

SECTION 270000 - COMMUNICATIONS GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. The work covered under this Section consists of the general requirements for the furnishing of all necessary labor, supervision, materials, equipment, tests and services of the communications systems as specified.

1.2 PROJECT REQUIREMENTS

- A. In Flathead County Earl Bennett Building to the South Campus Building:

1. Install, terminate all strands, label and provide printed digital test results for one 72 strand Single mode (Indoor/outdoor) plenum rated fiber cable, from IT data closet on 2nd floor of EBB, to the IT server room on the 2nd floor of the South Campus building. Single mode fiber must be run in 1" corrugated plenum rated fiber inner-duct in data closets and ceiling spaces. Install MaxCell, 3 cell fabric innerduct in all IT conduits between EBB and the new south campus building and South Campus to the Adam's building.
2. Provide two necessary Cooper Industries Cooper B-Line 19" swing gate wall mounted equipment racks (Cooper Industries part # SB708195418 in flat black powder coat), Cooper B-Line vertical cable management for both sides of both racks, fiber tray, LC single mode connectors, adapter panels, fan-out kits, pigtails, sleeves, and any other miscellaneous parts needed to complete installation on both sides.

- B. For South Campus Building:

1. Install, terminate, label and provide printed digital test results for 290 Category 6 plenum rated cable drops in designated areas (digital copies of floor plans will be provided). Provide necessary CAT6 patch panels, Blue CAT6 patch cords, CAT6 jacks, faceplates, all 2U Cooper B-Line horizontal cable management panels and any other miscellaneous parts needed to complete installation. All cabling must be installed in J-hook or Arlington loop system in ceiling space where necessary. All termination points must be properly labeled on both ends and on the physical cable. General Contractor will provide conduits/sleeves indicated in Flathead County South Campus drawings. Low voltage contractor will be responsible for providing any additional conduit/sleeves required for the complete installation.
2. Install, terminate, label and provide digital test results for one CAT3 (indoor/outdoor) plenum rated 25 pair telco cable from, Adam's building data closet, to IT server room on 2nd floor of South Campus building. Provide necessary patch panels, 66 blocks, and any other miscellaneous parts needed to complete installation. All telco pairs must terminate in an entrance protector (110 indoor style) on both ends, which includes all gas tube module fuses.

- C. For South Campus Building to Adams Building:

1. Install, terminate all strands, label and provide printed digital test results for one 24 strand Single mode (indoor/outdoor) plenum rated fiber cable, from IT server room on 2nd floor of South Campus Building to IT data closet on 1st floor data closet of Adams Building. Single mode fiber must be run in 1" corrugated plenum rated fiber inner-duct. Provide fiber tray, LC single mode connectors, adapter panels, fan-out kits, pigtails, sleeves, and any other miscellaneous parts needed to complete installation on both sides.
2. Install, terminate, label and provide digital test results for one CAT3 (indoor/outdoor) plenum rated 25 pair telco cable from, Adam's building data closet, to IT server room on 2nd floor of South Campus building. Provide necessary patch panels, 66 blocks, and any other miscellaneous parts needed to complete installation. All telco pairs must terminate in an entrance protector (110 indoor style) on both ends, which includes all gas tube module fuses.

1.3 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions, and Division 01 General Requirements, apply to the Work of this Section.

1.4 REFERENCES

A. General:

1. Codes, standards, and industry manuals/guidelines listed by reference, including revisions by issuing authority, form a part of this Specification Section to extent indicated. Consider such codes and/or standards a part of this Specification as though fully repeated herein.
2. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
3. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid unless otherwise specifically stated.

