SECTION 27 05 00 – COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Structured cabling for voice and data

B. Grounding and Bonding

C. Cable Pathways

D. Cable Management

E. Outfitting of Communication Equipment Rooms

1.2 RELATED WORK SPECIFIED UNDER OTHER DIVISIONS

A. Foundations and pads required for equipment furnished under this Division

B. Field painting, except such painting as is required to maintain shop coat painting and factory finish painting.

C. Flashing of conduits into roofing and outside walls.

D. Heating, ventilating, and air conditioning equipment.

E. Electrical service to equipment rooms.

F. Cutting and patching for low voltage systems work, except for errors and omissions under this Division.

1.3 RELATED WORK - OWNER FURNISHED EQUIPMENT AND SYSTEMS

A. Telephone system electronics

B. Data network electronics

C. Computer workstations, servers, printers and other peripherals

1.4 QUALITY ASSURANCE

A. Contractor shall identify all types of quality control mechanisms they employ. Please list.

B. Perform work in accordance with contract documents.

C. All personnel performing the work of this Section shall be thoroughly familiar with the cabling methods set forth in the latest release of the BICSI TDMM (Building Industry Consulting Services International Telecommunications Distribution Methods Manuals).

D. Contractor's RCDD shall review all required work prior to commencing. The Contractor's RCDD shall oversee the installation and will have the end responsibility for the quality of the installation work performed. All submitted designs and or changes to the design shall be approved and signed off by the Contractor's RCDD.

E. The installed cabling systems shall not generate nor be susceptible to any harmful electromagnetic emission, radiation, or induction that degrades cabling systems.

F. Expansion Capability: Unless otherwise indicated, provide spare positions in wall fields, cross connects, and terminal strips, and space in cable pathways to accommodate fifty (50) percent future growth in campus distribution and riser.

G. Backward Compatibility: The provided solution shall be backward compatible with lower category ratings such that if higher category components are used with lower category components, the permanent link and channel measures shall meet or exceed the lower channel's specified parameters.

H. Component Compliance: The provided solution's components shall each meet the minimum transmission specifications listed herein such that no individual component will be less than specifications for permanent and channel, regardless of the fact that tests for permanent and channel ultimately meet required specifications.

I. Pre-installation inspection: Visually inspect all cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport.

J. Test optical fiber cable while on reels. Use an optical time domain reflectometer (OTDR) to verify the cable length and locate cable defects, splices, and connector, including the loss value of each.

K. Test each pair of UTP cable for open and short circuits. Test results to be submitted to Owner.

L. Visibly damaged goods are to be returned to the supplier and replaced at no additional cost to the Owner.

1.5 STANDARDS

A. The Contractor's performance of the Work shall comply with applicable federal, state and local laws, rules and regulations. The Contractor shall give required notices, shall procure necessary governmental licenses, permits, and inspections and shall pay without burden to The Owner, all fees and charges in connection therewith unless specifically provided otherwise. In the event of violation, the Contractor shall pay all fines and penalties, including attorney's fees and other defense costs and expenses in connection therewith.

B. Federal Communications Commission

1. Equipment requiring FCC registration or approval shall have received such approval and shall be appropriately identified.

C. Codes, Standards and Ordinances

1. Design, manufacture, test, and install telecommunications cabling networks per manufacturer's requirements and in accordance with NFPA 70 (National Electrical Code®), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards:

    a. NECA 1 – Standard Practice of Good Workmanship in Electrical Construction, 2015
    b. ANSI/NECA/BICSI-568 – Standard for Installing Commercial Building Telecommunications Cabling, 2006
    c. ANSI and TIA Standards

