

SECTION 27 00 10

BASIC COMMUNICATIONS REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies the basic requirements for Communications Systems installations as indicated or required, and includes requirements common to more than one Specification Section of this Division (such as related documents, related Sections, definitions, governing requirements, Contractor requirements, warranty requirements, submittal requirements/procedures, and project closeout requirements/procedures, as well as other requirements).

1.02 RELATED DOCUMENTS

- A. The General Requirements of the Contract (including General and Supplementary Conditions, apply to the work of this Division.
- B. This Section may expand upon or supplement the General Requirements of the Contract. In the event of a conflict or discrepancy between this Section and the General Requirements of the Contract, the General Requirements of the Contract shall govern. However, if the requirement of this Section (or portion thereof) exceeds that of the General Requirements of the Contract, and is furthermore not contrary to the General Requirements of the Contract, then the requirement of this Section (or portion thereof) shall prevail.
- C. Examine the Construction Documents in their entirety (including Drawings and Specification Sections in the other Divisions) for requirements or work which may affect work under this Section, regardless of whether such requirements or work are specifically indicated in this Section.

1.03 RELATED SECTIONS

- A. All Specification Sections in this Division.
- B. The following Sections in other Divisions:
 - 1. Division 26 – Electrical for Communications Systems

1.04 COMMUNICATIONS SYSTEMS

- A. The following Communications Systems are included within this Division or within Division 28 refer to paragraph *DEFINITIONS* later in this Specification Section for further explanation of each system>:
 - 1. Audiovisual System:
 - 2. Communications Cabling System:
 - 3. Electrical for Communications Systems
 - 4. Low Voltage System(s):
 - a. Public Address
- B. The definitions below are applicable to this Division:
 - 1. General
 - a. Accepted/Acceptable: Work or materials conforming with the intent of the project, and in general, conforming to the pertinent information in the Construction Documents.
 - b. Approved/Approval: The written approval of the Engineer.

- c. Accessible: Easy access. Access attained without requiring extensive removal of other materials to gain access.
- d. Accessible Ceiling: Acoustical tile hanging ceilings (“Hard-lid” ceilings (concealed spine or sheetrock/gypsum ceilings), even when provided with access panels, are not considered an Accessible Ceiling.)
- e. Agreement: The contractual agreement between the Owner and the Contractor.
- f. By Others: A party or entity other than the Contractor. The Contractor shall engage the General Contractor, Architect, and/or Owner to determine this party or entity for consideration of pricing and/or execution of the Work.
- g. Concealed: Hidden from sight in interstitial building spaces, chases, furred spaces, shafts, crawl spaces, etc.
- h. Construction Documents: Collective term for the entire set of bound or unbound material describing the construction and services required, including all Drawings, Specifications, addenda issued prior to execution of the contract, and modifications issued after execution of the Contract (such as change orders, construction change directives, supplemental instructions, etc.).
- i. Contract Documents: The Agreement (including other documents listed in the Agreement), Conditions of the Contract (General, Supplementary and other conditions), and the Construction Documents.
- j. The Contract: The Contract Documents form the Contract. The Contract represents the entire and integrated agreement between the Owner and the Contractor and supersedes any prior negotiations, representations or agreements, either written or oral. The Contract shall not be construed to create a contractual relationship of any kind (1) between the Engineer and the Contractor, (2) between the Owner and a subcontractor, or (3) between any persons or entities other than the Owner and Contractor.
- k. Contractor: The party responsible for providing the Communication System(s) as indicated herein.
- l. Drawings: The graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including (but not limited to) plans, elevations, sections, details, schedules and/or diagrams.
- m. Engineer: The party responsible for producing the Communication System(s) Construction Documents.
- n. Exposed: Not concealed (see above) and not installed underground.
- o. Final Completion: The date when the Engineer confirms in writing that the Contractor has completed the work in accordance with the Construction Documents, including completion of all punch list items, cleanup work and delivery of all required guarantees, warranties, licenses, releases and other required deliverables.
- p. Furnish: To purchase, supply, and deliver to the project materials in new and operable condition, ready for installation.
- q. Governing Requirements: Collective term for regulations, laws, ordinances, codes, rules, standards, requirements, guidelines, and recommendations that govern the installation and inspection of the work defined in the Contract Documents.
- r. Governing Authority: Entities or their representatives charged with formation and/or enforcement of Governing Requirements, such as the Authority Having Jurisdiction (AHJ).
- s. Install: To place in final position in fully operable, tested condition.
- t. Inside Plant (ISP): Infrastructure within a building.
- u. Or Equal: Materials approved for use by the Engineer and which are dimensionally suitable and operationally identical to the specified item.
- v. Outside Plant (OSP): Infrastructure exterior to a building.
- w. Owner: The Owner and the Owner’s designated representative(s).
- x. The Project: The total construction of which the Work performed under the Contract Documents may be the whole or a part, and which may include construction by the Owner and/or separate Contractors.
- y. Provide: To furnish and install, complete, tested and ready for intended use.
- z. Rough-in: Provide the Communications Pathway System, including (but not limited to) device boxes, pull boxes, wall boxes, floor boxes, poke-through devices, conduit, enclosures,

cable tray, ducts/duct banks, maintenance holes, hand holes, and other pathways and items indicated (or as required) for routing, supporting, and installing communications cables, devices, or equipment which shall be provided by others or provided under a subsequent set of Contract Documents.

- aa. Substantial Completion: The date when all work required by the Construction Documents shall be complete (subject to the final punch list to be prepared by the Engineer) and on which the applicable jurisdictional authorities have issued a temporary certification of occupancy.
- bb. Section: An individual Section of the Specifications.
- cc. Shown on Drawings: Noted, indicated, scheduled, detailed, or any other written reference made on the Drawings.
- dd. Specifications: The portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the Work and performance of related services.
- ee. Specification Section(s): One or more Sections of the Specifications.
- ff. Section(s): An abbreviated form of Specification Section(s).
- gg. The Work: The construction and services required by the Contract Documents, whether completed or partially completed, and all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

2. Communications Systems

- a. Audiovisual System: Includes (but is not limited to) audiovisual cables, connectors, terminations and termination equipment, audiovisual equipment, equipment racks, equipment required for system configuration, programming and testing, and other incidental and miscellaneous product and labor as required.
- b. Communications Cabling System: Includes (but is not limited to) communications cables, connectors, terminations and termination equipment and panels, equipment racks and distribution equipment, equipment required for the build-out of communications rooms and spaces, cable support equipment not covered under Communications Pathway System including, but not limited to J-hooks/Straps, and other incidental and miscellaneous product and labor as required.
- c. Communications Infrastructure System: A Communications Cabling System in conjunction with a Communications Pathway System.
- d. Electrical for Communications Systems:
 - 1) Communications Pathway System: Includes (but is not limited to) device boxes, pull boxes, conduit, cable tray, duct/duct bank, and other pathway and raceway components necessary to provide pathway for, support, and route cables for Communications Systems. No bridal rings allowed.
 - 2) Telecommunications Grounding and Bonding System: Includes (but is not limited to) providing a permanent grounding and bonding infrastructure for the Communications Cabling System.
 - 3) Commonly referred to as Electrical Technology in the Division 27 Construction Documents.
- e. Low Voltage System(s): Includes (but is not limited to) low-voltage cables, connectors, terminations and termination equipment, equipment, equipment racks, equipment required for system configuration, and testing, and other incidental and miscellaneous product and labor as required.

