SECTION 27 05 00
COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary
   Conditions and Division 01 Specification Sections, apply to this Division.

B. Related Sections:
   1. Division 28 Section “Fire Alarm and Smoke Detection Systems with Voice
      Evacuation Notification.”

1.2 SUMMARY

A. Section Includes:
   1. Scope of Work for Project and Entire Division 27.
   2. Contractor Qualifications for Entire Division 27.
   3. Definitions for Entire Division 27.
   4. Pre-Bid and Submittal Requirements for Entire Division 27.
   5. Communications Equipment Coordination and Installation.
   6. Sleeves for Pathways and Cables.
   7. Ground Pull Boxes for Entire Division 27 and Division 28, if required.
   8. Grout.

1.3 SCOPE OF WORK FOR ENTIRE DIVISION 27

A. Contractor shall be responsible for providing complete, functional systems, whether
   ancillary devices/components are included in this specification or not. Products shall be
   made in the USA. Additionally, the Contractor shall provide equipment for 20% growth
   on patch panels and punch-down locations.

B. The installation shall include cable (fiber optic and twisted-pair copper), connectors (fiber
   optic and twisted-pair copper), jumpers (fiber optic and twisted-pair copper), patch panels
   (fiber optic and twisted-pair copper), wire management, communication outlets, and racks,
   as required.
C. It is the intent that all site systems' cabling would utilize common backbone pathway routing and be coordinated for conduit and ground pull box sizes. Likewise, the buildings' structured cabling would utilize common horizontal pathway routing via properly sized flexible cable tray and J-hook systems.

D. In addition to material and equipment, Contractor shall provide labor and any incidental material required for installation. All fiber strands shall be terminated with connectors and landed on the fiber interconnect equipment. All copper station cables shall be terminated on patch panels (MDF/IDF end) and data communications outlets (work station end). Upon completion of installation, Contractor shall test all systems cable and record the test results, as specified herein.

E. Intent is to install a 10 GIG fiber optic compliant system (IEEE Std 802.3ae). Contractor shall provide a manufacturer's 20 year system performance guarantee.

F. The work performed under this specification shall be of good quality and performed in a professional manner. In this context, "good quality" means the work shall meet industry technical standards and quality of appearance. The Owner/Engineer reserves the right to reject all or a portion of the work performed, either on technical or aesthetic grounds.

G. Install/terminate fiber optic, UTP, and voice cable. Runs shall be in a star configuration. Provide for common backbone pathways. Splices shall not be installed.

H. Conduit, ground pull boxes, and cabling to be provided by this Contractor. Coordinate all requirements with other trades prior to submitting shop drawings.

I. Contractor shall notify the Engineer, prior to installation, in the event his cable routing exceeds the Standard's lengths.

1.4 CONTRACTOR QUALIFICATIONS FOR ENTIRE DIVISION 27

A. This Contractor shall be able to submit proof that they meet the following qualifications upon request from the Engineer.

1. PERFORMANCE HISTORY: Contractor must have successfully performed at least three projects of similar scope and size, within three years of the date of this bid, in the local area. Proof of performance shall be in the form of reference sheets; which shall include a brief description of the project, the beginning and ending contract price, the project foreman or superintendent's name, and the name, address, and telephone number of a project contact. The Superintendent proposed for the project shall have been responsible for at least two of these projects under the employment of this Contractor.

2. FIBER OPTICS EXPERIENCE: Contractor must be able to prove to the satisfaction of the Owner/Engineer that it has significant experience in the installation of fiber optics cable systems. Installation must include installation of fiber optics cable, fiber termination, a knowledge of interconnect equipment, and a thorough knowledge of testing procedures.

3. TIME IN BUSINESS: Contractor must have been in business, under the current name and in the business of installing communications systems, continuously, for a period of at least three years prior to the date of this bid. Essential installation personnel shall include at least one foreman and two journey level installers or technicians. By submitting the names of these personnel, Contractor is committing them to the execution of the project outlined in this specification.
4. REQUIRED LICENSE: The Contractor shall possess, at a minimum, a State of Florida Low Voltage License.

5. RCDD ON STAFF: The Contractor shall have a BICSI Registered Communication Distribution Designer on staff. Contract RCDDs shall not be acceptable. Contractor shall provide copy of a current RCDD certificate upon request.

