

ADDENDUM

ADDENDUM NUMBER: 1

TO THE DRAWINGS AND SPECIFICATIONS FOR:

St Cloud HRA
Grace McDowall Apartments Boiler & AHU Replacement
St Cloud, Minnesota

ARCHITECT'S PROJECT NUMBER: 2226

ENGINEER'S PROJECT NUMBER: 2022-175

DATE OF ADDENDUM: January 20, 2023

This addendum forms a part of the contract documents dated January 13, 2023, and modifies the original specifications and drawings as noted below. This addendum shall apply to any and all contracts and subcontracts. Bidders shall acknowledge receipt of the addendum on the Bid Proposal Form.

SPECIFICATION CHANGES AND ADDITIONS

1. Division 23 Specifications Index is revised as attached to this addendum to add Division 21 Fire Protection Sprinkler Work.
2. Specifications Section 21 01 00—General Provisions is added by this addendum.
3. Specifications Section 21 13 00—Fire Protection is added by this addendum.
4. Section 23 09 00—AUTOMATIC TEMPERATURE CONTROL
 - A. Article 3.03- BOILERS, B1 & B2 AND PUMPS, P1 & P2 and existing secondary pumps: Add the following paragraph:
 - F. *Glycol Fill Tank Low Water Alarm: Wire through low water/fluid alarm tank to initiate an alarm through the BAS upon a low fluid condition in the tank.*
5. SECTION 23 21 00—HYDRONIC PIPING SYSTEMS: Add the following Articles:
 - 2.05 **GLYCOL FEEDER**
 - A. *Provide Xylem or approved equal by Neptune, Axium or Wessels.*
 - B. *Provide feeder for each hydronic system. Note that the feeder will be part of the hydronic hot water system.*
 - C. *Feeder shall be 55-gallon storage/mixing tank with cover, pump suction hose and inlet strainer, pressure pump with thermal cut-out, integral pressure switch, integral check valve, cord and plug, pre-charged accumulator tank with EPDM diaphragm, manual divertor valve for purging air and agitating contents of storage tank, pressure regulating valve adjustable from 5-55 psig complete with pressure gauge, union and low-level cut-out.*
 - D. *Unit shall be completely pre-assembled and certified by a recognized testing Agency (CSA or ETL).*
 - E. *Provide low level alarm panel with remote monitoring dry contacts and selectable audible alarm.*

3.08 GLYCOL FEEDER

- A. *Install in accordance with manufacturer's recommendations.*
 - B. *Feeder shall only be used after initial charge of system when air has been bled from the system.*
 - C. *Drain some system fluid and test proper operation and percent glycol of the system.*
 - D. *Adjust pressure reducing valve to maintain proper system pressure and to achieve an auto fill upon a decrease in system pressure.*
 - E. *Install alarm panel and test for proper operation.*
 - F. *Fill feeder tank 2/3 full as recommended by the manufacturer.*
6. Division 26 Specifications Index is revised as attached to this addendum.
7. Specifications Section 28 05 00 - General Electronic Safety and Security Technology Requirements is added by this addendum.
8. Specifications Section 28 30 00 - Fire Alarm System is added by this addendum.

DRAWING CHANGES AND ADDITIONS

No Drawing Changes

ACCEPTABLE MANUFACTURERS

The following listed manufacturers of materials, equipment or systems are approved in name only. They are subject to final approval of the specific product, and conformance with the contract documents and the physical limitations of the project.

Section	Item	Manufacturer
23 2100	Air Separator	Taco

End of Addendum

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MECHANICAL SPECIFICATIONS INDEX

FIRE PROTECTIONⁱ

- 21 01 00 *FIRE PROTECTION GENERAL PROVISIONSⁱⁱ*
- 21 13 00 *FIRE PROTECTIONⁱⁱⁱ*

HEATING, VENTILATING AND AIR CONDITIONING

- 23 01 00 HVAC GENERAL PROVISIONS
- 23 05 00 HVAC BASIC PRODUCTS AND METHODS
- 23 05 40 MECHANICAL SOUND AND VIBRATION CONTROL
- 23 05 90 TESTING, ADJUSTING AND BALANCING
- 23 07 00 HVAC SYSTEMS INSULATION
- 23 08 00 HVAC SYSTEMS COMMISSIONING
- 23 09 00 AUTOMATIC TEMPERATURE CONTROL
- 23 11 20 NATURAL GAS PIPING SYSTEMS
- 23 21 00 HYDRONIC PIPING SYSTEMS
- 23 21 20 HYDRONIC SYSTEMS EQUIPMENT
- 23 31 00 AIR DISTRIBUTION DUCT SYSTEM
- 23 31 90 DUCTWORK CLEANING
- 23 34 00 AIR DISTRIBUTION EQUIPMENT
- 23 62 10 AIR COOLED CONDENSING UNITS

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SECTION 21 01 00ⁱ

FIRE PROTECTION GENERAL PROVISIONS

PART 1 REFERENCE

1.01 GENERAL

- A. Division 00 Conditions of the Contract and Division 01 General Requirements are hereby made a part of this division.
- B. All reference to Fire Protection Work or Division 21 in other Divisions are hereby made a part of this division.
- C. Division 21 work shall include all Fire Protection work referenced in other Divisions of the work unless explicitly indicated otherwise.
- D. If any statements contained in Division 21 should conflict with the conditions of the contract or the General Requirements, the statement requiring the greater quantity, superior quality, or condition most favorable to the owner shall take precedence.
- E. If any statements contained in Division 21 conflict within the other Divisions of the work, the statement requiring the greater quantity, superior quality, or condition most favorable to the owner shall take precedence.
- F. Where words fire protection contract(s), fire protection contractor, fire protection, fire protection work, sprinkler contractor, sprinkler contract, sprinkler or sprinkler work appear in contract documents, that shall be taken to mean or refer to contracts or subcontracts for plumbing work required as scope of Division 21 work.
- G. Contract drawings show arrangements and sizes of principal apparatus and devices to be provided under this contract and connections thereto. These shall be followed as closely as actual building construction will permit.
- H. Drawings are diagrammatic and are a graphic representation of contract requirements, produced according to best available standards to an optimum scale. Dimensions of work as indicated on plans are not guaranteed to be as-built dimensions. No measurements shall be scaled from drawings and used as a definite dimension for layout or fitting work in place.
- I. Dimensions and ratings of equipment herein specified or indicated on drawings are indicated to establish desired outlines and characteristics of such equipment. Minor deviations will be permitted to allow manufactures specified to bid on their nearest stock equipment providing that substituted equipment equals or exceeds the basic performance conditions indicated. Contractor making substitution shall pay any increments costs incurred; contractor shall bear all costs of modifying substituted product to fit conditions shown or modifying building or other systems to receive product.
- J. The mechanical reference symbols used on the drawings refer to the symbol sheets on the drawings or bound herein. These symbols shall designate materials, type, line descriptions and valve types for use on this project.
- K. Give careful consideration to work by all contractors on the job and organize the work so that it will not interfere with work of other trades. Consult the drawings and specifications for work to be provided by other trades for correlating information, and the architectural

and structural drawings for details, dimensions, foundations, pits, etc. The contractor shall verify all dimensions and conditions before starting their work.

- L. Manufactured material hereinafter specified or shown on drawings shall be installed or applied according to manufacturers' directions unless specifically designated otherwise.
- M. Provide shall be defined as furnish and install. Therefore, where documents call for this division of the work to provide a certain item, this contractor shall be responsible for furnishing and installing that item.

1.02 WORK INCLUDED

- A. Work includes furnishing all labor, material, equipment, service and the completion of details not mentioned or shown which are necessary for and reasonable incidental to successful operation of all mechanical systems as shown on drawings and as specified, except as such items as are specifically noted as being furnished under other sections of specifications.
- B. Drawings and specifications are to be considered as supplementing each other. Work specified but not shown, or shown but not specified, shall be performed or furnished as though mentioned in both specifications and drawings.
- C. Minor items, accessories or devices reasonably inferable as necessary for completion and proper operation of any system shall be provided by contractor or subcontractor for such system whether or not specifically called for by specifications or drawings.
- D. The only fire protection work not included shall be those items explicitly indicated otherwise.
- E. Layout of equipment as shown on drawings shall be checked and exact locations determined from dimensions or equipment approved by engineer. Adequate space for operation and maintenance shall be maintained.