1.05 ABBREVIATIONS

- A. Refer to the individual Specification Sections and Drawings for abbreviations and their definitions.

1.06 GOVERNING REQUIREMENTS

- A. All work shall be executed in compliance with the applicable portions of the following Governing Requirements:
1. Communication System Specific: The following portions of the General Governing Requirements above are particularly relevant to a given Communications System. Omission from this list does not alleviate the Contractor from responsibility for executing all Work for all Communications Systems in compliance with all applicable portions of the Governing Requirements above:
 - a. Audiovisual System:
 - 1) AV Design Reference Manual, 1st Edition
 - b. Communications Cabling System:
 - 1) ANSI/TIA:
 - a) ANSI/TIA-568-C.0 (September 2010) Generic Telecommunications Cabling for Customer Premises
 - b) TIA-568-C.0-1 (September 2010) Generic Telecommunications Cabling for Customer Premises- Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
 - c) ANSI/TIA-568-C.1(February2009)CommercialBuildingTelecommunications Cabling Standards
TIA-568-C.1-2 (November 2011) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
ANSI/TIA-568-C.2 (August 2009) Balance Twisted Pair Communications and Components Standards
ANSI/TIA-568-C.3 (June 2008) Optical Fiber Cabling Components Standard
ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
 - d) ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
 - e) ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
 - f) TIA-569-B (October 2004) Commercial Building Standard for Telecommunications Pathways and Spaces
 - g) TIA-569-B-1 (May 2009) Temperature and Humidity Requirements for Telecommunications Spaces
 - h) ANSI/TIA-606-B (June 2012) Administration Standard for Telecommunications Infrastructure
 - i) TIA-607-B (September 2011) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
 - j) TIA-758-A (August 2004) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
 - k) TIA-1152 (September 2009) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
 - l) ANSI/TIA-862-A (April 2011) Building Automation Systems Cabling Standard
 - m) TIA-1005-1 (March 2010) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
 - 2) ISO.IEC
 - a) ISO 11801 - Generic Cabling for Customer Premises
 - 3) National Electric Codes
 - a) National Electrical Safety Code (NESC) (IEEE C2-2012)

- b) National Electrical Code (NEC) (NFPA 70)
- 4) OSHA Standards and Regulations – all applicable
- 5) Local Codes
- 6) Standards – all applicable BICSI
- a) Telecommunications Distribution Methods Manual, 12th Edition
- 7) Information Transport Systems Installation Methods Manual (ITSIMM), 6th Edition
- 8) ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices
- 9) ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
- 10) NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
- 11) ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
- 12) AV Design Reference Manual, 1st Edition Network Design Reference Manual, 7th Edition
- 13) Outside Plant Design Reference Manual, 5th Edition Wireless Design Reference Manual, 3rd Edition
- 14) Anywhere cabling standards conflict with electrical or safety codes, Contractor shall defer To NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either
- 15) Knowledge and execution of applicable codes is the sole responsibility of the Contractor. Any code violations committed at the time of installation shall be remedied at the Contractor’s expense.
- c. Electrical for Communications Systems:
 - 1) TIA/EIA 569: Commercial Building Standard for Telecommunication Pathways and Spaces
 - 2) TIA/EIA 606: The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
 - 3) ANSI/NECA/BICSI 607: Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
 - 4) ANSI J-STD-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
 - 5) TIA/EIA 758: Customer-owned Outside Plant Telecommunications Cabling Standard
 - 6) ANSI/TIA 942: Telecommunications Infrastructure Standard for Data Centers
 - 7) TIA/EIA: Technical Service Bulletins (TSBs) (related to the above TIA/EIA standards)
 - 8) BICSI: Customer Owned Outside Plant Design Manual
 - 9) BICSI: Telecommunications Cabling Installation Manual
 - 10) BICSI: Telecommunications Distribution Methods Manual
 - 11) NFPA 70: NEC: National Electrical Code (NFPA Article 70)
 - 12) NFPA 75: Protection of Electronic Computer and Data Processing Equipment
 - 13) NFPA 78: Lightning Protection Code
 - 14) UL 467: Grounding and Bonding Equipment

- d. Low-Voltage System(s):
 - e. Public Address
2. Owner Specific: The Contractor shall comply with the following Owner requirements. These requirements shall be incorporated by reference into these Specifications and shall be hereinafter considered a Governing Requirement:
- a. AHJ
- B. Nothing in the Governing Requirements and Construction Documents shall be construed to permit work not conforming to all governing codes and regulations.
- C. Errors or omissions in the Construction Documents do not relieve the Contractor from executing the work in accordance with the Governing Requirements, including all governing codes and regulations.
- D. The applicable portions of the Governing Requirements shall be incorporated by reference into each related Specification Section in this Division.

1.07 PERMITS AND FEES

- A. The Contractor shall obtain and pay for all licenses, permits and inspections required by the laws, ordinances and rules governing work specified herein. Such fees shall be included in the bid amount.
- B. The Contractor shall pay all fees, including but not limited to fees for local utility service installation, connection charges, etc. Such fees shall be included in the bid amount.
- C. Notations on permit or review documents shall be observed. Additional requirements noted by the Governing Authority shall be made part of the requirements for construction of the Project. Additional costs for implementing these requirements, if any, shall be submitted for review prior to construction.
- D. Engineering Fees: The Specifications may identify work required of the Engineer due to improper action(s), lack of action(s), and/or deficiencies on the Contractor's part. Such instances will be identified in the Specifications and the Contractor shall be responsible for these fees if they are incurred by the Engineer.
- 1. Fees charged to the Contractor will be at the Engineer's billing rates at the time the services are performed. Travel time will be included, if applicable. Mileage will be charged for required automobile travel at the standard IRS mileage rate in effect at the time the services were performed. Expenses will be billed at cost plus 10 percent markup.
 - 2. Fees will either be paid directly to the Engineer or will be deducted directly from payments (or the final payment) to the Contractor.

1.08 SUBSTITUTIONS AND DEVIATIONS

- A. The requirements below expand upon and/or supplement the requirements in Division 1.
- B. Substitution of product and deviations from the methods of construction specified which are used in the Contractor's bid shall be at the sole risk of the Contractor, and as such are subject to rejection without consideration.
- C. Proposed substitution and deviation requests shall be reviewed during the time of Submittal review:
- 1. Conditions for Consideration: Substitution and deviation requests will be received and considered only when one or more of the following conditions are satisfied:
 - a. The specified product or method of construction cannot receive necessary approval by a Governing Authority, and the requested substitution can be approved.
 - b. The specified product or method of construction cannot be provided in a manner that is compatible with other materials.