- B. Codes: Perform Work and furnish materials and equipment under Division 27 in accordance with applicable requirements of the latest edition of governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:

1. United States Department Of Labor (DOL) Regulations (Standards - 29 CFR):
 - a. Part 1910, "Occupational Safety and Health Standards."
2. National Fire Protection Agency (NFPA):

- a. NFPA 70, "National Electrical Code" (NEC).
 - b. NFPA 75, "Protection of Information Technology Equipment."
 3. Administrative Rules of Montana (ARM) Title 24, Chapter 301.
 4. Uniform Building Code (UBC).
 5. Uniform Fire Code (UFC).
 6. Uniform Mechanical Code (UMC).
 7. National, State, Local and other binding building and fire codes.
 8. FCC Regulations:
 - a. Part 15 - Radio Frequency Devices and Radiation Limits.
 - b. Part 68 - Connection of Terminal Equipment to the Telephone Network.
- C. All work shall be performed in compliance with the most restrictive of Municipal, State, and/or Federal Codes that may govern this Work, including any standards, codes, etc. which will be adopted within 90 days following the Award of Contract.
- D. Code compliance is mandatory. Nothing in these Specifications and/or the Drawings permits work not conforming to applicable codes. Where work is shown to exceed minimum code requirements, comply with Drawings and Specifications. Where work is shown which is in apparent conflict with applicable codes, notify the Owner, Construction Manager, and Designer immediately, prior to proceeding with Work. Do not proceed with Work that is in apparent conflict with applicable codes without first receiving written direction from the Designer.
- E. Standards: Perform Work and furnish materials and equipment under Division 27 in accordance with the latest editions of the following standards as applicable:
1. Underwriter's Laboratories (UL): Applicable listing and ratings, including but not limited to the following standards:
 - a. UL 444: Communications Cables.
 - b. UL1655: Community-Antenna Television Cables.
 - c. UL 1690: Data-Processing Cable.
 - d. UL 1963: Communications-Circuit Accessories.
 2. ANSI/TIA/EIA-568-C Commercial Building Telecommunications Cabling Standard:
 - a. Part 1: General Requirements.
 - b. Part 2: Balanced Twisted-Pair Cabling Components.
 - c. Part 2, Addendum 1 (ANSI/TIA/EIA-568-C.2-1): Transmission Performance Specifications for 4-Pair 100 Ohm Category 6 Cable.
 3. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces, including the following addenda:
 - a. TIA/EIA-569-A-7 Cable Trays and Wireways.
 4. ANSI/TIA/EIA-606-A Administration Standard for Commercial Telecommunications Infrastructure.

5. ANSI/J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
6. EIA testing standards.
7. Insulated Cable Engineers Association (ICEA):
 - a. ANSI/ICEA S-90-661-2002 Category 3 Individually Unshielded Twisted Pair Indoor Cable for Use In General Purpose and LAN Communication Wiring Systems.
8. Building Industry Consulting Services International (BICSI):
 - a. Telecommunications Distribution Methods Manual (TDMM).

1.5 APPLICABLE PUBLICATIONS

- A. The Contractor is expected to have access to, and adhere to, the most recent version of, and all ratified addenda to, the following reference materials and standards appearing below to ensure conformity to the project requirements.
- B. Electronic Industries Alliance/Telecommunications Industry Association (EIA/TIA) publications and related material:
 1. TIA/EIA-310-D - Racks, Panels and Associated Equipment.
 2. TIA/EIA-568-1 - Commercial Building Telecommunications Cabling Standard Part 1: General Requirements.
 3. TIA/EIA-568-2 - Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components.
 4. TIA/EIA-569 - Commercial Building Standard for Telecommunications Pathways and Spaces.
 5. TIA/EIA-606 - Administration Standard for Commercial Telecommunications Infrastructure.
 6. TIA/EIA-J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
 7. TIA-758 – Customer-owned Outside Plant Telecommunications Infrastructure Standard. National Electrical Safety Code (IEEE C2).
- C. IEEE 802.3 (10BaseT Ethernet Specifications), IEEE 802.3u (100BaseTX Specification), 802.3z (Gigabit Ethernet Specification), and IEEE 802.3af (Power over Ethernet).
- D. FCC Part 15 and Part 68.
- E. Rural Electrification Association (REA), Bulletin 345-63, REA Standards for Acceptance Tests and Measurements of Telephone Plant.
- F. Telcordia GR-1089-CORE.
- G. BICSI Telecommunications Distribution Methods Manual (TDMM).