1.03 EXAMINATION OF DOCUMENTS

- A. Carefully read the project drawings and project specifications before submitting bid on the work to be done. Any doubt as to the true meaning of any part of the project specifications or other proposed contract documents shall be submitted in writing to the engineer for an interpretation thereof.
- B. The person submitting the request will be responsible for its prompt delivery.
- C. Interpretation of the proposed contract documents will be made only in writing duly issued, a copy of which will be mailed or delivered to each bidder receiving a copy of the project drawings and project manual and to such other prospective bidders as have requested they be furnished with a copy of each.

1.05 SUBSTITUTE MATERIAL

- A. Requirements Division 0 Conditions of the Contract and Division I General Requirements apply to this article.
- B. If contractors wish to use item of equipment and/or materials other than those named in specification, apply in writing to the architect/engineer for approval of substitution prior to opening of bids, submitting with request for approval complete, descriptive and technical

data on the items or item proposed to be furnished. Prior approval period shall be as indicated in the General Conditions.

- C. System design is based on first manufacturer mentioned. Additional listed manufacturers may be used in the base bid provided that this division of the work assumes responsibility for correct size and capacity, space limitations, plumbing and electrical deviations. This responsibility to include any redesign of the structure, foundations, utilities, piping, wiring or any other part of the structural, mechanical, sanitary or electrical work. The cost of all such redesign, drawings, detailing and accompanying additional costs of any such items of the work, shall be paid by this section of the work and such redesign shall be subject to the approval of the engineer.

1.06 GUARANTEES

- A. Requirements of Division 00 Conditions of the Contract and Division 01 General Requirements apply to this article.
- B. This contractor is responsible for any defects which may develop in any part of the mechanical systems, caused by faulty workmanship, material or equipment, and shall agree to replace any such faulty workmanship, material or equipment during the period of one year from date of substantial completion of the work without cost to owner. Acceptance of this work shall not waive this guarantee.

1.07 CODES AND STANDARDS

- A. The mechanical design is intended to conform with all local codes, including the applicable requirements of the latest edition of the following standards and/or regulations. All material and equipment must conform to these codes. This shall not permit a lower grade of construction where the drawings or specifications call for workmanship or materials in excess of code requirements.

International Building Code with State of Minnesota Amendments
International Fire Code with State of Minnesota Amendments
Uniform Plumbing Code with State of Minnesota Amendments
International Mechanical Code with State of Minnesota Amendments
International Energy Conservation Code with State of Minnesota Amendments
Local Codes
American Concrete Institute
American Conference of Governmental Industrial Hygienists
American Institute of Steel Construction
American Gas Association
Institute of Electrical and Electronic Engineers
American Society of Mechanical Engineers
American Society of Testing Materials
American Standards Association
American National Standard Institute
Sheet Metal, Air Conditioning and Roofing Contractors Association
American Welding Society
National Board of Fire Underwriters
National Fire Protection Association
National Bureau of Standards
National Electric Code
National Electrical Manufacturers Association
National Sanitation Foundation
American Air Balance Council
American Society of Heating, Refrigeration and Air Conditioning Engineers

National Safety Code for Mechanical Refrigeration
National Association of Sheet Metal and Air Conditioning Engineers
Environmental Protection Agency
Pollution Control Agency
Occupational Safety and Health Act

1.08 FEES AND PERMITS

- A. All fees, permits and licenses required for the mechanical work are to be included in the contract. Fees shall also include Plan Review Fees required by the State.
- B. Any inspection charges by governing authorities shall be requested and paid for under this contract.

1.09 Submittals

- A. Division 01 General Requirements shall apply to this Division of the Contract.
- B. Submit shop drawings for the following equipment and materials:
 - Valves
 - Piping and Associated Specialties
 - Hangers, Supports and Anchors
 - Sprinkler Heads
 - Piping Identification
 - Clean Agent Systems
 - Miscellaneous Specialties
- C. Refer to individual specification sections for additional specific requirements.
- D. Submit job tailored piping diagrams for equipment with unit mounted piping systems.
- E. Submit job tailored wiring diagrams for equipment with unit mounted control systems.
- F. See other Division 21 Sections for further requirements.

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

3.01 CUTTING AND PATCHING

- A. All cutting, fitting, repairing, and finishing of carpentry work, metal work or concrete work, etc., which may be required for the work installed under this division, shall be done by workers skilled in their respective trades at the expense of this contractor. When cutting is required, it shall be done in such a manner as not to weaken walls, partitions or floors and holes required to be cut in floors must be drilled without breaking out around the holes. The contractor shall make arrangements with the trades to do all work covered by their respective trades.
- B. Before doing any cutting, the contractor shall obtain permission from the engineer and follow engineer's instructions as to the method of cutting. All holes shall be cut as small

as possible to admit piping and with as much care as possible. This shall include cutting of all floors that are poured where sleeves or openings are omitted.

- C. Avoid cutting insofar as possible by setting sleeves, frames, etc., or requesting openings in advance.
- D. Assist general contractor in framing openings for ducts and/or piping by checking location of openings required and checking sizes of openings required.
- E. If cutting of existing work or newly furnished work is required by the contractor, contractor is responsible for the work to its original condition.

3.02 TEMPORARY WATER AND SEWER

- A. Carefully examine all parts of Division 00 Conditions of the Contract, and Division 01 General Requirements for requirements regarding temporary sewer, water, gas, etc. Each contractor shall provide for these requirements.

3.03 ENTRY OF EQUIPMENT

- A. Make all provisions for the entry of equipment provided under contract to the installed locations. Provide all openings in the building, if necessary, and do all excavating, backfilling and repair necessary.

3.04 CONNECTIONS AND LAYOUT

- A. Piping and equipment shall be installed substantially as shown on the drawings. Exact location of each and every pipe and piece of equipment cannot be given by scaling the drawings, but shall in every case be placed so as to avoid interference with other work. Should it be necessary to make minor changes in the location of any pipe or piece of equipment for its proper installation and operation, or to avoid conflict with other trades, it shall be done by the contractor without extra cost.
- B. Where connections are made to equipment furnished by others, the contractor shall obtain exact location of connection from persons furnishing said equipment.
- C. Pipes shall be run with proper grade to provide for easy draining. Pipes must be thoroughly reamed and cleaned before installation. Consult and cooperate fully with the other contractors so as to obtain the proper grouping of pipes and to avoid interference. Pipes run overhead shall be placed as close to the ceiling structure as possible to maintain proper headroom and to present a neat appearance, all consistent with the correct pitching of pipes. Consult the engineer before installing any pipe lines or ductwork which will reduce the proper headroom or ceiling in any way. Piping shall be run as shown on the drawings, but the engineer reserves the right to make slight changes, without extra charge, to avoid interference with other work or unforeseen structural interference.

3.05 CLEANING AND HOUSEKEEPING

- A. Requirements of Division 00 Conditions of the Contract, and Division 01 General Requirements apply to this article.
- B. Each contractor shall clear away all debris, surplus materials, etc., resulting from the work or operation, leaving the job and the equipment furnished under the contract in a clean condition.

- C. Fixtures and equipment shall be thoroughly cleaned, removing all plaster, paint, stickers, rust, stains, and other foreign matter or discolorations, leaving every part in an acceptable condition and ready for use.

3.06 IDENTIFICATION

- A. The fire protection contractor shall be responsible for and provide the identification and labeling of all equipment and piping. All identification shall conform to the requirements of the International Mechanical Code and as follows:
 - 1. Label all lines using Seton Company or equal prepared label, or the stencil method with black lettering on all light colored lines and white lettering on all dark colored lines.
 - 2. Pipe Labeling Locations:
 - a) Whenever a pipe turns 90 degrees out of sight from identification.
 - b) Wherever a pipe passes through a wall, bands shall occur close to the wall on both sides.
 - c) In all other locations deemed necessary by architect/engineer for ease of maintenance.
 - d) At no more than 25 foot intervals.
 - 3. Adjacent to each color band or set of bands, the function of the particular pipe and an arrow denoting the direction of flow shall be stenciled in black. Stenciled letters shall be a minimum of 1" high and along with the arrow, shall be applied in a position that is easily read from the normal location of personnel within the space.
 - 4. Equipment shall be identified with 1" high letters indicating unit abbreviation and number. For example, water heaters shall be identified as WH-1 and WH-2.