- c. The specified product has been discontinued or recalled by manufacturer, or has become technologically obsolete. In such cases, the substituted equipment shall be of like manufacturer, make, and model as specified product when possible.
 - d. The manufacturer of specified product has ceased business practices.
2. Conditions for Rejection: Substitution and deviation requests will be rejected for the following reasons, among others:
- a. The conditions for consideration (see above) have not been met.
 - b. Extensive revisions to the Construction Documents are required to support the proposed changes.
 - c. The proposed changes do not comply with the general intent of the Construction Documents.
 - d. The substitution request is for product which does not include the statement, "Or Equal", or is specified as "no substitute", "substitutions are not acceptable", "provide as specified" or similar.
 - e. The substitution and deviation is not of equal or greater value as specified product or design.
 - f. The proposed change is solely for the convenience or economic gain of the Contractor.
- D. The Contractor shall not proceed with procurement or installation of a substitution or deviation without written approval.
- 1. Upon approval of the request, the Contractor shall be responsible for fees incurred by the Engineer for re-design work or modifications to the Construction Documents if necessitated by the nature of the request.

1.09 SUBMITTALS

- A. The requirements below expand upon and/or supplement the requirements in Division 1.
- B. General:
- 1. Submittal review is a courtesy extended to the Contractor for the limited purpose of checking for general conformance with the design concept and the information shown in the Construction Documents.
 - 2. Prior to submission of any product or methods of construction submittal items, submit a Submittal Schedule indicating items to be submitted with respective dates. Schedule shall allow the Engineer's possession of each submittal for a minimum of two week(s). Schedule shall clearly indicate submittal items that will contain a "Substitution and Deviation Requests" section (see below) including a statement indicating condition for consideration of such as listed under requirements of *Part 1 – General: Substitutions and Deviations* herein.
 - 3. The Contractor shall provide submittal information as soon as practicable after the date of Notice to Proceed and prior to the purchase, delivery, fabrication, and installation of product and materials.
 - 4. In the event of discrepancies or conflict between Submittals and the Construction Documents, either prior to or after review, the requirements of the Construction Documents shall prevail.
 - 5. Submission of material for review, regardless of the outcome of the review, does not alter the Contractor's obligation to follow the intent of the Construction Documents, nor the Contractor's responsibility to comply with the Construction Documents.
 - 6. Submittals will not be reviewed and will be returned to the Contractor without review for the following reasons:
 - a. Submittal package does not conform to the requirements listed herein.
 - b. Submittal is for a product or method of construction not required by the Construction Documents.
 - c. Submittal is partial or incomplete. For example, a submittal shall be considered partial or incomplete if Product Data is not accompanied by related Shop Drawings.

- d. Submittal contains information concerning the proposed implementation of means, methods, procedures, sequences or techniques, temporary aspects of the construction process, or other items, which are the sole responsibility of the Contractor.
 - e. Submittal was not carefully reviewed by the Contractor prior to submission, as evidenced by poor organization, obvious or numerous errors, lack of correlation or cross-referencing, lack of clarity in presentation, or containing Shop Drawings which do not meet the standard of the Construction Drawings.
 - f. Submittal was submitted directly from the Contractor's subcontractor(s) or vendor(s).
 - g. Subcontractor and/or vendor submittal information was not carefully reviewed and/or approved by the Contractor.
 - h. Submittal does not bear the Contractor's approval stamp, and/or contains subcontractor and/or vendor submittal information which does not bear the Contractor's approval stamp.
 - i. Submittal contains substitution and/or deviation requests, which are not clearly identified as substitution or deviation requests in a separate "Substitution and Deviation Requests" section of the Submittal.
- 7. Submittals shall be submitted as a single package and shall include subcontractor and vendor submittal information.
 - 8. Each submittal (or re-submittal) set shall bear a unique Contractor's submittal sequence number.
 - 9. Requests for substitution shall only be included under the "Substitution and Deviation Requests" section of the submittal (see below) and shall comply with the requirements of *Part 1 – General: Substitutions and Deviations* herein. Submission of substitution requests in any other portion of the Submittal does not constitute an acceptable or valid request for substitution, nor will review of such information constitute approval in any manner.

C. Submittal Format:

- 1. Submittals shall be bound in one letter-sized (8-1/2 inch by 11 inch) document and under separate cover from submittals furnished under other Divisions.
- 2. Front cover of Submittal shall indicate the name of the project, the project number, the name of the Owner, year of completion, the title "Telecommunications Submittals", and the names of the Engineer and Contractor, as well as the General Contractor.
- 3. Submittals shall include a table of contents identifying sections, Specification Sections, and page numbers.
- 4. Information provided in the submittal shall follow the same general order of the Specifications.
- 5. Submittals shall be sectionalized (Indexed with titled tab dividers (by section name – not numbered and not handwritten).
 - a. Sections shall be (see Submittal Sections below for more detail regarding each section):
 - 1) Product Data
 - 2) Shop Drawings
 - 3) Samples
 - 4) Substitution and Deviation Requests
 - 5) Test Reports
 - 6) Other Information
 - b. Within each section, information shall be organized by Specification Section and/or Drawing to which the information applies.
 - c. Within each section, where section is not applicable (e.g. shop drawings, technical drawings, etc.), the section shall include a page denoting same.
- 6. Pages shall be numbered.
- 7. Drawings (except for full and half-size Shop Drawings), if not in 8-1/2 inch by 11 inch size, shall be bound and accordion folded to 8-1/2 inch by 11 inch size.
- 8. Quantity: Submit copies in quantities per the requirements of Division 1.
- 9. Quantity: Submit 6 copies of the Submittal.

- D. Submittal Sections: Submittals shall be sectionalized and shall include sections for Product Data, Shop Drawings, Substitution and Deviation Requests, and Samples, Other Information (see Submittal Format herein).
1. Product Data: Submit Product Data information as called for in the individual Specification Sections. Product Data shall include:
 - a. For all product, provide the following product information (as applicable):
 - 1) Specification Section to which the product applies.
 - 2) Catalog cut sheets, manufacturer data sheets, and/or specification sheets detailing the product, item, assembly and installation.
 - 3) Manufacturer’s printed recommendations (if not included in the above).
 - 4) Written description.
 - 5) Notation of dimensions verified by field measurement.
 - 6) Notation of coordination requirements.
 - 7) Compliance with recognized trade association and testing agency standards.
 - 8) Highlighted details within the product data that identifies compliance with the Construction Documents or the intent of the Construction Documents.
 - 9) Highlighted details within the product data that identifies deviations from the Construction Documents or the intent of the Construction Documents.
 - b. For products for which the Contractor is proposing a substitution, include the product as specified in the Submittal per the above requirements and list the reference to the proposed substitution in the “Substitution and Deviation Requests” section of the Submittal (see below).
 - c. Do not provide product quantities – quantities are the sole responsibility of the Contractor and will not be reviewed.
 2. Shop Drawings: Submit Shop Drawings that are newly prepared, drawn to accurate scale, and that fully illustrate the Contractor’s understanding of the intent and requirements of the Construction Documents (i.e. Shop Drawings shall not be based upon or consist of a reproduction of the Construction Documents or standard printed data). Submit Shop Drawings as called for in the individual Specification Sections. Shop Drawings shall include:
 - a. Identification of products and materials
 - b. Schedules, including but not limited to:
 - 1) Equipment and components
 - 2) Cables: identify manufacturer, model number, outside diameter and connector
 - c. Notation of coordination requirements
 - d. Notation of dimensions established by field measurement
 - e. Notation of details that identify compliance with the Governing Requirements
 - f. Notation of details that identify compliance with the Construction Documents or the intent of the Construction Documents.
 - g. Notation of deviations from the Construction Documents or the intent of the Construction Documents. *Highlight, encircle, or otherwise clearly indicate such deviations*
 - h. Roughing-in and setting diagrams
 - i. Fabrication, installation, and adaptation details including, but not limited to:
 - 1) Electronic equipment to be mounted within racks
 - 2) Cable routing between electronic equipment in racks or housings
 - 3) Equipment to be mounted within furniture
 - 4) Wall and ceiling mounted devices
 - 5) System labels, including but not limited to engraved, lamacoid, silk screen and paper labels
 - 6) Suspended loudspeaker mounting, including but not limited to tilt angle, splay angle, height above finished floor, coverage pattern, and assembled weight