1.6 GENERAL REQUIREMENTS AND CONDITIONS

- A. This Project requires certified payroll showing Montana Prevailing Wage has been met. Certified payroll documents shall be provided showing weekly payrolls and shall be submitted with payment requests. See other requirements section 1.10 for stated wage rate.
- B. Safety and Indemnity:
 - 1. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of persons and property during performance of work.
 - 2. The Contractor shall ensure that all personnel working in or anywhere on the site shall be provided a hard hat, safety shoes, a face shield or safety goggles, safety vest, etc. for their protection.
 - 3. No act, service, drawing review, or construction observance by Owner project staff or any other party employed by Owner is intended to include review or approval of adequacy of the Contractor's safety measures, in, on, or near the construction site.
- C. The Drawings and these Specifications do not necessarily describe all work required to achieve the intent of the Contract Documents. On the basis of the scope of work described herein, and/or indicated on the Drawings, the Contractor shall furnish all items and labor required for the proper execution and completion of the work.
- D. All installation practices shall be in accordance with, but not limited to, these Specifications and Drawings.
- E. Where the Specifications and/or Drawings call for an installation to be made in accordance with the manufacturer's recommendations, a copy of such recommendations shall always be kept on the job site, and shall be available to the Owner and/or Designer.
- F. Follow manufacturers' instructions where they cover points not specifically indicated on Drawings and Specifications. If said instructions differ from the Drawings and Specifications, obtain clarification from the Designer before commencing Work.
- G. A visit to the site and/or buildings on the site is required of the Contractor prior to submission of final contract bid. Contractor will be held to have familiarized himself (herself) with existing site conditions and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.
- H. The Contractor must verify locations, routes, and dimensions by inspecting the site prior to installation. In addition, the Contractor must verify that all electrical requirements are installed and the installed conduits and sleeves have the capacity to carry the cabling defined on the Drawings. Any discrepancy noted between site conditions and information shown on plans must be brought to the attention of the Construction Manager in writing. Commencement of work after field examination implies acceptance of site conditions.
- I. Verify equipment installation requirements with provisions specified herein, along with those appearing under other Sections of the Specifications and the Drawings. Verify room dimensions with equipment dimensions and requirements specified under this Section. Check actual job conditions prior to start of any work. The Contractor will be responsible for inspecting the previously performed work of other trades, and commencement of work will serve as evidence

of the acceptance of this work as suitable for the work to follow. Report necessary changes in time to prevent needless work. Necessary changes made without prior authorization shall be at the Contractor's risk and expense.

- J. If, in the opinion of the Contractor, an installation practice is desired or required which is contrary to these Specifications or Drawings, a written request for modification shall be made to the Designer for approval.
- K. Cooperate at all times, and to the fullest extent, with all trades doing work in the building to the end that lost time, work stoppages, interference, and inefficiencies do not occur. Inform contractors of other trades of the required access to and clearances around equipment to maintain serviceability and code compliance.
- L. Additional cutting and patching may be required to facilitate the work specified herein and on the Drawings. Coordination of said cutting and patching with Owner and other trades is imperative. The Contractor shall bear the responsibility for, and any added expense associated with remedial work associated with improper holes, supports, and other openings.
- M. Lines of other services damaged, as a result of this work shall be promptly repaired at no expense to the Owner, and to the complete satisfaction of the Owner.
- N. Ceiling grid, ceiling and floor tiles, architectural features, paint work, broken or defaced by the Contractor during the installation and testing process must be replaced by the Contractor, at no cost, and to the complete satisfaction of the Owner.
- O. The Owner controls the job site and access to the work. All work, deliveries, and storage of materials must be coordinated with the Owner's Representative. The Contractor is responsible for the unloading, storage, and any moving of materials required for the work. The Contractor will coordinate scheduling of activities with the Owner's Representative.
- P. No work shall be concealed until after inspection and approval by proper authorities. If work is concealed without inspection and approval, the party that concealed said work shall be responsible for all work required opening and restoring the concealed areas, in addition to all required modifications.