3.07 PAINTING

- A. This Contractor shall do no painting except as hereinafter specified.
 - 1. This contractor shall paint all unpainted brackets, stands, supports, etc., with one coat of Rust-Oleum metal primer and one coat of Rust-Oleum grey paint.

3.08 ELECTRICAL

- A. This section includes all electrical wiring systems for the mechanical work as hereinafter described. Furnish and set in place all motors required for the operation of equipment furnished in this contract.
- B. All electrical and motor characteristics shall be as shown on the electrical and mechanical drawings or specifications.
- C. Electrical contractor will furnish all disconnects and starters as required for all motors, unless noted otherwise.
- D. Unless indicated otherwise, the electrical contractor will mount the disconnects and starters and will wire through the disconnect, through the starter and make connections to motors unless mounted and wired as part of package equipment.

- E. Unless indicated otherwise, all control devices and all control wiring required for the proper operation of all plumbing equipment shall be furnished and installed complete by this contractor.
- F. Motor control wiring done by this contractor shall conform to the requirements of the Electrical Specifications.
- G. Changes to the electrical system necessitated by equipment, motors, etc., furnished by this contractor that differ from those specified shall be paid for by this contractor.
- H. Single phase motors shall be permanent split capacitor type, drip-proof. Three phase motors general purpose, squirrel cage induction type unless specified otherwise. Minimum service factors shall be 1.15. All motors single speed, 1750 RPM, unless specified otherwise for specific equipment.
- I. All three phase motors for mechanical equipment rated 3 horsepower and larger shall be high efficiency type. Motors shall be labeled to comply with NEMA Standard MG1-12.53 with the nominal efficiency printed on the nameplate. Efficiency shall be based on dynamometer testing per IEEE, Standard 112, Method B. Motors shall be equivalent to Delco E2, Ground-Century, E-Plus, G.E. Energy Saver, Reliance XE or Westinghouse Lifeline Tee II.
- J. Wiring work by this Division of the Work shall be performed in accordance with the requirements of the Division 16 Specifications and the latest edition of the National Electric Code.

3.09 SLEEVES AND FIRESTOPPING

- A. Sleeve and seal all wall penetrations and for acoustical and firestopping purposes as needed.
- B. Penetrations through fire and smoke rated assemblies shall be sleeved and fire stopped with approved firestopping material. Assemblies shall meet the required UL Listings.

3.10 TRAINING

- A. Prior to on-site training, provide classroom training at a site approved by the Owner.
- B. Provide additional on site training to walk through start-up, shut down and preventative maintenance procedures.
- C. Provide additional on site training at the time of final completion to refresh the owner on the proper operation of the system.
- D. Training shall be video taped with the video tape furnished to the Owner.
- E. Contractor shall coordinate training between equipment suppliers and the Owner so the equipment suppliers actually perform the training.

3.11 SERVICE INTERRUPTIONS

- A. Service interruptions shall be coordinated with and approved by the Owner.
- B. Service interruptions shall be limited to unoccupied hours of operation.
- C. This Article shall apply to the following services:
 1. Fire Protection Water

3.12 REMOVAL WORK

- A. Remove existing piping, ductwork, controls and equipment as required to allow installation of new systems shown on the plans.
- B. Turn over any existing materials or equipment that the Owner deems suitable for salvage. All other materials and equipment shall be removed and disposed of at the expense of this Contractor.
- C. Connect to existing piping systems as shown on the plans.

END OF SECTION

ⁱ *Addendum 1—January 20, 2023*

SECTION 21 13 00ⁱ

FIRE PROTECTION

PART 1 GENERAL

1.01 REFERENCE

- A. Requirements of Section 210100 General Provisions apply to all work under this section.

1.02 SCOPE

- A. This section includes all labor, material, equipment, skill and tools necessary to furnish and install the sprinkler piping, sprinkler risers, and sprinklers from five feet outside of the building.
- B. The installation shall comply with all local rules and regulations and with all rules and regulations of the National Fire Protection Association #13, #14, #20, #24, #231, #231C, and #291.
- C. Areas subject to freezing shall be provided with dry pipe systems.
- D. Modify existing piping systems as required to accommodate the remodel work. Existing CPVC piping located in the mechanical rooms shall be replaced with schedule 40 steel piping.
- E. Provide heads under ductwork and equipment where required by NFPA 13.

1.03 QUALIFICATIONS OF CONTRACTOR

- A. The contractor for this fire protection installation shall be a duly licensed and qualified fire protection contractor, and regularly engaged in the installation of automatic sprinkler systems.

1.04 WORKING DRAWINGS

- A. Before commencing fire protection installation, the fire protection contractor shall submit installation drawings and hydraulic calculations to the local fire marshal and the owner's insurance company for approval. Installation drawings and hydraulic calculations shall be certified by a Minnesota Licensed Professional Engineer.
- B. The installation drawings shall be coordinated with the work of other trades to avoid conflict with conduit, lights, piping, mechanical equipment, and structural elements.
- C. After fire marshal and insurance company approval, the sprinkler contractor shall submit the working drawings and hydraulic calculations to the architect and shall secure agency approvals before commencing work at the job site. Copies of installation approval letters or certificates shall be delivered by sprinkler contractor to architect at completion of work.
- D. Professional Liability/Errors & Omissions Insurance: At the time of Shop Drawing Submittal, submit a Certificate of the Professional Liability/Errors and Omissions Insurance. Contractor shall carry Engineer's Professional Liability insurance policy coverage with a \$1,000,000.00 limit for each occurrence and \$2,000,000.00 annual aggregate coverage.

1.05 SPRINKLER DENSITIES

- A. Densities shall match existing.

PART 2 MATERIALS AND INSTALLATION

2.01 MATERIALS, EQUIPMENT, VALVES AND DEVICES

- A. All materials, equipment valves and devices installed and/or furnished under this section shall be listed and/or approved for use in fire protection installation by the authorities, agencies, codes, and standards named in this section of the specifications.
- B. Piping located in the Boiler and Mechanical Fan Rooms shall be of schedule 40 steel construction UL Listed or FM approved for use with fire protection sprinkler piping systems.

2.02 PERMITS AND FEES

- A. Any permits or fees for the installation or construction of any portion of the automatic sprinkler system which are required by any of the authorities and/or agencies having jurisdiction, shall be obtained and paid for by this contractor.

2.03 SPRINKLER HEADS

- A. Sprinkler heads shall be U.L. listed, 1/2" orifice and 165 degrees F. rated. Sprinkler heads located in the computer room shall be high temperature 212 degrees F. rated. Sprinkler heads installed are to be sidewall, upright or pendant as conditions require and shall be one of the following types and finishes:
 1. Upright sprinklers with plain brass finish in rooms without ceilings.
 2. Sidewall type sprinklers throughout room areas with finished ceilings shall be white finish complete with escutcheon plates of the same finish.
 3. Unless noted otherwise, finished areas with ceilings shall be provided with fully/semi-recessed pendant type heads and escutcheons of white finish.
 4. Sprinkler heads shall be quick response type where required by Code.
 5. Sprinkler heads located in Mechanical Fan Rooms and other areas subject to abuse shall be provided with wire cage type guards.
- B. Furnish spare sprinkler heads as required by NFPA.

2.04 NUMBER OF SPRINKLER HEADS

- A. The contractor shall provide engineering drawings showing risers, cross main, branch main spacing, zones and head location and quantity. If more or less heads are required to obtain agency approval, the contract price will not be adjusted. The fewer or additional heads will be considered incidental to the installation.
- B. Provide wet sprinkler system complete with fire department connection.