- 7) Non-standard manufactured or adapted equipment
 - 8) Dimensions
 - 9) Other details as necessary to establish the intent of the Construction Documents
- j. One-line diagrams detailing the interconnections of system components, including the identification of all devices, cabling, terminations, and termination techniques as required for fully functional systems
 - k. Applicable software block diagrams representing the internal operation of devices such as, but not limited to, control processors and digital signal processors
 - l. Templates
 - m. Floor plans identifying equipment locations, *if not shown on the Construction Documents*
 - n. Reflected ceiling plans identifying equipment locations, *if not shown on the Construction Documents*
 - o. Indication of sectionalized manufacturing of equipment (i.e. for oversized equipment that cannot be installed as a single component).
 - p. Shop drawings shall be provided in form, format and size identical to that of the Construction Drawings (the Construction Drawings set the standard). Shop Drawings that do not meet this standard shall be rejected without review.
 - 1) Title Block: May be the Contractor's Title Block, but shall indicate Project name, manufacturer's name and logo, date of submittal, content of sheet, and sheet number.
 - 2) Floor Plans: Plan titles, scales, north arrows, column lines, line types, fonts, and room names and numbers shall match that of the Construction Drawings.
 - q. For methods of construction for which the Contractor is proposing a deviation, include the method of construction as specified per the above requirements and list the reference to the proposed deviation in the "Substitution and Deviation Requests" section of the Submittal (see below).
3. Substitution and Deviation Requests: For each substitution and/or deviation request, include the following:
- a. Whether the request is for substitution of product or a deviation from a construction method.
 - b. The Specification Section(s) or Drawing to which the request applies.
 - c. Reason for the request. (Note: the reason must conform to the requirements of *Part I – General: Substitutions and Deviations* herein.)
 - d. If a substitution, provide:
 - 1) Specified product to which the proposed substitution applies.
 - 2) Product Data for the substituted product.
 - 3) Notation of differences between the proposed substitution and the specified item. *Highlight, encircle, or otherwise clearly indicate the substitution.*
 - e. If a deviation, provide:
 - 1) Specified Drawing and/or method of construction to which the proposed deviation applies.
 - 2) Shop Drawings showing the deviation.
 - 3) Notation of differences between the proposed deviation and the specified drawing and/or construction method. *Highlight, encircle, or otherwise clearly indicate the deviation.*
 - f. Written statement signed by the Contractor stating that the proposed substitution or deviation is equivalent or superior in function, appearance, and quality to the specified product or construction method and that the proposed substitution or deviation will be at no additional cost to the Owner.

4. Samples: Submit Samples as called for in the individual Specification Sections.
 - a. Samples shall be indexed in this section and provided as an attachment to the Submittal.
 5. Test Reports:
 - a. Submit full-size mock-ups of the test reports that will be used to document the testing.
 6. Other Information:
 - a. Contractor Statement of Qualifications, per Division 27 Specification Section *Contractor Qualifications*.
 - b. Bid Form or Bid Supplement Form, per Division 27 Specification Section *Bidding*.
 - c. Owner Specific: Submit other information as required by Owner Specific Governing Requirements.
 - d. Submit additional information as called for in the individual Specification Sections.
- E. Submittal review:
1. The submittal review will not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of work with other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor.
 2. Corrections or comments made on the Submittal by the reviewer during the submittal review do not relieve the Contractor from compliance with the requirements of the Construction Documents.
 3. Review of a specific item shall not indicate that the reviewer has reviewed the entire assembly of which the item is a component.
 4. Review does not relieve the Contractor from responsibility for errors, which may exist in the submitted data.
 5. Review of substitutions and deviations:
 - a. The reviewer shall not be responsible for review of substitutions and/or deviations that were not brought to the attention of the reviewer by specific inclusion of the substitution and/or deviation in the Substitution and Deviation Requests section of the Submittal.
 - b. Where a substitution and/or deviation is not included in the Substitution and Deviation Requests section of the Submittal, the procurement and installation of the substitution and/or deviation is at the sole risk of the Contractor.
 - c. If the reviewer does not specifically note substitutions and/or deviations, it remains the Contractor's responsibility to comply with the Construction Documents.
 6. After review, submittals shall be returned together with review comments and specific actions (if required) to be taken by the Contractor. Typical comments and actions will be:
 - a. No Exception Taken
 - b. Revise - Resubmittal Required
 - c. Revise - Resubmittal Not Required
 - d. Submit Specified Item
 - e. Rejected
 - f. Not Reviewed
 7. The Contractor shall perform no portion of the Work requiring a submittal until the respective submittal has been reviewed and approved. Such Work shall be in accordance with the approved submittal.
- F. Re-submission of submittals:
1. Submittals shall continue to be re-submitted and reviewed until all submitted items are marked by the Engineer as 'No Exceptions Taken' or 'Revise - Re-submittal Not Required'.
 2. Re-submittals shall be clearly identified as a re-submittal and shall identify changes on a separate Revisions page inserted after the Table of Contents page(s).

3. The Contractor shall be responsible for fees incurred by the Engineer resulting from subsequent review of re-submittals that fail to meet the requirements herein. Such fees will be incurred after the Engineer has reviewed the original submission and one re-submission.
4. Re-submittals do not entitle the Contractor to additional time, nor are they considered cause for delay of the project.