        1) ANSI/TIA-568.0-D – Generic Telecommunications Cabling for Customer Premises, 2015
        2) ANSI/TIA-568.0-D-1 –Generic Telecommunications Cabling for Customer Premises – Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling, 2017
        3) ANSI/TIA-568.1-D – Commercial Building Telecommunications Infrastructure Standard, 2015
        4) ANSI/TIA-568.1-D-1 – Commercial Building Telecommunications Infrastructure Standard – Addendum 1: Updated References, Accommodation of New Media Types, 2018
        5) ANSI/TIA-568.2-D – Balanced Twisted Pair Telecommunications Cabling and Components Standard, 2018
        6) ANSI/TIA-568.3-D – Optical Fiber Cabling and Components Standard, 2016
        7) ANSI/TIA-568.3-D-1 – Optical Fiber Cabling and Components Standard - Addendum 1: General Updates, 2019
        8) ANSI/TIA-568.4-D - Broadband Coaxial Cabling and Components Standard, 2017
        9) ANSI/TIA-569-D – Telecommunications Pathways and Spaces, 2015
        10) ANSI/TIA-569-D-1 - Telecommunications Pathways and Spaces, Addendum 1: Revised Temperature and Humidity Requirements for Telecommunications Spaces, 2016
        11) ANSI/TIA-569-D-2 - Telecommunications Pathways and Spaces, Addendum 2: Additional Pathway and Space Considerations for Supporting Remote Powering Over Balanced Twisted-Pair Cabling, 2018
        12) ANSI/TIA-606-D – Administration Standard for Telecommunications Infrastructure, 2021
        13) ANSI/TIA-607-D – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, 2019
        14) ANSI/TIA-526.7-A – Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, 2015
        15) ANSI/TIA-526.14-C – Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant, 2015
        16) ANSI/TIA-758-B – Customer-Owned Outside Plant Telecommunications Infrastructure Standard, 2012
        17) ANSI/TIA-942-B – Telecommunications Infrastructure Standard for Data Centers, 2017

    d. NEMA-VE-1 – Metal Cable Tray Systems, 2009
    e. NEMA-VE-2 – Metal Cable Tray Installation Guidelines, 2006
    f. NFPA-70 – National Electrical Code, 2017
    g. Install cabling in accordance with the most recent edition of BICSI® publications:

        1) BICSI – Telecommunications Distribution Methods Manual, 14th Edition
        2) BICSI – Information Technology Systems Installation Methods Manual, 8th Edition

h. Federal, state, and local codes, rules, regulations, and ordinances governing the Work, are as fully part of the specifications as if herein repeated or hereto attached. If the Contractor should note items in the drawings or the specifications, construction of which would be code violations, promptly call them to the attention of the Owner's Representative in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.
i. American Society for Testing and Materials (ASTM): ASTM E. 814 – Standard Test Method for Fire Tests of Penetration Firestop Systems
j. Underwriters Laboratories, Inc. (UL): UL 1479 – Tests of Through-Penetration Firestop Systems
k. Americans with Disabilities Accessibility Guidelines.
l. Code of Federal Regulations, Title 29, Chapter XVII, Part 1910 (OSHA).
m. Uniform Building Code (UBC).
n. International Building Code (IBC).
o. Texas Department of State Health Services (TDSHS).
p. DFW Airport Design Criteria Manual
q. US Customs and Border protection Airport Technical Design Standard, 2017
r. Applicable codes and directives of authorities having jurisdiction

1.6 COMPLETENESS OF WORK

A. The Contract Documents depict low voltage systems which are intended to be complete and functioning systems. All products, materials, labor, and programming necessary to render a fully functional system to fulfill the design intent shown on the documents shall be provided by the Contractor.

B. Catalog numbers referenced throughout this Division’s drawings and specifications are intended to convey a general understanding of the type of quality of the product required. Where written descriptions differ from information conveyed by a catalog number, the written description shall govern. No extra charge shall be allowed because a catalog number is found to be incomplete or obsolete.

1.7 PRE-INSTALLATION CONFERENCE

A. Arrange and schedule pre-installation conference prior to beginning any work of this section Communications.

B. Agenda: Clarify questions in writing related to work to be performed, scheduling, coordination, etc. with consultant and/or project manager/Owner representative.

C. All individuals, who will be in an on-site supervisory capacity, shall be required to attend the pre-installation conference. This includes project managers, site supervisor and lead installers. Individuals who do not attend the conference will not be permitted to supervise the personnel that install, terminate, or test communications cables on the project. The Contractor’s RCDD that will oversee the installation is required to attend the pre-installation conference.

D. The manufacturer that will be providing the extended warranty is required to have a representative attend the pre-installation conference.

1.8 SEQUENCE AND SCHEDULING

A. The Contractor shall comply with all scheduling requests established by OAR, both prior to commencing Work, and during construction. The Contractor shall provide a detailed schedule of work to be performed.

B. Submit schedule for installation of equipment and cabling. Indicate delivery, installation, and testing for conformance to specific job completion dates. As a minimum, dates are to be provided for installation start date, completion of station cabling, completion of riser cabling, completion of testing and labeling, cutover, completion of the final punch list, start of demolition, Owner acceptance, and demolition completion.

1.9 SUBMITTALS

A. Comply with provisions of Division 01.

B. Produce Shop Drawings for all Sections which include the requirement.

C. Provide Product submittals for all Sections which include the requirement. All product submittals must include all products, accessories, and options clearly identified within the submittal.