2.05 DRAINS

- A. System drains shall be discharged to the outside of the building.

PART 3 EXECUTION

3.01 GUARANTEE

- A. The entire fire protection installation, as specified under this section of the specifications, shall be guaranteed for one (1) year against defective equipment, materials and workmanship. The guarantee period is to begin on the date the equipment is placed in operation at the owner's request or for owner's convenience, or from the date a successful acceptance test is made, whichever occurs first.
- B. This guarantee shall not be construed to render service or maintenance required in the normal operation of the equipment, or to make repairs that may be needed due to normal wear and tear or the owner's negligence, abuse or breakage.

3.02 SYSTEM CLEANING AND TESTS

- A. Flush system of foreign matter in accordance with NFPA 13.
- B. At completion of installation, hydrostatically test system in accordance with NFPA 13.
- C. Test shall be witness by Fire Marshal, owner and/or architect/engineer.

3.03 INSTALLATION

- A. Place pipe runs to minimize obstruction to other work.
- B. Where ceilings will exist, place piping in concealed spaces above finished ceilings.

3.04 PIPE SLEEVES

- A. This contractor shall be responsible for coordinating the location and size with the general contractor of all openings that pertain to the phase of work that passes through walls, floors or partitions including field core drilled precast. All sleeves shall be fabricated of new material, cut square and reamed.
- B. Sleeves shall be 1/2" greater in inside diameter than the external diameter of the pipe passing through. Pipes specified to be insulated shall have sleeves large enough for through-going covering.
- C. Sleeves through partition walls shall be schedule #40 steel pipe extending through the full thickness of the wall and shall be flush with the finished surfaces.
- D. Seal the space between all sleeves (or openings) and pipe with fire retardant packing and install a 1" depth of fire-retardant caulking compound flush with the top of the sleeves. Pipe insulation shall not be continued through fire rated construction.
- E. Firestopping: Submit firestopping details for various applications on the project. Submit U.L. listing details and schedules as applicable for the various penetrations. Fire caulking compound shall be 3M, Specified Technologies or approved equal. Provide Fire Stop collars where needed.

END OF SECTION

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ELECTRICAL SPECIFICATIONS INDEX

DIVISION 26

- 26 00 00 GENERAL PROVISIONS
- 26 05 13 CONDUCTORS AND CABLING
- 26 05 26 GROUNDING AND BONDING
- 26 05 33 RACEWAYS
- 26 24 16 PANELBOARDS
- 26 27 16 BOXES AND SPECIAL ENCLOSURES
- 26 27 26 WIRING DEVICES
- 26 28 13 FUSES
- 26 28 16 DISCONNECT SWITCHES
- 26 29 13 MOTOR STARTERS AND CONTROLS

DIVISION 28

- 28 05 00 GENERAL ELECTRONIC SAFETY AND SECURITY TECHNOLOGY REQUIREMENTS
- 28 30 00 FIRE ALARM SYSTEM

SECTION 28 05 00

GENERAL ELECTRONIC SAFETY AND SECURITY REQUIREMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The Electronic Safety and Security Contractors shall provide, install, configure, and provide warranty service for all communications/technology systems described and provided under Division 28.
- B. The Electronic Safety and Security Contractor(s) shall provide and install all sleeves through the wall penetrations as required whether or not specifically marked on Project Drawings, unless otherwise noted.
- C. All cables and related terminations support, and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in the following section(s).
- D. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the Electrical Code in the state where the work is to be performed, and present manufacturing standards.
- E. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply, and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

1.02 WORK RELATED

- A. Provisions of General Conditions, Supplementary Conditions, and the sections included under Procurement & Contract Requirements are included as part of this section as though bound herein.
- B. The omission of express reference to any items or work necessary for, or reasonably incidental to, a complete installation shall not be construed as releasing the Contractor from providing such items or work.
- C. This section applies to all work in Division 28 specification sections.

1.03 REQUIREMENTS OF REGULATORY AGENCIES / REFERENCES

- A. Product and installation provided under Division 28 shall be as required by the NEC (National Electrical Code). NEC standards are minimum requirements only, and may be superseded by the requirements of this section.
- B. The products provided by this section shall comply with the following applicable references (latest edition):
 - 1. ADA – Americans with Disabilities Act
 - 2. AIA – American Institute of Architects

3. ANSI – American National Standards Institute
 4. ASTM – American Society of Testing and Materials
 5. CFR – Code of Federal Regulations
 6. U.S. Copyright Law
 7. ECIA – Electronic Components Industry Association; ESC – EIA Standards Council
 8. IACS – International Annealed Copper Standard
 9. IEC – International Electrotechnical Commission
 10. IEEE – Institute of Electrical and Electronics Engineers
 11. ISO – International Organization for Standardization
 12. ITU-T – International Telecommunication Union – Telecommunication
 13. NEC – National Electrical Code (NFPA 70)
 14. NECA – National Electrical Contractors Association
 15. NEMA – National Electrical Manufacturers' Association
 16. OSHA – Occupational Safety and Health Administration
 17. TIA – Telecommunications Industry Ass
 18. UL – Underwriters' Laboratories
- C. Referenced standards and/or procedures shall be binding on the Contractor and work shall be judged against such standards and procedures unless otherwise stated in writing.
- D. Local/State Codes: Contractor shall comply with all local and state code requirements as determined by the authority having jurisdiction (AHJ).

1.04 QUALIFICATIONS

- A. Manufacturer's Qualifications: Engage firms experienced and regularly engaged in manufacture and supply of system and components and capacities, whose products have been in satisfactory similar service for not less than three (3) years. Supplier: Authorized by the manufacturer(s) to conduct business in the area of the installation.
- B. Installer's Qualifications: Licensed to install in the state where the project is being constructed. Engage installer familiar and experienced with connections and terminations required and who has at least five (5) years of successful installation and experience a minimum of 4 projects of this type. The Owner has the right to contact these previous customers for verification of credibility as an installer.
- C. Materials and Equipment: Where materials or equipment are specified to conform, be constructed, or be tested to meet specific requirements, Contractor shall supply, upon request by the Consultant or Owner, certification that the items provided conforms to such requirements. Certification by a nationally recognized testing laboratory that a representative sample has been

tested to meet the requirements, or a published catalog specification statement to the effect that the item meets the referenced standard, will be acceptable as evidence that the item conforms. Compliance with these requirements does not relieve the Contractor from compliance with other requirements of the specifications.

1.05 SUBMITTALS

- A. Qualifications: Shall include documentation of all required qualifications.
- B. Custom shop drawings shall be submitted for approval for all Division 28 Systems, including, but not limited to, the following:
 - 1. A custom drawing(s) of the complete assembly clearly labeled to indicate all features and components and associated wiring requirements.
 - a. Title: Each drawing shall have a descriptive title and all subparts of each drawing shall have unique identifiers.
 - b. Floor Plans: Shall include device locations, and equipment locations/mounting. Contractor provided furniture and installation notes.
 - c. System Drawings: Shall include functional diagrams for each system detailing system flow including all equipment, routing, inputs/outputs, wiring signal type, cable identification detail, connectors, adapters, intra/inter-rack power distribution, outlet configurations, installation notes and any other information required to convey the complete turnkey system design.
 - d. Equipment Rack and Cabinet Elevations: Shall include placement of all mounted equipment.
 - e. Structurally Mounted Elements: Shall include both plan view of placement as well as a detail of structural mounting techniques to be used.
 - f. Furniture: Shall include all Contractor provided furniture showing dimensional drawings, cable management and finishes with samples for Owner approval.
 - 2. Equipment or component data (cut sheets).
 - a. Equipment Schedules: Shall include manufacturers, part numbers, quantities and unit pricing.
 - b. Product Cut Sheets: Shall identify (highlight, arrow, etc.) actual part numbers to be utilized including but not limited to equipment, mounting hardware, cabling, connectors, software and power distribution equipment.
 - 3. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, copies of these recommendations shall be provided prior to installation. Installation of the items will not be allowed to proceed until the recommendations are received and approved
- C. Field Report: A field test report shall be submitted (by the manufacturer) to the engineer prior to the final site observation, certifying that the respective system(s) are installed, and has been tested, and are operating properly.