1.10 RECORD DOCUMENTS

- A. The requirements below expand upon and/or supplement the requirements in Division 1.
- B. The Contractor shall maintain a set of Record Documents showing all additions, changes, and deletions that have been made to the original Drawings and Specifications throughout the course of construction, as well as reviewed Submittal data, including but not limited to Shop Drawings.
 1. Items to be noted shall include but shall not be limited to:
 - a. Final device box, pull box, floor box, sleeve and conduit stub/ poke thru locations
 - b. Final locations, sizes, and dimensions of equipment, including concealed equipment
 - c. Routing of concealed raceways/pathways
 - d. Raceways/pathways located more than 2 feet from where shown on the original Construction Documents
 - e. Raceways and main pathways (pathways with more than 30 cables) not shown on the Drawings
 - f. Building outline changes
 - g. Addenda, accepted Alternates, Change Orders, other document revisions which occurred after the award of the Contract and/or the start of construction activities
 - h. System component labels (including outlet numbers) and identifiers for all major components
 - i. Shop Drawings, including those submitted for approval and those used for construction but not required for submission.
 2. Notations shall be in a neat, legible and logical manner. Areas affected by the change shall be clouded.
- C. Record Documents shall:
 1. Be kept current (i.e. no more than one week behind actual construction) throughout the course of construction.
 2. Be retained at the job site until Final Acceptance.
 3. Be made readily available at all times to the Owner's representative.
 4. Not be the Contractor's working documents.
 5. Be protected from deterioration and loss in a secure, fire-resistive location.
 6. Be made readily available to the Engineer for review of completeness and accuracy throughout the course of construction.
 7. At project closeout, be updated with the items on the Known Exceptions/Deviations List per the requirements of *Part 3 – Execution: Project Close-Out*, herein. Include only those items marked "Approved" by the Engineer.
- D. Submission:
 1. Handwritten notations on Record Drawings shall be CAD drafted by the Contractor for preparation of electronic Record Drawings prior to submission. Electronic Record Drawings shall be provided in form, format, size, and 2D or 3D CAD application and version identical to that used by Engineer in preparation of the Construction Drawings (the Construction Drawings set the standard). Electronic Record Drawings that do not meet this standard shall be rejected without review. Unless otherwise indicated, Contractor shall obtain electronic Construction Drawings CAD files from Engineer. Unless otherwise indicated, handwritten notations on Record Drawings and electronic Record Drawings shall be submitted to Engineer during Project Close-Out site visit.

2. Unless otherwise indicated, handwritten notations on Record Drawings shall be submitted to Engineer during Project Close-Out site visit.
 3. The Record Drawings shall be reviewed by the Contractor for accuracy and completeness prior to submission.
- E. Owner Specific:
1. Submit other information as required by Owner Specific Governing Requirements.
- F. Submit additional information as called for in the individual Specification Sections.

1.11 OPERATING AND MAINTENANCE (O&M) MANUALS

- A. General:
1. O&M Manuals shall be submitted in accordance with the applicable portions of Division 1.
 2. O&M Manuals shall be submitted as a single package and shall include subcontractor and vendor O&M information.
 3. O&M Manuals shall be prepared by personnel who are:
 - a. Completely familiar with the requirements of this Section
 - b. Trained and experienced in the maintenance and operation of the described products
 - c. Skilled as a technical writer to the extent required to communicate essential data
 - d. Skilled as a draftsman competent to prepare the necessary Drawings
 4. Catalog pages and data included in O&M Manuals shall be originals. Where not possible to obtain original copies in sufficient quantity, catalog pages and data shall be neat, clean copies of the originals.
 5. O&M Manuals shall include the following:
 - a. Table of Contents
 - b. Operations: Assemble operations and instructions data which shall include all procedures necessary for activating and controlling each system and/or component in all modes of operation and for fulfilling all functional requirements.
 - c. Product Data: Include the product data provided in the original Submittal(s) reflecting product as supplied and installed, as well as additional information such as manufacturer, installation, operation, routine maintenance information, and technical specifications.
 - d. Shop Drawings: Include the Shop Drawings provided in the original Submittal(s) reflecting the system and/or components as installed.
 - e. Service Information: Assemble service information (cleaning, adjustments, frequency, etc.) for each device requiring service. For devices requiring qualified service, compile an index of qualified service providers (and their contact information) able to service these devices. Provide a recommended maintenance schedule for each device.
 - f. Spare Parts: Assemble a list of spare parts. Compile an index of spare parts providers (and their contact information) able to provide the spare parts.
 - g. Tests Results: Assemble all test documentation made for each system, device, and/or component requiring testing.
 - h. Calibration/Configuration Settings: Assemble and document all calibration/configuration settings made for each system, device and/or component requiring calibration and/or configuration. Include 'normal' settings for each component.
 - i. Record Documents: Provide Record Documents per the requirements of *Part 1 – General: Record Documents* herein.
 - j. Final punchlist: Provide the final punchlist including all corrective action taken and Contractor initials per the requirements of *Part 3 – Execution: Project Close-Out*.
 - k. Certificates of Inspection: Provide certificates of inspection and final approval from all applicable Governing Authorities, the Manufacturer(s), the Contractor's RCDD, etc.
 - l. Warranty: Provide warranty documentation per the requirements of Division 27 Specification Section *Warranty* and the individual Specification Sections.
 - m. Software, including but not limited to:

- 1) All source code for custom programs. Source code shall be provided on CD-ROM.
 - 2) System software
 - 3) Computer system operating software
 - 4) Application software
 - 5) Version Documentation: Provide a spreadsheet in MS Excel format documenting all software and firmware versions for all programmable devices. Provide in both printed format and on CD-ROM.
- n. Other Information:
- 1) Submit additional information as called for in the individual Specification Sections.
 - 2) Owner Specific: Submit other information as required by Owner Specific Governing Requirements.
6. O&M Manual contents shall also be submitted in both hard copy and soft copy on CD-ROM.
- B. O&M Manual format:
1. O&M Manuals shall be bound in one letter-sized (8-1/2 inch by 11 inch) hard cover (hard back or loose leaf) binder.
 2. Separate O&M Manuals shall be provided for each Communication System (i.e. Communications Cabling, Audiovisual, Security, etc.)
 3. Front cover of the O&M Manual shall indicate the name of the project, the project number, the name of the Owner, the title of the O&M Manual indicating the communications system (Communications Cabling System O&M Manual, Audiovisual System O&M Manual, Security System O&M Manual, etc.), the year of completion, the name of the Engineer, the name of the Contractor, and as applicable the names of the Architect and the General Contractor.
 4. Side cover of the O&M Manual shall indicate the name of the project, the project number, the name of the Owner, and the title of the O&M Manual.
 5. O&M Manual shall include each section defined under *O&M Manual Requirements* above.
 6. O&M Manuals shall include tab dividers, titled (not numbered) for each section. Tab dividers shall not be handwritten.
 7. O&M Manuals shall include a table of contents identifying sections and page numbers.
 8. Pages within each section shall be numbered.
 9. Drawings (excluding full size Record Drawings) shall be bound and accordion folded to 8-1/2 inch by 11 inch size. Also be provided as CAD files.
- C. O&M Manual submission:
1. The Contractor shall submit one draft copy of the O&M Manual for review and approval by the Engineer.
 - a. The submission will be reviewed for accuracy, completeness, and compliance to the requirements herein. A submission which fails to meet these requirements will be rejected and returned to the Contractor together with review comments and specific actions to be taken by the Contractor. The Contractor shall revise the O&M Manual and re-submit for review and approval.
 - b. The O&M Manual shall continue to be re-submitted and reviewed until such time as the O&M Manual is approved by the Engineer.
 - c. The Contractor shall be responsible for fees incurred by the Engineer resulting from subsequent review of O&M Manuals that fail to meet the requirements herein. Such fees will be incurred after the Engineer has reviewed the original submission and one re-submission.
 2. Upon approval of the draft copy, the Contractor shall submit 3 final copies of the O&M Manual.
- D. Final payment to the Contractor will not be authorized until the final copies of the O&M Manuals (including Record Documents) have been received and approved by the Engineer.