1.7 GENERAL RESPONSIBILITIES

- A. The Contractor shall obtain from the General Contractor, projected dates when the relevant areas will be available for the on-site installation.
- B. Installation shall include the delivery to the installation site, unloading, setting in place, fastening to walls, floors, ceilings, counters, or other structures where required, interconnecting wiring of the system components, equipment alignment and adjustment, and all other work whether or not expressly required herein which is necessary to result in complete and fully operational system.
- C. The Contractor shall furnish all equipment and materials, whether specifically mentioned herein or not, to ensure a complete and operating system. The Not in Contract (NIC) and Owner Furnished Equipment (OFE) and materials are specifically exempted from this requirement.

- D. During the installation, and up to the date of final acceptance, the Contractor shall be under obligation to protect his finished and unfinished work against damage and loss. In the event of such damage or loss, he (she) shall replace or repair such work at no cost to the Owner.
- E. The Contractor shall generate all Shop Drawings and information for the complete installation and wiring of the system. The Contractor shall provide (or subcontractor for) the on-site installation and wiring, and shall provide on-going supervision and coordination during the implementation phase.
- F. The Contractor shall be responsible for the initial and final adjustment of the systems as herein prescribed and shall provide all test equipment for the system checkout and acceptance tests.
- G. The Contractor shall be responsible for field verifying all associated electrical infrastructure prior to fabrication and/or ordering of custom wall plates.

1.8 QUALIFICATIONS OF TRADE CONTRACTOR PERSONNEL

- A. All Contractors and employees performing the work outlined within this Section for telecommunications related work shall have a minimum of five (5) years' experience in satisfactory completion of jobs of similar scope and contract value.
- B. An on-site Contractor superintendent must be available at all times. Contact can be by person, telephone, or pager.
- C. The Contractor shall have completed a project of similar size and scope within the last twenty-four (24) months.
- D. The Trade Contractor performing telecommunications work on this project shall be certified for the installation, termination, splicing, and testing of copper cables, riser cable, and inside wiring.

1.9 QUALIFICATIONS OF SUBCONTRACTORS

- A. All subcontractors employed by the Contractor engaged in the work outlined within this Specification shall have a minimum of five (5) years' experience in satisfactory completion of jobs of similar scope and contract value.
- B. The Contractor shall compile detailed information relating to similar work completed by all subcontractors, including corporate references sufficient to enable the Owner to evaluate and agree to the subcontractors' responsibility, experience, and capacity to perform the work.
- C. The Trade Contractor performing work related to Section 270000 must be certified for the installation, termination, splicing, and testing of copper cables, riser cable, and inside wiring.
- D. An on-site Contractor superintendent for the subcontractor(s) must be available at all times. Contact can be by person, telephone, or pager.

- E. No subcontract shall be permitted for the Contractor's responsibilities, as herein defined, unless specifically identified in the quote response submission and approved by the Owner.
- F. The Contractor shall have sole responsibility for the satisfactory implementation of each system, even though the Contractor may have subcontracted a portion of the installation or had certain manufacturers install their own equipment.
- G. If the Contractor proposes to subcontract the wiring, installation, programming, or other portions of the work, the Contractor shall provide direct supervision of the subcontracted work.
- H. The supervision of such subcontracted work shall not be intermittent, but shall be continuous during the installation.
- I. If it is the intention of the Contractor to "team" with one or more other Contractors, then this must be clearly identified in the response. The Contractor returning the quote shall be considered as the prime in respect of this, and shall hold full responsibility for the performance of the members of their team, including themselves and all other subcontractors engaged in the performance of this Contract.

1.10 OTHER REQUIREMENTS

- A. The job classification for this position is, "Telecommunications equipment installer" located in District #1. Current prevailing wage rates are \$20.30 per hour.
- B. County will need to preapprove the manufacture of products and cable being installed.
- C. All cabling will be terminated and tested using the latest EIA/TIA standards. Printed test results must be provided.
- D. All cabling and fiber innerduct must be plenum rated.
- E. Digital meter used for printed test results, must be calibrated within the last 12 months of this project being completed. Calibration certification date must be provided on printed results.
- F. Label all cables and conduits. Physical cables and fiber trays must be labeled at both termination points. Labels must include building and/or closet locations and must include fiber pair counts.
- G. Fire caulk all appropriate conduit and sleeves where used by contractor.
- H. All fiber splices must be fusion spliced.
- I. Contractor must terminate and test all 72 strands of the single mode fiber cable on both ends of South Campus building and EBB.
- J. Contractor must terminate and test all 24 strands of the single mode fiber cable on both ends of South Campus building and Adam's building.
- K. Use LC connector types for all installations unless noted otherwise.