- D. Closeout Documentation: Provide the Owner/Customer with a complete set post construction documents including, but not limited to, the following.
1. Test Results.
 2. Operation Manuals & Maintenance Manuals
 3. As-Built Drawings: Provide the customer with a clean set of As-Built Drawings clearly indicating the locations of all equipment/components. Coordinate labeling scheme with the owner/customer. As-Built Drawings shall include all changes made during construction.
 4. End User Software.
 5. All documentation shall be provided in hard copy (full size paper and/or 3-ring binder) and electronic form (flash drive).
- E. Submittal Conditions:
1. The Contractor shall not consider the Consultant or Owner's review of submittals to be exhaustive or complete in every detail. Approval of shop drawings or submittals including substitutions indicates only the acceptance of the Contractor's apparent intent to comply with general design or method of construction and quality as specified. The finished product shall meet functional requirements, operations, arrangements, and quantities and comply with the contract documents unless specifically approved otherwise.
 2. The Contractor shall be held responsible for delivery of systems as specified. Any errors or omissions in the submittals shall not relieve Contractor of responsibility to deliver complete systems as specified.

1.06 QUALITY ASSURANCE

- A. Assurance: It is the intent of these specifications to describe and provide for a complete, professional, and reliable installation.
- B. Qualifications: Contractor employees who are engaged in installation shall be properly trained in the tasks they are expected to perform.
- C. Acceptability: Owner shall determine the acceptability of work.
- D. Regulatory Requirements: Contractor shall comply with code requirements that apply to the work being performed.
- E. Certifications: Where manufacturer certifications are required for warranty or for authorized resale, installation personnel shall have received such certification prior to the start of installation of those manufacturers' materials.

1.07 COORDINATION

- A. Coordinate arrangement, mounting, and support of communications equipment:
1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 3. To allow right of way for piping and conduit installed at required slope.
 4. To connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
 - C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section Access Doors and Frames.
 - D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section Firestopping.
 - E. During installation period, when connections are made to the Owner's existing infrastructure, Contractor shall use care to ensure that such connections will not have a negative impact which could reduce or hamper existing systems.

PART 2 PRODUCTS

2.01 BASIC EQUIPMENT AND MATERIALS REQUIREMENTS

- A. Standards: Equipment and materials used to accomplish the goals of this project shall meet standards for good engineering practice as defined within this document.
- B. Quality: Products specified in these documents are intended to establish a baseline or operational, functional, and performance-based standards that all proposed products shall meet or exceed by functionality and quality.

2.02 FACTORY-ASSEMBLED PRODUCTS

- A. Manufacturer: Reference to specific equipment manufacturers does not imply that all products produced by that manufacturer meet the specification requirements.
- B. Age of Equipment: Equipment shall be new and unused with full manufacturer's warranties. Contractor shall supplement such warranties as required by the specification. Contractor shall immediately notify the Consultant of any product that will be or is expected to be discontinued by the end of the project for resolution.
- C. No Modification: Where a product is available from a factory/manufacturer to meet the needs as outlined, that product shall be used without modification to ensure the full factory warranty is maintained.
- D. Like Materials: Like materials used shall be of the same manufacturer, model, and quality unless otherwise specified.
- E. Software/Firmware: No software or firmware is to be used unless specifically authorized by Owner or its appointed representative.

2.03 RACKS, CABINETS, HARDWARE

- A. Provide equipment racks and cabinets as specified herein and/or described in accompanying documents, appendices, or drawings. Verify that any existing racks and/or cabinets provided by others are complete, bringing any discrepancies to the attention of Owner and the Consultant prior to beginning the installation.
- B. Contractor shall supply necessary mounting hardware to install rack-mounted equipment. Mounting hardware shall be a product of the manufacturer of the equipment to be mounted, or manufacturer of the rack system, or approved by either for use with their product. Provide supporting channels, shelves, rack mounts, and/or rack ears as recommended by equipment manufacturers.
- C. Contractor shall provide screw head types appropriate to the level of security required for the equipment and racking. Screws shall include polyethylene or nylon washer.
 - 1. Public Access Areas: Star post or square post security screws shall be used for hardware and equipment mounted in equipment racks and consoles in areas that are accessible to the public.
 - 2. Restricted Access Areas: Philips head screws may be used where a secure room entrance or locked rack/console door prevents public access.

2.04 POWER DEVICES

- A. Power strips shall be UL listed, surface mounted, and rated for 20 amp continuous electronic loads, unless indicated otherwise. Outlets shall be 125 volt, 20 amp, three-wire, grounded, and NEMA 5-20R compliant. Cords shall be 12/3 SJT with molded plug.
- B. Power distribution panels shall be UL listed, rack mounted, rated for 20 amp continuous electronic loads, with switch and pilot light, unless indicated otherwise. Up to eight outlets shall be mounted to the back, each rated 125 volt, 20 amp, three-wire, grounded, and NEMA 5-20R compliant. Switch and pilot shall be mounted to the front. Cords shall be 12/3 SJT with molded plug.
- C. Contractor shall provide acceptable power distribution units as required in order to provide sufficient outlet connectivity for Contractor-furnished and Owner-furnished equipment indicated on drawings and equipment schedules, plus up to 15% additional capacity for future growth. This may be in addition to any power distribution equipment indicated on equipment schedules.

2.05 CABLE AND CONNECTORS

- A. Cable shall be selected and applied in a manner defined by signal type, consistent with best industry practices. Highest quality products shall be used with attention given to transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Where required by the NEC, substitutions of air handing plenum cable shall exactly match the normally applied product and shall meet the standards of UL Standard #900 and the NEC Articles 800 and 820.
- B. Highest quality connector products shall be used with attention given to transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Strain reliefs and cable clamps shall be sized for the connector and the cable.

- C. Cable and connector color shall be coordinated with the Consultant to maintain consistency with cable and connector color schemes used by other trades.

2.06 CABLE MANAGEMENT

- A. Single use white nylon plastic cable ties, appropriate screw fittings, or mounting clips may be used for AC power cable management within racks and enclosures. Plastic/nylon cable ties shall not be used for signal and DC cables.
- B. Velcro cable tie straps shall be used for all signal and DC cables. Velcro straps shall be black, with no logo or decoration, except as authorized by the Consultant.

2.07 ANCILLARY HARDWARE

- A. Contractor shall provide ancillary and required accessory items necessary to provide a complete and fully functional system to Owner.
- B. Exclusion of or limitation in the language used in the drawings or specifications shall not be interpreted as meaning that ancillary or accessory items of work or equipment necessary to complete or make the installed system fully functional can be omitted.

2.08 GROUNDING HARDWARE

- A. Refer to Section 26 0526 and 27 05 26 for specific Grounding and Bonding requirements.
- B. Provide grounding systems indicated in the project drawings and specifications. Products shall include, but are not limited to, cables/wires, connectors, terminals, compression lugs, grounding rods/electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where materials or components are not indicated, provide products complying with NEC, UL, IEEE, ANSI/TIA and established industry standards for applications indicated.

2.09 FIRE STOPPING MATERIALS

- A. All penetrations of walls shall be approved by the General Contractor before any penetrations are made. Should the Contractor find it necessary to penetrate any walls extending to the slab, it will be the responsibility of that Contractor to provide satisfactory sleeving and fire caulking both inside and outside of that sleeving. If existing sleeving is to be utilized, it will be the responsibility of the Contractor to fire caulk inside the sleeving.
- B. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Firestopping.
- C. A submitted response to this specification assumes that all firestopping will be provided as specified. The firestop manufacturer's specifications and instructions shall be submitted with the final documentation.

2.10 COMPATIBILITY OF RELATED EQUIPMENT

- A. Existing Equipment and systems specified in these documents shall be assumed to be compatible with the systems already installed at Owner site(s) and as identified in this document as related to this project.

- B. Specified and installed equipment and systems shall be compatible with all other equipment and systems as offered by Contractor, thus placing the responsibility on Contractor to ensure proper interaction.