PART 2 - MATERIALS

2.01 GENERAL

- A. Where one or more products are listed for a specified component:
 - 1. The product listed first shall establish size, capacity, grade, quality, technical specifications, and the basis of design.
 - 2. Products not listed first shall be considered “other acceptable” products. Should the Contractor choose to use those products, costs for changes to the construction required to support the use of these products shall be borne by the Contractor.
- B. If no product is listed, then any manufacturer able to meet the listed Specifications is acceptable.
- C. The Contractor is responsible for providing submittals for product as indicated and shall comply with the requirements of *Part 1 – Submittals* herein. Substitutions shall comply with the requirements of *Part 1 – General: Substitutions and Deviations* herein.
- D. Unless otherwise indicated, where product is specified without the statement “or equal”, substitutions will not be considered.

2.02 MATERIALS

- A. The Contractor is responsible for providing all incidental and/or miscellaneous tools, scaffolding, consumable items, testing equipment appliances, and other hardware not explicitly specified or shown on the Drawings required for the installation of a complete and operable systems ready for the Owner’s use.
- B. Products shall be:
 - 1. New and unused, free from blemish and defects.
 - 2. Standard products of manufacturers regularly engaged in the production of such products.
 - 3. Of the manufacturers latest standard design at the time of procurement,
 - 4. Designed to ensure satisfactory operation and life in the environmental conditions that prevail in their installation location.
 - 5. Designed for application in commercial/professional systems, except as otherwise specifically noted.
- C. All products, whether stock or custom, shall be supported by replacement parts and manufacturer schematic drawings as applicable. “Black box” and/or unidentified components are not acceptable.
- D. All products of the same or similar type shall be the product of one manufacturer.
- E. All component products within a unified system shall be the product of one manufacturer.
- F. Equipment shall be UL listed, or equivalent.

2.03 DELIVERY, STORAGE, AND HANDLING

- A. Prior to ordering and delivery of equipment, the Contractor shall:
 - 1. Verify that the equipment shall adequately pass through building openings and passageways with unobstructed access to the final equipment location. When building openings and passageways will not permit the equipment to pass through unobstructed, equipment shall be manufactured and shipped in sections for final assembly at the equipment location.
 - 2. Verify that the equipment shall properly fit the space allocated, that required clearances can be maintained, and that the equipment can be located without interference from other systems, structural elements, or the work of other trades.

- B. The Contractor shall arrange deliveries in accordance with the construction schedule. Deliveries shall be scheduled to maintain the progress of work, to avoid conflict with the work of other Trades, and to accommodate site conditions.
 - 1. The Contractor shall be responsible for coordinating and scheduling the timely delivery of products and materials indicated to be furnished by others or by the Owner.
- C. Deliver, store and handle products and materials in full compliance with the manufacturer’s recommendations and/or instructions, using means and methods that will prevent damage, deterioration, and loss (including theft).
- D. The Contractor shall protect products and materials until Final Acceptance. Such protection is the sole responsibility of the Contractor, and the Contractor shall be responsible for replacing damaged, deteriorated, stolen or lost product at no additional cost to the Owner.
 - 1. Where products and materials are indicated to be furnished by others or by the Owner, the Contractor shall make a complete and careful check of all materials delivered. The Contractor shall provide a written and signed receipt acknowledging acceptance of the delivery and the condition of the materials delivered. After receipt, the Contractor shall assume full responsibility for the materials.
- E. Products and materials subject to damage by the elements shall be stored above ground, under cover, in a weather tight enclosure, with ventilation adequate to prevent condensation. Temperature and humidity shall be maintained within the manufacturer’s recommendations.
- F. The Contractor shall make provisions for receiving and storing products and materials, including products and materials to be furnished by the Owner (or by others) to be installed by the Contractor as part of the work.
- G. Products and materials shall be carefully inspected for damage upon delivery. Defective or damaged products and materials shall be marked ‘Rejected’, removed from the site, and shall not be installed.
- H. Products and materials shall be delivered to the site in the manufacturer’s original containers, complete with labels and instructions for the proper handling, storage, unpacking, protection and installation.
- I. The Contractor shall ensure that products and materials to be installed are not temporarily used as steps, ladders, platforms, scaffolds, or for storage by the Contractor or by other trades during the construction process. Materials found to be used in such a manner will be considered “damaged”, shall not be installed, and shall be replaced at no additional cost to the Owner.
- J. The Contractor is responsible for providing storage on the grounds of the project. As a minimum, water tight, lockable container capable of storing a two week supply of materials plus all of the Contractor's equipment is acceptable.
- K. Outside portable storage units will need DPS approval prior to placement. The Contractor must remove any graffiti on Contractor’s equipment immediately.

PART 3 - EXECUTION

3.01 GENERAL

- A. Work shall comply with the latest edition of applicable portions of the Governing Requirements in effect at the time of construction, including all addenda, errata, annexes, and technical service bulletins (TSBs), etc., except where a specific edition is otherwise indicated, or where otherwise mandated by a Governing Authority. Where the specific edition is indicated for a Governing Requirement that is not mandated by a Governing Authority, and a later edition is available for such Governing Requirement at the time of construction, the more stringent applicable provisions of both the latest and specifically indicated editions of such Governing Requirement shall prevail.

- B. In the event of a conflict between a code and the other Governing Requirements, or between a code and a requirement of the Construction Documents, the code requirement shall govern. However, if the non-code requirement (or portion thereof) exceeds that of the code, and is furthermore not contrary to the code, the non-code requirement (or portion thereof) shall prevail.
- C. Installation shall be performed by workers skilled in the trade, familiar with the particular techniques and methods of construction applicable to the work of the trade.
- D. Completed work shall present a neat and professionally installed appearance. The appearance of the work shall be of equal importance to its operation. Failure to present a neat and professionally installed appearance shall be considered sufficient reason for rejection of the system in part or in whole.
- E. Completed work shall demonstrate quality workmanship. Quality workmanship shall be of equal importance to its operation. Failure to demonstrate quality workmanship shall be considered sufficient reason for rejection of the system in part or in whole.
- F. In the event that supplemental information is required to confirm the intent of the Construction Documents, the Contractor shall notify the Engineer and await the Engineer's response prior to procurement of materials and performance of the related work. Procurement of materials and work performed without such interpretation and/or clarification is at the sole risk of the Contractor, and as such, the Contractor shall correct such work at no additional cost to the Owner should the materials or work not conform to the intent of the Construction Documents.
- G. The Contractor shall order and install materials and equipment with long lead times and/or those having a major impact on work by other trades so as not to jeopardize the project or project schedule.
- H. The Contractor is responsible for ensuring that each installed component's performance is within the Manufacturer's published specifications, the Governing Requirements, and all other requirements as specified within this Division.
- I. The Contractor is solely responsible for the safety of the public and workers in accordance with all applicable rules, regulations, building codes and ordinances, and Governing Requirements, including but not limited to employee training and Safety Program development, documentation and execution.
- J. Notwithstanding any other provisions of the Contract Documents, the Contractor shall be solely responsible for location and protecting any and all utility service lines (both Owner controlled and Public) in the work area.