D. Contractor shall not utilize the Consultants' original design drawings in the submittal or shop drawing process. Contractor shall develop their own original shop drawings.

1.10 ALTERNATES, SUBSTITUTIONS AND CHANGE ORDERS

A. If a proposed alternate material is equal to or exceeds specified requirements, Contractor shall provide manufacturer's specifications in writing for written approval prior to purchase and installation of proposed materials. The proposed material substitution shall not void or change manufacturer's warranty.

B. Contractor shall provide a complete cabling infrastructure according to these written specifications and drawings. If the Owner changes the scope of work to be performed by the Contractor, it shall be in writing. Contractor shall respond to these changes with a complete material list, labor, and taxes in writing presented to the Owner for approval. Contractor shall not proceed with additional scope of work without a signed approval by the Owner.

C. Additional work performed by the Contractor will not be paid by Owner without signed approval of these changes prior to implementing changes. Submit a copy of signed change order upon billing.

1.11 USE OF THE SITE

A. Use of the site shall be at the Owner's direction in matters in which the owner deems it necessary to place restriction.

B. Access to building wherein the Work is performed shall be as directed by the Owner.

C. The Owner will occupy the premises during the entire period of construction for conducting his or her normal business operations. Cooperate with the owner to minimize conflict and to facilitate the owner's operations.

D. Schedule necessary shutdowns of plant services with the Owner and obtain written permission from the owner. Refer to article - CONTINUITY OF SERVICES herein.

E. Proceed with the Work without interfering with ordinary use of streets, aisles, passages, exits, and operations of the owner.

F. All Contractor personnel must check in with the facilities engineering department and/or the General Contractor upon arrival and upon departure.

1.12 DELIVERY AND STORAGE

A. Insofar as possible, deliver items in manufacturers' original unopened packaging. Where this is not practical, cover items with protective materials, to keep them from being damaged. Use care in loading, transporting, unloading, and storage to keep items from being damaged.

B. Store items in a clean dry place and protect from damage.

C. Storage space on project site may be limited. Contractor shall coordinate delivery and arrange storage of materials and equipment with the OAR.

D. Components sensitive to damage in a harsh environment shall be stored off-site and delivered as needed.

E. Provide protective covering during construction to prevent damage or entrance of foreign matter.

F. Contractor is responsible for on-site security of tools, test equipment and materials.

G. Replace at no expense to Owner, product damaged during storage, handling or the course of construction.

1.13 CONTRACTOR CLOSE OUT SUBMITTALS

A. Submit Closeout documentation in accordance with Division 1 of the Project Manual and any applicable supplements. The number of submittal sets required is the greater of either the requirements of Division 01 of the Project Manual, or a minimum of four (4) sets.

1. Segregate documents into separate binders containing data relevant to operational, maintenance, and warranty issues.
2. Test reports on all copper and optical fiber cables (electronic file format and hard copy).
3. As-built cable schedules with recorded cable routing and lengths of each designated run.
4. As built documentation of all cabling systems.
5. As built documentation of CR/IDF modifications and associated cabinet elevations.

B. Warranty and Maintenance:

1. Test Report Binder(s)
2. Record Drawings

1.14 RECORD DRAWINGS

A. Keep a hard copy set of project drawings at the job site exclusively for recording deviations from the Construction Drawings.

B. Record locations and depths of buried and concealed conduits from fixed, easily identifiable objects, such as building walls. Where conduits are concealed in walls, indicate distances off of building corners or other building features not likely to be disturbed by future alterations.

C. Mark deviations in a different color so that work of various systems can be easily identified.

D. When Work is completed, record all deviations in an electronic format using AutoCAD 2007 in a format usable to the Owner. Coordinate this format with the Owner.

E. Submit two copies of completed "record drawings" on electronic media such as CD or DVD to Owner's Representative for distribution.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All materials and equipment used in carrying out these specifications are to be new and have UL listing, or listing by other recognized testing laboratory when such listings are available.

B. Model numbers and manufacturers included in this specification are listed to establish as standard of product quality.

C. Other qualified manufacturers may be substituted only with The Owner’s written consent. To request a substitution, the Contractor shall submit complete technical data, samples, and if requested, results of independent testing laboratory tests of proposed equipment.

1. If proposed System includes equipment other than specified model numbers, submit a list of major items and their quantities, with a one-line schematic diagram for review.
2. Material not specifically identified within this document, but which is required for the successful implementation of the intended system(s), shall be of the same class and quality as the specified material and equipment.
3. Include a list of previously installed projects using proposed equipment that are similar in nature to specified system.