2.11 COMMUNICATIONS

- A. Each Electronic Safety and Security System on the project shall be provided with its own dedicated analog telephone communications line(s) for monitoring and alarm reporting.

2.12 LICENSES

- A. Any and all licenses required for system functionality shall be provided.
- B. All licenses shall be Professional.

2.13 SPARE PARTS

- A. Contractor is requested to submit a list of suggested spare parts with an offered price, allowing Owner to select appropriate parts.
- B. Contractor shall state where spare parts can be obtained after the installation.

PART 3 EXECUTION

3.01 GENERAL

- A. Contractor shall provide, furnish, deliver, transport, erect, install, connect and configure all of the material and equipment described herein or depicted on any bid package document or drawing, as required for a turnkey solution.

3.02 COORDINATION

- A. Contractor shall cooperate with other Contractors for proper provisioning, anchorage, placement, and execution of all work. Interference between the work of various Contractors shall be resolved before installation. In the event of conflict on space requirements or location of devices, refer the matter to Owner and the Consultant for decision.
- B. References to the following related work do not limit or release Contractor from the responsibility of coordination with other trades or from having the necessary knowledge of other non-referenced work.
 - 1. Work by General Contractor.
 - 2. Work by other Electronic Safety and Security Contractors.
 - 3. Work by Electrical Contractor, including electrical rough-ins and surface-mounted raceway.
- C. Contractor shall coordinate with all other trades to avoid causing delays in the installation schedule.
- D. Contractor shall coordinate with General Contractor its requirements for proper AC power to service all equipment installed by Contractor.

- E. Contractor shall provide openings through walls as necessary, with sleeving and fire-stopping materials installed in a professional manner to meet local and national codes.
- F. Grounding and Bonding: Contractor shall coordinate with General Contractor its requirements for proper grounding and bonding to their equipment.
- G. Surface-Mounted Raceway Coordination
 - 1. General and Electrical Contractors: Contractor shall coordinate with General Contractor and Electrical Contractor the installation of surface-mounted-raceway where not provided but made necessary by non-penetrable wall.
 - 2. Verification: Contractor shall field verify and coordinate the proposed use of surface-mounted raceway at any location with the Consultant and Owner.

3.03 BASIC EXECUTION REQUIREMENTS

- A. Contractor is responsible for following industry standards of good practice for safety and security equipment.
- B. Aesthetics
 - 1. All cables and equipment terminating at panels frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.
 - 2. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.
 - 3. For any given telecom room, a horizontal and vertical alignment for all mounting hardware will be maintained to provide a symmetrical and uniform appearance to the distribution frame.
 - 4. All surface-mounted devices shall be firmly secured level and plumb
 - 5. All rack mount equipment shall be securely installed.
- C. Hardware positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in the respective Systems Spec sections.
- D. Manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers or as indicated in their published literature unless otherwise noted herein.
- E. Work area and associated work shall be properly protected during construction; including shielding soft or fragile materials, protecting against dust and dirt, protecting and supporting cable ends off of the floor and from other traffic, protecting floor box lids, and temporarily plugging open conduits during construction. Upon completion, installation shall be thoroughly cleaned and all tools, equipment, obstructions, or debris present as a result of work shall be removed from the premises.
- F. Contractor shall make appropriate preparations to protect all cabling and equipment from foreign material. Foreign material is defined as any substance or material that would void the manufacturer's performance warranty, impact ratings (UL, Plenum, etc.), or cover up markings

needed for inspection. Foreign material includes, but is not limited to, paint overspray (intentional or not), fire-stopping material, drywall compound, or any other chemical, liquid, or compound that could come in contact with cables, cable jackets, cable termination points, or other equipment.

1. Cleaning of cables or equipment with harsh chemicals from a failure to comply with Protection of Cable and Equipment clause is unacceptable. Contractor shall replace any affected cable, cable components, or equipment in their entirety at Contractor's sole cost.
- G. Contractor shall keep work area neat, orderly, and free from accumulation of waste materials. Remove trash and debris from the building and job site as required to maintain a clean work environment at all times. Rubbish shall be moved to a common trash point or receptacle on the job site as determined and directed by General Contractor or Owner.
- H. No construction debris shall be placed in building's dumpsters. Contractor shall provide a dumpster for construction waste and debris at own expense. Said dumpster shall be emptied on a regular schedule. Location of dumpster shall be arranged through Building Management. Appropriate measures shall be taken to protect asphalt or other ground surfaces.
- I. Contractor shall not hang cable supports from ceiling grid wire.
- J. Contractor shall not shoot into the roof deck for mounting cable hangers.
- K. Equipment and enclosures shall be mounted plumb and square in relation to the structure.
- L. All cabling installed below the raised floor shall be placed in the provided cable trays with appropriate means to hold cable in place. If no cable tray exists, Contractor shall provide J-hooks to hold cables in place. Sleeves shall be utilized for cable egress.
- M. Care shall be taken to properly dress all cables placed within motorized furniture and provide sufficient cable length and strain relief to allow motorized elements to operate within their full range of travel.
- N. Care shall be taken to properly dress all cables placed within flexible or re-configurable furniture to provide sufficient cable length and strain relief to allow full range of travel for flexible furniture configurations.

3.04 PREPARATION

- A. Prior to any installation, the Contractor shall prepare the site by removing any remaining debris, leveling equipment racks (where appropriate), and verifying information and systems stated to be in-place are ready for use.
- B. Prior to installation, Contractor shall ensure that required major equipment has been secured and is ready for installation.

3.05 CLEANING

- A. Contractor is not permitted to use restrooms for tool clean-up. A slop-sink may be provided in janitorial closet on each floor for cleaning of tools and equipment and as a source of water. Janitorial closet or maintenance area or shop shall be kept clean at all times. Contractor or Contractor's Personnel found using restrooms for clean-up or other similar purposes shall be subject to removal from building.

- B. At the end of each work period or day, Contractor shall remove excess packing, drilling remnants, and other non-equipment related parts, materials, or debris to ensure a clean, safe, and professional working environment.
- C. Contractor shall ensure that no damage to carpeting occurs as a result of their work. Contractor shall cover carpets in areas of work to prevent wire and other debris from entering the carpet.

3.06 FIRE STOPPING

- A. Contractor is responsible for applying fire-stopping material in and around all openings that it creates or are created for it, whether or not specifically indicated in specifications or project drawings, where code requires the use of fire stopping material.
- B. If Contractor removes anything from an opening in a fire-rated wall, Contractor shall restore the fire-rating condition of the wall to the same condition as before Contractor started its work. Depending on the size of the opening, this may involve sheetrock patching, in addition to use of other appropriate fire-stopping materials
- C. Contractor shall ensure that all fire-stopping materials meet appropriate codes and are installed in a neat and workman like manner.

3.07 WATERPROOFING

- A. Contractor is responsible for creating a waterproof seal in and around any openings to the outside environment that are created by Contractor or for systems being installed.
- B. Contractor shall ensure that all waterproof materials meet appropriate codes and are applied according to good engineering practice.

3.08 RACKS, CABINETS, AND HARDWARE

- A. Contractor shall assemble and install racks and cabinets.
- B. Install hardware in a secure manner. Screws shall be tightened to a torque just sufficient to secure equipment without deforming washers beyond their original diameter.
- C. Rack mount equipment shall be secured as recommended by the manufacturer with consideration to airflow, power, and in/out connections.
- D. Where cross connections are required between equipment, interconnections shall be installed using cable management devices to secure cables in a neat and workmanlike manner, applying best industry practices.

3.09 INSTALLATION REQUIREMENTS

- A. Cable pulling shall be done in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Recommended pulling tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed.
- B. All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to ensure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a "break-away", or other approved method.

- C. Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all installation work. During pulling operation, an adequate number of workers shall be present to allow cable observation at all points of pathway entry and exit.
- D. All cable shall be free of tension at both ends.
- E. PLENUM rated cable shall be used in areas used for air handling or where required by code.
- F. Contractor shall replace any cables that have been damaged or abraded during installation.
- G. Pulling lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used and will not harden or become adhesive with age.
- H. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit or surface mount raceway.