- L. All cabling must be dressed using soft Velcro; tie wraps are not acceptable.
- M. Contractor must provide a 25 year warranty, which covers all cable, connectors, installation and performance.
- N. Contractor will provide County with all applicable warranty information.
- O. Contractor must follow all EIA / TIA contract standards.
- P. Contractor must provide County with Visio drawings of all new cabling installed including all lengths.

1.11 SUBMITTALS

- A. Submit under provisions of Section 013300 "Submittal Procedures."
- B. Required Submittals:
 - 1. The Contractor shall submit, prior to project start, a time line for the project, showing all major dependencies and interactions with other trades. The schedule shall:
 - a. Identify any and all disruption to existing services and/or service shutdowns on the schedule.
 - b. Identify specifically the anticipated completion date for each building and each floor within each building as applicable. These completion dates shall be designated as milestones on the schedule.
 - 2. The Contractor shall not take any facility out of service during the Owner's normal hours of operation without agreement from the Owner. Any out-of-service activity shall be requested in writing and be coordinated two weeks in advance. The activity should generally be scheduled after hours.
 - 3. The Contractor shall make updates to the time line and shall provide a weekly written status report to the Construction Manager.
 - a. Each status report shall include details of project progress and shall describe any special incidents, activities, circumstances, or interruptions of workflow.
 - b. The status reports shall specifically itemize areas that shall be affected by project activities planned for the succeeding week.
 - 4. Provide qualifications of the foreman in charge of the work.
 - 5. Provide qualifications of the project management team.
 - 6. Within ten (10) working days following the acceptance of the project, the Contractor shall provide to the Owner and the Designer:
 - a. One (1) complete set of "as-built" record Drawings consisting of computer data files (on disc). Note that Drawing files must be in VISIO file format following the Contract Drawing layering protocol.
 - b. One (1) hard copy of all test results and associated computer data files (on disc).
 - c. A copy of the cable tester's display software.

- d. Any equipment manuals or instructions provided by the manufacturer for the equipment and display software.

1.12 QUALITY ASSURANCE

- A. The Contractor shall ensure that all design, workmanship, materials employed, required equipment, and the manner and method of installation conforms to accepted practices. Where specific standards do not apply, the more stringent of industry publications, Owner policies, and manufacturer's guidelines shall apply.
- B. In completing the Work, the Contractor shall adhere to all applicable professional practices, including but not limited to the standards set forth herein, governing the installation of Structured Building Cabling Systems wiring and associated components.
- C. The Contractor shall complete the Work in accordance with manufacturer's specifications (where applicable).
- D. The Contractor shall furnish his (her) best skill and judgment in performing the services requested.

1.13 WARRANTY

- A. The Contractor shall warrant that throughout the term of this Contract, prices charged for products and services are no higher than those charged to any other entity for products of like grade and quality in similar or lesser quantities.
- B. The installed structured telecommunications wiring (as applicable for given cable media) system, shall be warranted for a minimum 25-years. This warranty shall be a performance warranty and must cover, at a minimum, the following:
 1. All defects of wire, cable, components and other materials in the system installation.
 2. All specifications provided herein and as presented in all design documentation (at time of installation).
 3. All workmanship associated with the system installation.
- C. The Contractor will correct any problems and malfunctions that are warranty-related issues without additional charge to the Owner for the entire warranty period. The 1-year construction warranty period shall commence following acceptance of the Work as specified herein. Any longer term warranties provided by the Contractor or passed through from the manufacturers shall also commence at this time.
- D. All extended material warranties shall be passed through to the Owner.