6. OFFICE LOCATION: The Contractor shall maintain a permanent office within 75 miles of the project site.

1.5 DEFINITIONS (Other Sections May Contain Additional Definitions That Are Specific To That Section)


B. CROSS-CONNECT: A facility enabling the termination of cable elements and their interconnection or cross-connection.

C. EMI: Electromagnetic Interference.

D. IDC: Insulation Displacement Connector.

E. LAN: Local Area Network.

F. RCDD: Registered Communications Distribution Designer.

G. FLEXIBLE BASKET CABLE TRAY: A fabricated structure consisting of wire mesh bottom and side rails.

H. LADDER RACK: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).

I. UTP: Unshielded Twisted Pair.


K. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

L. COMMUNICATIONS EQUIPMENT ROOM (CER) OR TELECOMMUNICATIONS ROOM (TR) OR MAIN CROSS-CONNECT (MC or MDF or MXC): The MDF is the location, within a building or complex of buildings, where the entire communications system originates. It includes the physical location, enclosure, wire and cable management hardware, termination hardware, distribution hardware, and equipment racks. EIA/TIA-569 refers to the room housing the MDF as the "Equipment Room." Walls supporting "wall mount" equipment shall be covered with 3/4", factory-finished (and labeled), fire treated plywood, ACX or better, from 12" above the finished floor to the ceiling shall be provided, as manufactured by Pathway Spaces, Inc. Backboard Kits or pre-approved equal. The MDF should be located either in proximity to or co-located with the telephone utility demarcation point. In certain instances, there may be a telephone MDF and a separate data MDF in which case there will be a major backbone interconnecting the two. If the MDF is co-located with a power distribution room, observe minimum clearances from power distribution equipment (10 feet) and enclose the data distribution equipment in a cabinet. A clear working space of 30 inches in front of and behind the equipment racks is required.
M. COMMUNICATIONS CLOSET (CC) OR INTERMEDIATE CROSS CONNECT (IC or IDF or IXC): The IDF is the location in a building where a transition between the backbone or vertical riser system and the horizontal distribution system occurs. It includes the physical location, enclosure, wire and cable management hardware, termination hardware, distribution hardware, and equipment racks. Walls supporting "wall mount" equipment shall be covered with 3/4", factory-finished (and labeled), fire treated, ACX plywood, as manufactured by Pathway Spaces, Inc. Backboard Kits or pre-approved equal. Each IDF in the building shall be such that the station cable route distance to the furthest workstation is within 90 meters. If an IDF is co-located with a power distribution room, observe minimum clearances from power distribution equipment (10 feet) and enclose the cable in metal conduit, and mount the patch panels in a cabinet. A clear working space of 30 inches in front and behind the equipment racks is required.

N. The intent is to provide a Category 6 system.

O. Provide means to provide and install.

1.6 APPLICABLE STANDARDS (Use Most Current Version)


E. TIA/EIA-569-B (-C) ...... Telecommunications Pathways and Spaces.


G. IEEE 802.3ab ............ Specification for Gigabit Ethernet over UTP cable.

H. IEEE 802.3z ............. Specification for Gigabit Ethernet over fiber optic cable.

I. IEEE Std 802.3ae ...... Specification for 10G Ethernet over Fiber Optic Cable (2002).

J. ANSI/TIA-1152 .......... Requirements for Field Test Instruments.


M. TIA/EIA-758-A (-B) ...... Customer-Owned Outside Plant Telecommunications Cabling Standard.

O. IEC 60603-7-5............. Connectors for frequencies below 3 MHz for use with printed boards
   – Part 7: Detail specification for connectors, 8-way, including fixed
   and free connectors with common mating features, with assessed
   quality.

P. NEC............................ National Electric Code.

Q. UL............................... Underwriters Laboratories Cable Certification Program and Testing
   Bulletin.

1.7 PRE-BID SUBSTITUTIONS FOR ENTIRE DIVISION 27

A. Under provisions of Division 01 and General and Supplementary Conditions Specification
   Sections to include detailed product information.

B. Submit any requests for substitutions or deviations prior to bid opening. Only those
   requests that are complete and approved by the Engineer in written addendum form shall
   be accepted.

1.8 SUBMITTALS TO ENCOMPASS THE ENTIRE DIVISION 27 (Unless Noted Otherwise In
   Section)

A. The Contractor shall submit per Division 01 under appropriate submission annex number.
   The submission shall consist of five major sections with each section separated with
   insertable index tabs.