3.10 CABLE

- A. Cable treatment: Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the rating of the manufacturer.
- B. Cable Termination hardware positioning and layout shall be reviewed and approved by the Owner prior to construction. Special requirements will be indicated by the respective System Spec Sections.
- C. Splicing
 - 1. No splices shall be installed in any cables provided under Division 28.
- D. Lengths
 - 1. Variations: Where cables are to be of the same length, variations in the length shall be less than plus or minus ½ inch. Lengths of cables are based on the length of the unterminated signal conductors.
 - 2. Labeling: Cables, regardless of length, shall be marked with a labeling scheme approved by the Consultant.
 - 3. Service Loops: A surplus of cable, located at or near the point of termination to facilitate potential future changes, shall be provided where appropriate. Cables shall have a minimum cable slack of 10ft (3m) at the telecommunication room(s) and 3.28ft (1m) at each telecommunications outlet in the suspended ceiling unless noted otherwise. Service loops shall be stored in an extended loop or in a figure-eight configuration, not in bundled loops.
- E. Grouping
 - 1. Cables shall be separated into like groups according to signal or power levels.
 - 2. Power Cable Group: Power cables shall be secured to one side of the rack separate from any low-energy signal cable groups. Separation shall be a minimum of 4" in all directions.

3. Signal Cable Group: Signal cables shall be grouped according to signal type and secured to one side of the rack separate from any power cable groups. Separation shall be a minimum of 4" in all directions.

F. In Equipment Racks

1. Equipment rack wiring and cabling shall be neatly dressed.
2. Fastening: Rack cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame.

G. Support for Cables Outside of Equipment Racks

1. External wire and cables shall be supported at least every 5 feet (1.5m) from the structure and as required to maintain less than 12 inches of cable sag between supports without over-tensioning the cables. Contractor shall vary the precise distance between cable supports on long runs to avoid harmonics issues.
2. Hardware: Cables shall be supported by J-hooks, cable tray, or ladder rack. Hardware shall be secured to building structure using 3/8" threaded rod supports.
 - a. Right Angles: Cables are to run at right angles to the structure, placed above ceiling in halls or corridors.
 - b. Height: Cables shall not run above red iron joist.

- H. Concealment: Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests. Cabling systems installed in public areas shall be installed within walls, ceiling, or floors or within surface wiring pathways, as dictated by codes and good engineering practice.

- I. Velcro Straps for Horizontal Cabling: Straps shall be installed snugly without deforming cable insulation. Straps shall be spaced at uneven intervals not to exceed 4 feet.

- J. Cable Ties and Velcro Straps within Equipment Racks and Cabinets: Ties and straps shall be installed snugly, without deforming cable insulation, at uneven intervals not to exceed 8 inches. Cable ties shall only be used for non-signal carrying cables. No sharp burrs shall remain where excess length of the cable tie has been cut.

- K. Obstruction: Contractor shall notify Owner immediately if any obstruction or hazard is discovered in a pathway provided by others.

3.11 CONNECTORS

- A. Cables shall be carefully prepared, and connectors installed as directed by the manufacturer. Proper stripping devices and crimping tools shall be used.
- B. Connectors shall be carefully fitted to mating devices on equipment to avoid damage to mating contacts, inserts, or bodies. Specialized terminations shall be made in a neat and secure manner suited to the service of the wire and as directed by the manufacturer. Contractor shall use manufacturer specified terminations when those specifications exist.
- C. A person skilled in that practice shall execute soldered terminations. Any excessive insulation displacement resulting from soldering shall be grounds to require the Contractor to re-terminate the connector.

- D. Adapters shall be used only where the identity of the necessary type of connector is unknown at the time of installation, such as for Owner-provided equipment or in anticipation of future equipment upgrades, with the Consultant’s approval.

3.12 SPARE PARTS AND REMOTE CONTROLS

- A. Contractor shall turnover all keys, tagged and organized by type on individual key rings, to Owner upon project completion.
- B. Refer to individual sections for spare parts and remote control requirements.

3.13 EQUIPMENT INSTALLATION

- A. Contractor shall make system properly operational and physically secure by mounting equipment and related accessories into furniture, consoles, and racks as required. Manufacturer’s guidelines for installation shall be followed. Discrepancies in installation procedure or inability to complete a given task due to a shortage of materials or malfunctioning equipment shall be reported to the Consultant immediately upon discovery.
- B. Contractor shall locate equipment as indicated on drawings and as specified herein. Where such information is not provided, Contractor shall follow industry best practices and locate operable devices at convenient positions; heat generating devices at the top and seldom-accessed equipment below.
 - 1. Unless otherwise specified, end user-operable devices shall be positioned within the range of front wheelchair access per ADA standards.
- C. Equipment shall be installed as directed by the manufacturer using equipment manufacturer’s desktop mounting frames, equipment tubs, installation hardware, and techniques. Contractor shall be responsible for moving equipment from storage and for providing necessary personnel or devices to carry and lift equipment around obstacles and into operating position.

3.14 FIRMWARE

- A. Firmware shall be latest version supported by software and/or equipment as of Date of Acceptance.

3.15 ROUGH-IN

- A. Contractor shall make every effort to install systems per this specification in a timely manner including rough-in of cabling and other apparatus where appropriate to stay on schedule.
- B. Where cabling and/or equipment is installed prior to other trades completing their work in an area, Contractor shall take necessary precautions to cover, wrap, or otherwise protect to reduce possible damage which may result from plastering, painting, cleaning, or other such work completed after installation and before substantial completion of the project.

3.16 CUTTING, DRILLING, PATCHING, AND PAINTING

- A. Contractor is responsible for coordinating with the General Contractor and other trades when any cutting or drilling is required for the installation or proper performance of the specified systems.
- B. Contractor is responsible for returning all surfaces (including walls, floors, and ceilings) to their previous condition after any cutting.

3.17 SYSTEM INSPECTION

- A. Contractor shall coordinate with project representative for inspection after Contractor has completed testing of entire system.
- B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.

3.18 LABELING

- A. Rack-mounted equipment and hardware shall be labeled as required herein. Connectors, jacks, receptacles, outlets, cables, cable terminations, terminal blocks, rack mounted equipment, active slots of card frame systems, etc. shall be clearly, logically, and permanently labeled in a manner acceptable to the Consultant.
- B. Proposed wording and/or numbering schemes for labeling shall be provided to the Consultant for review and written approval prior to procurement or installation.
- C. Labels used shall be permanent and secure. Provide labeling as follows unless otherwise noted in a specific section:
 - 1. All labels, including engraved labels, shall be sized to match other labels used for same purpose.
 - a. All labels shall be permanent and be machine generated (e.g., Brother, Dymo, etc.). No handwritten or non-permanent labels shall be allowed.
 - b. Labels shall be black print on a white background.
 - c. Cable labels cables shall be self-laminating, white/transparent vinyl, and be wrapped around the cable sheath at each end of the cable. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminated over the full extent of the printed area of the label.
 - d. All surfaces must be cleaned prior to attaching labels.
 - e. Labels shall be installed plumb and neatly on all equipment, faceplates, etc.
 - 2. Installer and Consultant Identification: Position at the front top center section of each equipment rack a label that states the names of system Installer and the Consultant.
 - 3. Custom Panels: Custom panel nomenclature shall be engraved, etched, or screened. Markings are to be designed to ensure consistency and clarity within and without of system. Verify markings and placements by submitting label sample layouts to the Consultant for approval prior to procurement.
 - 4. Ground Systems: All grounds shall be labeled as close as practical to the point of termination (for ease of access to read the label). Labels shall be nonmetallic and include the following statement: "WARNING: If this connector or cable is loose or must be removed, please call the building telecommunications manger." Refer to ANSI/TIA/EIA 606 for additional labeling requirements.
 - 5. Documentation: Labeling information shall appear on the as-built drawings.

3.19 ADDITIONAL ENGINEERING SERVICES

- A. Contractor is responsible for securing necessary engineering services where needed to meet the needs of the installation.
- B. Only when Contractor can show that additional engineering services are needed as a result of changes to the scope of the services being requested in the contract documents will Owner entertain a Change Order Request for these services.