1.14 ACCEPTANCE

- A. The following criteria shall be met in order for the project to be accepted:

1. All testing by the Contractor shall be complete and all test results have been delivered to the Owner and the Designer.
 2. All of Contractor's test results have been examined and approved by the Designer and Owner.
 3. Owner Contractor's test results have been examined and approved by the Designer and Owner.
 4. All documentation required by this specification has been delivered to the Owner and the Designer.
 5. Any punch list items discovered have been corrected to the satisfaction of the Owner and the Designer.
- B. Following completion and/or compliance with the requirements listed above, the Owner will issue a Notice of Completion confirming that the project is complete. A 45-day Acceptance Period will begin immediately following the issuance of the Notice of Completion.
- C. During this Acceptance period, the wiring system is to be up and operational. If there is a major system failure, the Acceptance period will begin again once the problem is resolved and the system is back up and running.
- D. The Acceptance period is considered to be outside of the Warranty period. Once the Acceptance period has passed, the Warranty shall begin.
- E. Major systems failures and emergency status are defined events that deleteriously impact 25 percent or more of the users.
- F. Contractor personnel shall respond to major failures within four hours. Minor failures shall be responded to at the Owner's discretion or within one business day.
- 1.15 DELIVERY, STORAGE AND HANDLING
- A. Deliver products, components, and accessories carefully to avoid breakage, denting and scoring finishes. Do not install damaged equipment.
 - B. Store products, components, and accessories in original cartons and in clean dry space; protect from weather and construction traffic.
 - C. All equipment delivered prior to installation shall be stored by the Contractor at his place of business.
 - D. Costs of all shipping to the Contractor's place of business, the job site, inside handling, and of all unusual storage requirements, shall be borne by the Contractor.
 - E. The Owner and/or General Contractor control the job site and access to the work. All work, deliveries, and storage of materials must be coordinated with the General Contractor. The Contractor is responsible for the unloading, storage, and any moving of materials required for the work. The Contractor will coordinate scheduling of activities with the General Contractor.

- F. It shall be the responsibility of the Contractor to make appropriate arrangements, and to coordinate with authorized personnel at the site, for the acceptance, handling, protection, and storage of equipment so delivered.
- G. Responsibility for any materials that the Owner provides shall be that of the Contractor once delivered to the Contractor.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Owner - Flathead County will need to preapprove the manufacturer of products and cable being used. These specifications define the minimum acceptable quality by designating a manufacturer's trade or brand name and catalog or model number, and by describing attributes, performance, or other standards.
- B. For products described only by attributes, performance, or standards, the Contractor shall select products that meet the specified requirements, treat them as substitute products, and submit a request for approval of their use.
- C. The Contractor shall provide product submittals adequate to demonstrate the conformance of the items submitted to the Drawings, Specifications, and intent of the design.

2.2 REQUIRED MATERIALS

- A. All materials used shall present no environmental or toxicological hazards as defined by current industry standards and shall comply with Montana State Department of Labor and Industry, United States Environmental Protection Agency (US EPA), or applicable national, federal, provincial, or state laws, standards, or regulations associated with the Site.
- B. Materials to be provided and/or installed include, but are not limited to:
 - 1. Fiber rack mount enclosures (not needed for EBB side)
 - 2. 2 each 41U Cooper Industries swing gate wall-mount equipment racks
 - 3. 4 each Cooper Industries Cooper B-Line vertical cable management (41U lengths)
 - 4. 8 each Cooper Industries Cooper B-Line horizontal cable management panels
 - 5. CAT6 48 port patch panels
 - 6. CAT6 patch cords (for patch panel side)
 - 7. All necessary single mode fiber optic cable (72 strand and 24 strand indoor/outdoor/plenum rated)
 - 8. Single mode Fiber adapter panels
 - 9. Single mode LC fiber optic connectors
 - 10. Fiber fusion protection sleeves
 - 11. Single mode LC pigtails
 - 12. Fiber fan-out kits
 - 13. 1 inch corrugated plenum rated fiber inner-duct with pull rope
 - 14. MaxCell innerduct with 3 sleeves needed for 2 inches conduit

15. "J" hooks or Arlington Industries loop cable hangers
16. Any miscellaneous mounting hardware needed
17. Any and all other necessary materials to complete this project

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall provide all materials, tools, equipment, miscellaneous parts, and labor as required to complete the Work as outlined herein.
- B. The Contractor shall complete the Work as specified herein and on the Drawings.
- C. The Contractor agrees to use best efforts to furnish an adequate supply of technicians and materials at all times, and to do the work in the most appropriate, expeditious, and economical manner that is consistent with the interests of the Owner. This includes, but is not limited to: all labor, services, materials, installation, hoisting, supplies, insurance, equipment, tools, utilities, scaffolding, storage, and any other facilities and items of every kind and description required for the prompt and efficient completion of the work.