3.02 IDENTIFICATION

- A. All Contractor personnel shall be clearly identified by uniform and/or company badge with photo ID, employee's name, and company name. Contractor vehicles shall be equipped with signs on both sides of vehicle identifying the Contractor's company name.
- B. The Contractor may also be issued and required to wear Owner provided Contractor ID's for the duration of the project (coordinate this requirement with the Owner prior to any on site work). Such identification will be for the purposes of entry into card access controlled locations and/or identification of authorized Contractor personnel. All Owner provided Contractor ID's shall be returned to the Owner prior Final Acceptance. The Work will not be considered complete until all ID's are returned.

3.03 SUPERVISION

- A. The Contractor shall appoint a Project Manager who will be the single point of contact for all work accomplished under this Project and will be vested by the Contractor with the authority to make decisions on behalf of the Contractor.
 - 1. The Project Manager will be responsible to represent the Contractor and coordinate all aspects of this Project, including but not limited to:
 - a. Overall and specific project responsibility

- b. Thorough knowledge of Project Specifications and Drawings
 - c. Creation and maintenance of a project schedule, including milestones, task definitions and resource allocations
 - d. Attendance at all Project Management meetings
 - e. Supervision and direction of all Contractor personnel
 - f. Documentation, including submittals and change orders
 - g. Quality assurance of Project
2. The Project Manager initially assigned to the Project shall be assigned to the Project for the duration of the Project. Once assigned by the Contractor, the Project Manager shall not be changed by the Contractor without Engineer and Owner approval.
- B. The Contractor shall assign a qualified Foreman to the Project and shall keep the Foreman on site and in charge of the work at all times. The Foreman shall be equipped with a mobile phone during project working hours.
1. The Foreman initially assigned to the Project shall be assigned to the Project for the duration of the Project. Once assigned by the Contractor, the Foreman shall not be changed by the Contractor without Engineer and Owner approval.

3.04 PERMITS AND FEES

- A. The Contractor shall make arrangements to obtain and pay for necessary permits, licenses, and inspections.
- B. No work shall be started prior to obtaining necessary permits and payment of required fees. Work installed prior to obtaining proper permits shall, if required by the Governing Authority (AHJ), be redone in compliance with requirements at no additional cost to the Owner.

3.05 INSTALLATION

- A. Schedule
1. For individual projects, Denver Public Schools and/or its designees will have compiled a project schedule. This schedule will be provided at the biweekly Project Managers Meeting. Each Contractor shall be responsible for reviewing the schedule and determining the necessary personnel to ensure timely task completion.
2. Denver Public Schools and/or its designees may find it necessary to reduce (shorten) the schedule or lengthen the schedule of the initial allotted time. DPS shall not incur any additional cost should the schedule change. Any changes to the schedule shall be handled individually, with the concurrence of all parties.
- B. The Contractor shall notify the Engineer and wait for direction/instruction prior to proceeding with procurement and installation for any portion of the Work which could be affected by the following:
1. Required items and/or details have been omitted from the Construction Documents.
2. Discrepancies or conflicts exist between the requirements of the Drawings and the Specifications, between the Governing Requirements and the Construction Documents, and/or between the various Governing Requirements.
3. Discrepancies or conflicts between the requirements of this Division and those of Division 1.
- C. Dimensions and clearances:
1. Equipment dimensions and dimensions indicated for the installation of equipment are restrictive dimensions. Verify that the equipment will fit within the indicated locations and spaces.
2. Maintain, at a minimum, code required clearances.
3. Promptly notify the Engineer of any potential dimension or clearance conflicts, and await the Engineer's direction prior to purchase and rough-in of the equipment.

4. The Contractor shall field verify all dimensions prior to installation. Field verifications shall include, but not be limited to, installing measuring tape in backbone pathways and reporting lengths to Materials Contractor.
- D. Access:
1. Install equipment such that it is readily accessible for operation and maintenance.
 2. Access to equipment shall not be blocked or concealed by conduits, supporting devices, boxes, or other items.
 3. Do not install equipment such that it interferes with the normal operation or maintenance requirements of other equipment.
- E. Equipment shall be installed level, plumb, parallel, and perpendicular to building structures and to other building systems and components, except where otherwise indicated.
- F. Seismic Bracing: Equipment shall be seismically braced as required by the governing requirements. Bracing shall be rigid – non-rigid bracing (chains, cables, etc.) is not acceptable, unless otherwise recommended by the manufacturer and approved or specified by the governing requirements. Seismic bracing hardware shall be provided by the manufacturer, or shall be approved or recommended by the manufacturer. Where no manufacturer hardware, approval, or recommendation is available, the seismic assembly shall be approved by a licensed structural engineer.
- G. Equipment shall be securely fastened. Select fasteners so that the load applied to any one fastener does not exceed 25 percent of the proof-test load.
- H. Place equipment labels and/or other identification where the label and/or identification can be easily seen and read without difficulty.
- I. Grounding/Bonding: Bond all non-current carrying raceway to the nearest TGB.
- J. Attachment of hanger rods, support cables, diagonal wall bracing, and any other connections made to the building structure after the application of fireproofing/fire stopping materials, shall be made with minimal impact to the fireproofing/fire stopping materials. The Contractor making such connections shall remove only as much fireproofing/fire stopping as required for the attachment, and for scoring and over-cut only as required for the connection. The Contractor shall be held responsible for costs associated with patching of excessively removed fireproofing/fire stopping material.
- K. Cables, conduits, and other raceway shall be firmly secured and cleaned where penetrating fire rated barriers.

3.06 DRAWINGS

- A. Drawings shall not be scaled for rough-in measurements or equipment locations. DoTs marks locations for all devices to include, but not limited to WAPs, communications outlets and paging devices.
- B. Unless specifically dimensioned or detailed, Drawings indicate approximate locations, arrangement, and general character. To avoid interference with structural members and equipment of other trades, or for the convenience of the Owner, it may be necessary to adjust the locations shown on the Drawings prior to installation. Unless specifically dimensioned or detailed, and with the exception of locations of equipment and raceway in specialized communications rooms and spaces (such as Telecommunications Rooms, Data Centers, etc.), the Contractor may make minor location adjustments without obtaining the Engineer's prior approval. All other adjustments require prior approval from DoTs PM.
1. Minor adjustments are defined as distances not to exceed:
 - a. 1 foot at grade, floor ceiling, and roof level in any direction in the horizontal plane
 - b. 1 foot on walls in a horizontal direction within the vertical plane.

