub-out wall as required for routing. Firestopping assembly must comply with UL for wall routing, material and cable used.
3. Size sleeves as required by the NEC for cable installed, but in no case shall sleeve be less than 2" diameter.
4. Sleeve size shall not be smaller than that required by TIA/EIA-569, Table 4.1-1, "Conduit Sizing".

### 3.05 TERMINATION BACKBOARDS

- A. Terminal boards shall be installed secure to wall with bottom of board at 6" above floor.
- B. Install termination backboards plumb, and attach securely to building wall at each corner.
- C. Finish paint termination backboards with durable gray paint having flame spread rating of class A prior to installation of any equipment on termination boards.

### 3.06 GROUNDING

- A. Provide and install complete grounding system as required to comply with all sections of these specifications and applicable codes.
- B. Connect Central Equipment rack to "systems" ground bus with #6 green insulated copper ground wire.
- C. Connect metal conduit (via grounding bushing) to "systems" ground bus.
- D. Connect cable shields to "systems" ground busbar.
- E. Connect surge suppression equipment to "systems" ground busbar.

### 3.07 CABLE/WIRES

- A. Install cables/wires in accordance with manufacturer's instructions and EIA/TIA 568.
- B. All cables shall be installed as illustrated on the drawings except where necessary to avoid EMI sources or other obstacles. The Engineer must accept major deviations from the illustrated path in advance.



- C. Provide adequate size and quantities of cross-connect/patch cables to perform necessary cross connections.
- D. Provide riser/backbone cable, which meets performance requirements specified, and links all closet locations indicated on Tele/Data Drawings.
- E. Install SCS Cables no closer than 12" from any wire/cable installed for power system cable/raceway, or fluorescent/ballasted light fixtures.
- F. Provide protection for exposed cables where subject to damage.
- G. Support cables above accessible ceilings to keep them from resting on ceiling tiles. Use bridle rings to support cables. Do not share bridle rings of SCS system with any other system. Provide quantity of bridle rings as required to provide 50 percent spare capacity at all riddle rings.
- H. All cables supported in bridle rings shall, after all cables of a run have been installed, be neatly bundled using nylon tie-wraps.
- I. Use suitable cable fittings and connectors.
- J. All cables in SMCs shall be provided by the contractor. All cables shall be neatly routed and properly secured to the cabinets.
- K. Cables shall be terminated to preserve wiring order consistently across all terminations (jacks, patch panels, connector blocks and patch cords). It is the contractor's responsibility to ensure this consistency. Corrections will be made at the contractor's expenses.
- L. Cables shall be terminated in order, lowest room number first.
- M. Cables routed through rated walls, floors and assemblies shall be routed via appropriate fireproofing system as accepted by UL.
- N. Label cable at both ends indicating the originating and terminating location of each end. This labeling/identification shall be fully documented in as-built (record) drawings.
- O. Horizontal cables shall be installed in a neat and orderly manner. All cables entering a room shall enter through a single point where possible; all cables shall be routed along a single path and bundled together.
- P. Install cables in ceiling space using or supports as specified herein.
- Q. Install cable type rated for environment.
- R. Terminate all horizontal station cable pairs according to EIA/TIA 568b wiring schedule.
- S. Terminate all four pair cables to RJ-45 modular jacks at each outlet.
- T. Terminate all cables at SMC. No cables shall be left unterminated.

- U. Contractor shall ensure individual pair twists of horizontal station cable shall be maintained at both the CO and patch panel.

### 3.15 LABELS

- A. All SCS components must be easily identifiable for any person that may need to locate telecommunications equipment, facilities, or circuit information.

### 3.19 DOCUMENTATION

The project close out documents shall include those listed below.

- A. Detailed as-built drawings shall be adapted from the original prints provided. Each SMC shall contain a copy of that building as-built drawing affixed to an adjacent wall or located in an interior pouch for quick reference.
- B. Building drawings shall be left in each closet and three (3) copies supplied for use by the Owner.

### 3.17 AS-BUILT AND DRAWINGS

- A. As-built drawings are required.
- B. The cable route drawings shall contain end points.
- C. The as-built drawing shall show communication closets, communication outlets, and types of jacks. The communication outlet may be summarized by indicating the type used in all locations throughout the installation as representation of the installation.

END OF SECTION 277420