PART 3 - EXECUTION

3.1 COORDINATION

A. Insofar as it is possible to determine in advance, advise the General Contractor to leave proper chases and openings. Place all outlets, anchors, sleeves, and supports prior to pouring concrete or installation of masonry work. Should the Contractor neglect doing this, any cutting and/or patching required is to be done at this Contractor’s expense. Visit site and be informed of conditions under which work must be performed. No subsequent allowance will be made because of error or failure to obtain necessary information to completely estimate and perform work involved.

B. Carefully coordinate with other divisions to ensure proper power requirements, grounding, fireproofing and interlocking controls between the fire alarm system, security system, and other owner furnished systems.

C. Any equipment installed by the contractor must have the appropriate sized power cords. Any power cords with more than 2 ft of slack will not be accepted

D. Notify other tradesmen of any deviations or special conditions necessary for the installation of work. Interferences between work of various Contractors to be resolved prior to installation. Work installed not in compliance with specifications and drawings and without properly checking and coordinating as specified above shall, if necessary, be removed and properly reinstalled without additional cost to Owner.

E. The Owner or the Owner's Representative shall be the mediating authority in all deviation and disputes arising on project.

F. Coordinate with local telephone and cable service providers to assure that proper points of service, demarcation location and grounding requirements are in accordance with contract drawings. Duct bank is to be provided by Division 26. This Contractor shall be involved regarding discussions about services to the building.

1. Coordinate with other trades to provide wall and ceiling access panels wherever required for access to communication equipment.

G. Intent:

1. These sections of specifications and drawings form a complete set of documents for communications systems for this project. Neither is complete without the other. Any item mentioned in one shall be as binding as though mentioned in both.
2. The intent of these specifications and drawings is to form a guide for a complete systems installation. Where an item is reasonably necessary for a complete system but not specifically mentioned, such as pull boxes, fittings, expansion fittings, support hangers, etc. provide same without additional cost to Owner.
3. Communication equipment room layouts indicted on drawings are diagrammatical only. Exact location of outlets and equipment to be coordinated and governed by project conditions. The Designer reserves the right to make any reasonable changes (approximately 6 feet) in location of junction boxes, or equipment prior to roughing in of such without additional cost to Owner.

H. Deviations:

1. No deviations from specifications and drawings to be made without full knowledge and consent of Designer.
2. Should the Contractor find during progress of work that existing conditions make desirable a modification of the requirements of any particular item, report such item promptly to Designer for his decision and instructions.

I. Main Horizontal Pathway/Raceway

1. Unless otherwise noted on the drawings, all communications/low voltage systems cabling shall be routed above accessible corridor ceilings parallel to room walls and corridors via cable tray or J-hook supports. Cabling shall be segregated by function as follows:
2. Voice/data cabling.
3. All other systems.

3.2 CONTINUITY OF SERVICES

A. The Contractor shall not take any action that will interfere with, or interrupt, existing building services unless previous arrangements have been made with the owner's representative. Arrange the Work to minimize shutdown time.

B. Owner's personnel will perform shutdown of operating systems. The Contractor shall give three (3) days' advance notice for systems shutdown.

C. Should services be inadvertently interrupted, immediately furnish labor, including overtime, material, and equipment necessary for prompt restoration of interrupted service.

3.3 TRENCHING, EXCAVATION, BACKFILLING, AND REPAIRS

A. Trenching, Excavation, and Backfilling is the responsibility of the General Contractor. This Contractor is to coordinate all requirements with the GC. Failure to properly coordinate this effort resulting in additional trenching, excavation, backfilling, or repairs shall be performed without additional cost to Owner.

3.4 PLYWOOD BACKBOARD AND WALL BACKING

A. Contractor shall provide 4-foot wide, by 8-foot high, by 3/4-inch thick fire retardant plywood backboard as indicated in all Communication Rooms. Plywood is to be painted with two coats of flat white fire-retardant paint on all six sides and installed 6 inches above finished floor, unless noted otherwise. The fire rating on the plywood shall be masked prior to painting and the mask removed after installation such that the fire rating is always visible.

B. General Contractor is to provide appropriate backing in walls as required for mounting brackets and other wall mounted equipment per manufacturer requirements.

C. Where work is to be done in an existing Telecommunication Room (TR), the Contractor shall ensure plywood in the TR is flame retardant. If the existing plywood does not comply the Contractor shall replace it with plywood compliant with 3.4.A.

3.5 FIRESTOPPING

A. Select appropriate type or types of through penetration firestop devices or systems appropriate for each type of communications penetration and base each selection on criteria specified herein.