2. Particular attention shall be paid to door swings, piping, ductwork, structural steel, and other ceiling conflicts:
 - a. In general, waste and vent lines, large pipe mains, and ductwork shall be given priority for the locations and spaces shown.
 - b. In general, electrical lighting fixtures shall be given priority for ceiling space.
3. Where minor location adjustments are required, such adjustments shall be made at no additional cost to the Owner.

3.07 ASBESTOS, LEAD, OR OTHER HAZARDOUS MATERIALS

- A. In the event the Contractor encounters suspected asbestos, lead, or other hazardous materials, the Contractor shall immediately stop work in the area affected and report the condition to the Owner verbally followed by written notice. Work in the affected area shall not be resumed except by written agreement between the Owner and the Contractor.

3.08 RESTORATION

- A. The Contractor shall restore all floors, ceilings, walls, furniture, grounds, pavement, etc. affected or damaged by the Contractor's work. All such areas shall be restored to original condition at no additional cost to the Owner.
- B. The Contractor shall restore to original finish all new products, materials, and equipment scratched, chipped, or otherwise marred by the Contractor.
- C. Restoration in every instance consists of completing the work to match and blend with the adjoining existing work insofar as methods, materials, colors, and workmanship are concerned.
- D. Restoration work shall be performed by workers qualified and skilled in the trades involved.
- E. Where restoration work requires painting: Painting shall consist of cleaning, surface preparation, painting (primer, intermediate, and finish) and finishing surfaces, for items both new and existing, affected by the work of the Contractor. Surface painting shall match and blend with existing adjoining surfaces. The areas around penetrations, once sealed, shall be painted.
- F. The Contractor shall be responsible for replacing improperly matched, blended, or poorly constructed restorative work at no additional cost to the Owner.

3.09 HOUSEKEEPING

- A. During the course of construction:
 1. The Contractor shall keep the building, premises and surrounding area free from accumulated surplus, waste materials and rubbish at all times.
 2. At the conclusion of each work shift, remove empty boxes, crates, surplus and waste materials, and other debris, and sweep clean all work areas affected by the Contractor's work.
 3. In occupied areas affected by the Contractor's work, the Contractor shall remove all evidence of the Contractor's work in those areas at the end of each work shift, including tools, equipment and scaffolding, leaving the area clean, unobstructed and fully useable by the occupants.
- B. At project completion, and prior to Final Acceptance:
 1. Remove all tools, equipment and scaffolding.
 2. Remove temporary labels and adhesives.
 3. Thoroughly vacuum the interior of enclosures to remove debris.
 4. Clear surplus product, materials and debris from the job site.
 5. Turn over equipment to the Owner in unblemished condition.

- 6. Thoroughly clean equipment and facilities inside and out, and remove all residue -- all areas affected by the Work shall be cleaned.
 - 7. Turn over the Work to the Owner in a fully operational state.
- C. All final cleanup work shall be performed by professional cleaners qualified and skilled in the trade. The Contractor shall not make use of unqualified personnel for cleanup work.
 - D. The Project shall not be considered complete until all area affected by the Work are left in a clean, neat, orderly, and fully operable condition.

3.10 SUBSTANTIAL COMPLETION

- A. Due to the technical nature of the Work, as well as the requirement that certain Owner provided equipment, systems, and training may necessitate use of the Work by the Owner prior to Substantial Completion, the Owner reserves the right to use the Work prior to Substantial Completion (when ready for use) without obligation to the Contractor and without implying Acceptance of the Work.
- B. Pre-Substantial Completion Submittal: Three weeks prior to Substantial Completion, the Contractor shall prepare and submit the following:
 - 1. Known Exceptions/Deviations List:
 - a. The Contractor shall compile a thorough list of known exceptions/deviations (in materials, construction, and/or workmanship) from that specified in the Contract Documents, and for which there was not associated documentation in the form of Change Orders (CO), Construction Change Directives (CCD), Architects Supplemental Instructions (ASI), or responses to a Request for Information (RFI).
 - b. The Contractor shall submit the list to the Engineer for review. The Engineer shall review each item and mark as either Accepted or Not Approved.
 - 1) Items marked “Not Approved” shall be corrected by the Contractor to conform with the intent of the Contract Documents at no additional cost to the Owner.
 - 2) The Contractor shall perform corrective action for “Not Approved” items prior to notifying the Engineer that the work is Substantially Complete.
 - 2. Other information as called for in the individual Specification Sections.
 - 3. Owner Specific: Submit other information as required by Owner Specific Governing Requirements.
 - 4. [click here and type]
- C. Notice of Substantial Completion: When the Work nears Substantial Completion, the Contractor shall notify the Engineer in writing the date that the work will be Substantially Complete and ready for review by the Engineer.

3.11 PROJECT CLOSE-OUT

- A. Punchlist:
 - 1. Once notice of Substantial Completion is received, the Engineer shall visit the site to review the Work, and shall prepare a punchlist of items determined to be incomplete, deficient or otherwise not in compliance with the intent of the Contract Documents.
 - a. During the review of the Work, if the Engineer finds that the Known Exceptions/Deviations List provided by the Contractor was insufficiently thorough, that the Work is not Substantially Complete, or that deficiencies in the work are excessive, the Engineer will cease review and inform the Contractor that the work is not Substantially Complete. The Contractor shall be responsible for fees incurred by the Engineer for this partial review.

2. The Contractor shall perform corrective action for each item noted in the punchlist. When complete, the Contractor shall submit the original punchlist with each item initialed attesting to the fact that the item was corrected.
 - a. If necessary, the Engineer will perform a subsequent review after receipt of the Contractor initialed punchlist.
 3. Should additional reviews beyond the original punchlist review be required of the Engineer due to the Contractor's failure to correct all incomplete, deficient, or non-compliant work, the Contractor shall be responsible for fees incurred by the Engineer for the additional reviews.
- B. Acceptance Testing
1. Once the punch list items have been corrected, the Engineer shall visit the site to review the fully functioning and operating system and shall prepare an acceptance testing punchlist of items determined to be incomplete, deficient or otherwise not in compliance with the intent of the Contract Documents.
 - a. During the review, the Engineer finds that the Known Exceptions/Deviations List provided by the Contractor was insufficiently thorough, that the Work is not Substantially Complete, or that deficiencies in the work are excessive, the Engineer will cease review and inform the Contractor that the work is not Substantially Complete. The Contractor shall be responsible for fees incurred by the Engineer for this partial review.
 2. The Contractor shall perform corrective action for each item noted in the acceptance testing punchlist. When complete, the Contractor shall submit the original acceptance testing punchlist with each item initialed attesting to the fact that the item was corrected.
 - a. If necessary, the Engineer will perform a subsequent review after receipt of the Contractor initialed acceptance testing punchlist.
 3. Should additional reviews beyond the original acceptance testing punchlist review be required of the Engineer due to the Contractor's failure to correct all incomplete, deficient, or non-compliant work, the Contractor shall be responsible for fees incurred by the Engineer for the additional reviews.
- C. Provide O&M Manuals per the requirements of *Part 1 – General: Operating & Maintenance (O&M) Manuals* herein.

END OF SECTION 27 00 10