3.2 STAFFING

- A. The Project foreman shall be replaced immediately if unsatisfactory to the Owner, the Construction Manager, and/or the Designer.
- B. The Contractor shall designate, in writing to the Owner, the Construction Manager, and Designer, a dedicated full time project manager as contact for resolution of problems, job coordination, etc. This person shall have full authority to represent the Contractor.
- C. Only a skilled, experienced, and reliable work force shall be used. The Contractor shall immediately discontinue the services of anyone employed on this project, at the request of the Owner, the Construction manager, and/or the Designer.
- D. Craft personnel must be trained or certified by the manufacturer of the product they are installing.
- E. Craft personnel shall be required to provide and use the manufacturer's recommended tools in the performance of each activity.

3.3 PHYSICAL INSTALLATION

- A. All materials shall be firmly secured in place unless requirements of portability dictate otherwise.
- B. Fastenings and bracings shall be adequate to support their loads with a safety factor of at least three (3) times. All requirements for Zone 1 seismic bracing and earthquake safety shall be met.

- C. All boxes, equipment, etc., shall be secured plumb and square.
- D. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
- E. Protective covers normally shipped with the connector shall remain over the connector after installation. The cover shall be temporarily held in place with electrical tape or permanently with plastic tie-wraps if there is any chance of it being dislodged during construction and move-in.
- F. Any connector that is not normally shipped with a protective cover shall be covered with a clear non-conductive medium, such as heat-shrink or plastic wrap, to protect against dust, paint and moisture. Protective covering shall not cover cable or station identification.
- G. Provide and install fire and moisture stop material in accordance with cable manufacturers' and stop manufacturer's specifications at all locations where required by applicable codes.
- H. All Trade Contractors must take such precautions as are necessary to guard against electromagnetic and electrostatic hum, to supply adequate ventilation, and to install the equipment so as to provide maximum safety to the person(s) operating said equipment.

3.4 FIRESTOPPING - GENERAL

- A. Codes and as indicated on the Drawings.
- B. All firestop materials and methods shall maintain the 'F' and 'T' ratings of the partition(s) wherein firestop materials are installed.
- C. The Contractor shall seal all penetrations for cable slots, rigid conduit, EMT conduit, or sleeves for communications wiring using approved materials installed according to the manufacturer's specifications.
- D. All slot or chase-type penetrations placed at time of construction shall be fire stopped.
- E. All individual cable or wire penetrations that are not in conduit shall be fire stopped.
- F. Any penetration in a fire-rated partition, sound-rated partition, or partition demising a pressurized area shall be sealed with a qualified fire stop system.
- G. "Through penetrations" in gypsum wallboard for cable trays shall be boxed-out with gypsum board and sealed with a design-tested, fire-stopping system installed per the manufacturer's specifications and instructions.
- H. A tested system shall be used to fire stop all openings made in concrete floors. Thickness or depth of fire-stopping material(s) shall be as recommended by the material manufacturer and backed by formal ASTM E-814 tests.
- I. Ceiling penetrations for conduit and cables shall be sealed with a system appropriate for the substrata and level of protection required.

- J. The methods of fire stopping roof penetrations shall be identical with those used for floor and ceiling assemblies.
- K. All metal and PVC conduits with or without wire and/or cable inside shall be fire stopped to restrict transfer of smoke and fumes.

3.5 CLEAN UP AND REPAIR

- A. Upon completion of an installation task, the relevant areas and equipment shall be left clean and in an operational state.
- B. The Contractor shall be responsible for debris removal and repairing any damage caused to the premises by the Contractor's installation activities, at no cost to the Owner or any other contractor working on the Project.

END OF SECTION 270000