1. The first section shall be the "Index" which shall include the project title and address,
   and name of the firm. The contents of each section shall be listed on the index.

2. The second section shall include a copy of the Contractor's valid State Low Voltage
   license, and a list of instrumentation to be used for system testing.

3. The third section shall contain the product specifications by Sections. Product
   submittal shall include a cover page listing manufacturer, part number and
   description of each product to be provided. Also, include in this section original
   specification data sheets for each product or computer printouts from .PDF files for
   each product. Photocopies of catalog pages shall not be accepted.

4. The fourth section shall contain samples of proposed cable markers and labeling.

5. The fifth section shall contain a scaled, complete, detailed MDF and IDF layouts with
   rack elevations, scaled floor plans with equipment locations shown, equipment
   interconnection, grounding (indicate location of grounding bus bar and its mounting
   detail showing standoff insulators and wall mounting brackets), and a layout of any
   wall mounted backloads.

6. Attach: Include disk copy and three hard copies of an AutoCAD drawing showing
   the jack numbering at each jack location and the patch panel jack numbering per
   room with FISH room numbers.

B. Products shall be made in the USA

C. The Contractor shall provide the shop drawing submittals within 60 days of receipt of
   contract. No work shall begin nor equipment ordered without an Engineer-accepted shop
   drawing submittal.
1.9 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 provide for ease of disconnecting the equipment with minimum interference to
   other installations.

3. To allow right of way for piping and conduit installed at required slope.

4. So connecting pathways, cables, wireways, cable trays, and busways shall 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. Access doors and panels are specified in
   Division 08 Section "Access Doors and Frames."

D. Coordinate sleeve selection and application with firestopping selection and application as
   specified in Division 07 Section "Penetration Firestopping" and per BICSI TDMM,
   "Firestopping Systems" Article.

1.10 CLOSE-OUT DOCUMENTS

A. This Contractor shall furnish Operating and Maintenance (O&M) manuals and As-built
   drawings before final payment will be issued.

1. O&M manuals shall be submitted in accordance with Division 1, General
   Requirements, and shall consist of the following (at a minimum):

   a. All Contractor and Manufacturer warranties.

   b. List of Contractors and Parts and Equipment Suppliers—complete with
      contact person, proper company name, address, and telephone numbers.

   c. Parts list for supplied equipment—including a checklist of recommended
      components to be stocked on-site.

   d. Maintenance and replacement parts manuals.

   e. Start-up and shutdown operating instructions.

   f. Manufacturer’s literature describing the equipment, which shall include wiring
      diagrams and operating specifications.

   g. Control system sequence of operation, system diagram, and backup disks of
      the system configuration.

   h. Sign-in sheet for Owner’s training.

2. List of attic stock signed for by Owner;
3. Sign-in sheet for training and training video, as required;

4. Electronic copy of Close-Out Documents saved in PDF format on compact disk.

5. The Contractor shall provide AutoCAD as-built drawings and copies of each AutoCAD file on CD before final payment will be issued.

PART 2 PRODUCTS

2.1 SLEEVES FOR PATHWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. For firestopping, provide fittings that have been UL tested for through-penetration firestops. Fittings shall be passive and designed for use on both sides of a wall/floor. Provide in galvanized finish and in sizes required through firewalls. Acceptable Manufacturer: Wiremold FlameStopper.

2.2 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.3 PRE-FABRICATED GROUND PULL BOXES AND ACCESSORIES, IF REQUIRED

A. Provide pre-fabricated, pre-cast ground pull boxes formed out of polymer concrete and reinforced by heavy weave fiberglass sized for indicated application +20%. Ground pull boxes shall be provided with composite traffic covers rated at 8,000 psi over 10" square, pulling irons, and open base with gravel. Units may be stackable to achieve required depth provided the boxes are designed for stacking.