B. Selected systems shall not be less than the hourly time delay ratings indicated in the Contract Documents for each respective fire-rated floor, wall, or other partition of building construction. Firestop for each type of communications penetration shall conform to requirements of an independent testing laboratory design drawing or manufacturer's approved modification when used in conjunction with details shown on the Drawings.

C. Perform all necessary coordination with trades constructing floors, walls, or other partitions of building construction with respect to size and shape of each opening to be constructed and device or system approved for use in each instance.

D. Coordinate each firestop selection with adjacent Work for dimensional or other interference and for feasibility. In areas accessible to public and other "finished" areas, firestop systems Work

shall be selected, installed, and finished to the quality of adjacent surfaces of building construction being penetrated.

E. Use materials that have no irritating or objectionable odors when firestopping is required in existing buildings and areas that are occupied.

F. Provide damming materials, plates, wires, restricting collars, and devices necessary for proper installation of Firestopping. Remove combustible installation aids after firestopping material has cured.

G. All firestops shall be installed in accordance with the manufacturer's instructions in order to maintain the specific rating assigned by the independent testing laboratory.

H. Existing raceways, cable trays, and cabling that penetrate existing building construction shall be firestopped to the extent necessary to fill cavities that may exist between existing building construction and existing communications penetrations or existing conduit sleeve, and between existing conduits and existing conduit sleeve.

I. If required by inspecting authorities:

1. Expose and remove Firestopping to the extent directed by inspecting authority to permit his or her inspection.
2. Reinstall new firestopping and restore Work where removed for inspection.

3.6 TESTS

A. On completion of Work, installation shall be entirely free of damaged conductors, software errors, incomplete jack termination including labeling and faceplates and dust. Perform a thorough operation test in the presence of the Owner or their representative. Provide documentation of all test results as outlined in each system's specifications. Include labor, materials and instruments for above tests.

B. Furnish owner, as a part of closing documents, a copy of such tests including identification of each cable, also the dedicated communication service ground test as required by each system's individual manufacturer indicating compliance with their requirements.

C. Prior to final observation and acceptance, test and leave in satisfactory operating condition, all systems and equipment including but not limited to the following:

1. Grounding.
2. Firestopping of all sleeves and conduits.
3. Telephone and LAN systems.
4. Turn in test results on cabling.

3.7 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, dust, and construction debris and repair damaged finish, including chips, scratches, and abrasions. This includes touching up paint removed for grounding.

B. Contractor shall provide a clean work environment, free from trash/rubbish accumulated during and after cabling installation.

C. Maintain construction materials and refuse within the area of work. Clean the work area at the end of each day.

D. Contractor shall keep all liquids (drinks, Sodas, etc.) off finished floors, carpets, tiles, racks and equipment. If any liquid damage to above finishes or equipment, Contractor shall provide professional services to clean or repair scratched/soiled finishes or damaged equipment at own expense

3.8 INSPECTION FEES

A. Obtain and pay for all necessary inspection fees required for communication systems installation.

3.9 OBSERVATIONS

A. When field observation services are a part of the project scope, the Designer's office will provide periodic observation of the progress of Work specified herein. The purpose of the observation service is to ensure compliance of Contractor's Work with specifications and drawings. The Designer's office may also observe tests required of this Contractor as called for in other sections of the specifications.

B. Specifications and drawings represent Work to be done in view of total project requirements. To eliminate possible conflict with other trades, final location of conduits, jacks, outlets, components, etc., is responsibility of this Contractor. Contractor to provide all supervision required for his personnel to ensure that installation is made in accordance with specifications and drawings and all safety rules and regulations are observed. In event of conflicts of Work on project with other trades, Contractor is to make every reasonable effort to resolve conflict through meetings and discussions with other parties involved, by preparation of drawings, or other appropriate action. Only after this has been done shall the Designer's assistance be requested through the RFI process.

C. When the Designer is requested to visit the project to aid in resolution of conflicts, or for witnessing tests, they shall be given a minimum of 48 hours' notice prior to time their presence is requested at job site.

3.10 WARRANTY-GUARANTEE

A. The Designer reserves right to accept or reject any part of the installation which does not successfully meet requirements as set out in these specifications.

B. This Contractor shall, and hereby does, guarantee all Work installed under this division shall be free from defects in workmanship and materials for a period of one year from date of final acceptance. This Contractor further agrees to repair or replace any defective material or workmanship which is or becomes defective within the terms of this warranty-guarantee.

C. All surplus parts and pieces to the installation shall be maintained as a spare parts inventory at the building site. Parts replaced during the warranty period shall have a warranty matching that of the original part from date of replacement.

END OF SECTION 27 05 00

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