B. Covers shall be labeled identifying the system enclosed and shall have a minimum coefficient of friction of 0.5.

C. Provide pull slots on covers. Provide two pulling irons to facilitate lifting of covers.

D. Provide necessary hangers to keep conduit and cable in an orderly fashion.

E. Provide pull rings on all sides of box to facilitate cable pulls.

F. Label each cable in each GPB as to cable type (i.e., voice, data, intercom, CATV, CCTV, etc.)

G. Acceptable Manufacturers:

1. Quazite (Pre-Bid Submittal Required).

2. Brooks (Pre-Bid Submittal Required).

3. Others as submitted prior to Bid and approved via Addendum.
PART 3 EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items, unless indicated otherwise in the specific section.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 RECORD DOCUMENTS FOR ACCEPTANCE

A. Provide the following, in each Telecommunications Room, in a rigid frame under a clear plastic cover (submit a plan for approval to produce there, prior to implementing). Furnish electronic record (AutoCAD 2012 or later) of all drawings, in software and provide hard copies, in quantity determined by Owner. Label “As-Built.” Failure to comply shall result in no acceptance.

1. Cable Schedule: List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

2. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for communications closets, backbone pathways and cables, entrance pathways, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-B.

3.3 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Communications penetrations occur when pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

D. Cut sleeves to length for mounting flush with both surfaces of walls unless noted otherwise on drawings.
E. Size pipe sleeves to provide, at a minimum, a ¼-inch, annular clear space between sleeve and pathway or cable, unless indicated otherwise.

F. Seal space outside of sleeves with grout for penetrations of concrete and masonry.
   1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

G. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

H. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

I. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and provide weathertight joints. Comply with requirements in Division 07 Section "Joint Sealants."

J. Underground, Exterior-Wall Penetrations: Install steel pipe sleeves and provide watertight joints. Comply with requirements in Division 07 Section "Joint Sealants."

3.4 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations. Comply with requirements in Division 07 Section "Joint Sealants."

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.5 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUND PULL BOX EXCAVATION, IF REQUIRED

A. Provide excavation, backfill, and compaction in conformance with industry standards.

B. Provide dewatering, as required, to insure proper installation of duct bank or underground pathways.

C. Jack and bore under existing concrete slab, sidewalks, etc. shall be preferred for underground routing of pathways. Ensure safe re-routing of facility occupants during procedures or perform procedure after occupancy hours of the facility. However, if cutting of existing concrete slab, sidewalks, etc. is deemed to be required, the cutting shall be from joint to joint (control or expansion). Final surface finish shall match surrounding conditions.
D. Do not cut roots larger than ½” in diameter.

E. Hand trenching is required. Contractor to ensure that there are no open trenches prior to leaving the site unsupervised at the end of every work day.

F. Perform required trenching and backfilling associated with the Work under this Division.

G. Provide all materials necessary and as required by OSHA to protect personnel working in trenches.

3.7 GROUND PULL BOX INSTALLATION, IF REQUIRED

A. Excavate and install base material (gravel or crushed rock) to 6” below bottom of box. Compact base material prior to setting box. Set the top of the box's finished elevation flush with adjacent ground.

B. All conduits to be side entry. Size boxes accordingly.

C. Seal between punch-outs and conduit after installing conduit.

D. Route internal cabling, conduit, and pull wires in a neat and orderly fashion.

E. Clearly and permanently mark each conduits' point of origin.

F. Backfill around all boxes and compact accordingly. Make any adjustments to the top of the box's height prior to backfilling.

G. After in ground pull box and conduits are installed, provide a one piece, poured in place, 3,500 PSI concrete apron around perimeter of box. Apron shall be minimum 6” deep and extend 12” out on all sides. Top of box and concrete shall be at same elevation.

H. Splices shall not be permitted.

3.8 CONCRETE WORK

A. This Contractor shall be responsible to replace concrete pads, supports, piers, bases, foundations, and encasements damaged from the installation of the Work under this Division.

3.9 PAINTING OF DAMAGED AREAS

A. Raceways, conduit supports, hangers, and surface raceway, where exposed, shall be painted to match mounting surface or surrounding surfaces. Panels and equipment with damaged painted surfaces shall be refinished to previous conditions.

3.10 WARRANTY FOR ENTIRE DIVISION 27 (Unless Noted Otherwise In Section)

A. The Contractor shall and does hereby warrant all workmanship, materials, and equipment furnished under this scope of work to be free from defects and function or operate satisfactorily for a period of one year from Substantial Completion of this project unless noted otherwise in specific specification section.

B. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost; the one year warranty shall include material and labor.
C. Contactor shall respond, excluding weekends and holidays, within 24 hours to any warranty service calls. If equipment cannot be repaired within 24 hours of service visit, the Contractor shall provide “loaner” equipment to the facility at no charge.

*** END OF SECTION 27 05 00 ***