3.20 TESTING

- A. Contractor shall develop a rigorous testing procedure to ensure full functionality and durability of installed systems under heavy-use conditions.
- B. Contractor shall supply testing equipment needed to verify compliance with specifications found in these documents.
- C. Contractor shall complete required testing prior to the substantial completion inspection by Owner and the Consultant.
- D. Test data shall be properly documented and recorded so that it is available for final inspection.
- E. Testing may be repeated during the inspection process at the request of Owner or the Consultant.
- F. Prior to energizing or testing the system, Contractor shall ensure the following:
 - 1. Installation: Products are installed in a proper and safe manner per the manufacturer's instructions.
 - 2. Cleanliness: Products are neat, clean, and unmarred and parts securely attached. Dust, debris, solder, splatter, etc. is removed.
 - 3. Cables and Connections: Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.
 - 4. Grounding: Electronic devices are properly grounded.
 - 5. AC Power: Each AC power receptacle is tested with a circuit checker for proper hot, neutral, and ground connections prior to connecting equipment.

3.21 GROUNDING

- A. Refer to Section 26 0526 and 27 0526 for specific Grounding and Bonding installation requirements.

3.22 DEMONSTRATION AND TRAINING

- A. Instruction and User Orientation: Provide XX (XX) hours of instruction with a designated representative of the Owner concerning systems installation and administrative procedures. Demonstrate the essential features of the systems and reviewing system documentation. Arrange sessions with the schedule established at the convenience of the Owner's representative. As part of the instruction, turn over the Owner's manual with pertinent information identified, including equipment locations and relations to the Drawings. Session is conducted by the site group leader in charge of the installation. Contractor shall provide training

in the manner delineated below in addition to specific requirements identified in subsequent sections.

- B. Training shall include:
 - 1. Approved handouts.
 - 2. Practical and comprehensive operation of systems.
 - 3. Basic system troubleshooting techniques.
 - 4. Basic system maintenance.
- C. Training Blocks
 - 1. Training time is defined as those hours specifically set aside for the sole purpose of training end users. Credited time will not be given for any time spent providing instructions to the Owner's staff for a system not completed or that has not passed final acceptance by the Owner and the Consultant, or training performed outside of the approved training program.
 - 2. This training will be divided into training session "Blocks" as coordinated with the Owner. Provide audio-video recording of each training session to Owner.
 - a. The first training session block shall consist of training intended for the common system operators. Such training, at a minimum, shall include the day to day use of the system.
 - b. The second training session block shall consist of training administrators of the day to day administration of the system. Such training, at a minimum, shall include use of the administration control functions of the systems, user setup, and filtering and pulling reports.
 - c. The third training session block shall consist of training administrators on system troubleshooting, maintenance, and updates. Such training, at a minimum, shall include using the system tools to diagnose issues, diagnosing common physical equipment issues, performing simple maintenance, and performing system updates.
 - d. The fourth training session block shall consist of a training session structured for high-level users, for example staff trainers who will provide instruction to other users and will include advance system configuration and operational knowledge needed to maintain and manage all specified technology systems. The Contractor may elect to engage the Manufacturer(s) in certifying the high-level end users in the systems at no cost to the Owner.
- D. The Contractor shall issue a certificate of training completion to the trainees upon completion of their training. Such certificates must be signed by both the trainer and trainee(s) for the Contractor to receive training credit.

3.23 WARRANTY

- A. Provide a minimum of five (5) year warranty from the date of substantial completion on all labor and materials furnished and installed to be free of defects. Any repairs of such defects will be

at the installer's expense. Where an extended warrantee period is in force by the equipment or components manufacturer, the contractor shall warrant the system to the extended timeframe.

- B. Contractor shall provide a warranty conforming to the stipulations below in addition to specific requirements identified in subsequent sections.
- C. As part of the base proposal cost, the Contractor shall include a 1-year turnkey warranty period with full support costs.
- D. The Warranty period shall begin after all punch list items have been rectified. The Contractor shall receive a letter of Substantial Completion from the Consultant and Owner indicating project completion and starting the warranty period.
- E. The warranty and support work included in this contract shall cover the following materials, software, and services, without additional cost to the Owner:
 - 1. Inspections, preventative maintenance, and testing of equipment and components. The Contractor shall schedule a 10-month on-site preventative system review 10-months into each year of warranty and support including system inspections, preventive maintenance, software upgrades/patches, and testing of equipment and components.
 - 2. Regular Service, Emergency Service, and Normal Service.
 - 3. Labor, travel, equipment, materials, and transportation cost for all services covered by this warranty.
- F. Contractor shall respond to calls for warranty services in a timely manner as delineated below.
 - 1. The Owner reserves the right to make the final determination of emergency or normal service calls and the right to coordinate the best times for service of any system failure.
 - 2. Emergency service calls are defined as failures which prohibit the use of a typical system function(s) and pose a life safety concern, or such failures which cause a major impact to the Owner's daily operations.
 - a. The Contractor shall provide remote service diagnosing the impact within two (2) hours after notification by the Owner.
 - b. If remote service does not correct the reported issue, the Contractor shall provide on-site service correcting the impact within four (4) hours after notification by the Owner.
 - 3. Normal service calls are defined as failures which prohibit the use of typical system function(s), but which do not inhibit critical system usage, do not pose life safety concerns, and do not create a major impact to Owner's daily operations.
 - a. The Contractor shall provide remote service correcting the impact within twenty-four (24) hours after notification by the Owner.
 - b. If remote service does not correct the reported issue, the Contractor shall provide on-site service correcting the impact within forty-eight (48) hours after notification by the Owner.

4. The Contractor shall supply Service Request forms and or proper contact procedure to the Owner with instructions for proper notification of the Contractor for warranty service. By following said instructions, the Owner shall constitute proper notification for any needed warranty service

- G. Contractor shall locally stock critical parts in sufficient quantities such that emergency repair or replacement shall be guaranteed within twelve (12) hours. Temporary replacements within this time period shall be acceptable, provided temporary replacements do not compromise system functionality and provided permanent replacement is achieved within ninety-six (96) hours. Contractor may contact the Owner for use of Owner supplied spare parts where delay of system repair will have negative impact on system performance.

- H. A copy of this Warranty shall be delivered to and signed for by the Owner's representative whose primary responsibility is the operation and care of these systems. A copy of the signed Warranty document shall be delivered for review as part of the Final Submittals.

- I. Contractor shall register Warranty papers for all equipment and software in the name of the Owner and furnish reproductions of all equipment Warranty papers to the Owner with the Final Submittals.

- J. Warranty service work may not be subcontracted except with specific permission and approval by the Owner.
 1. Service/Warranty Procedures: Contractor shall submit a warranty service plan containing all contact information and Owner service call directions for Owner review with project close-out submittals.

- K. Resolution of Conflicts:
 1. The Owner retains the right to resolve unsatisfactory warranty service performance at any time by declaring the work unsatisfactory and stating specific areas of dissatisfaction in writing.

 2. If the Contractor or his approved Subcontractor does not resolve such stated areas of dissatisfaction within ninety-six (96) hours, the Owner may appoint an alternative service agency or person to fulfill the terms of the Warranty at the expense of the Contractor. This action may be taken repeatedly until the Owner is satisfied that Warranty service performance is satisfactory. Satisfactory resolution of a malfunction shall be considered adequate when the device, equipment, system or component which is chronically malfunctioning is brought into compliance with the standards of performance as contained herein and published by the manufacturers of the equipment installed.

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SECTION 28 30 00

FIRE ALARM SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. A complete fully functioning addressable type fire detection and evacuation alarm system with full Detection and Notification type shall be provided as required and indicated by the drawings.
- B. System interfaces shall be provided as indicated or required with other systems served or supplied under these specifications.
- C. All labor, materials, accessories, etc., shall be provided as required for a complete installation.

1.02 WORK RELATED

- A. System interfaces with other building systems shall be provided as served and supplied under these specifications.

1.03 SUBMITTALS

- A. Shop drawings shall be submitted to and approved by the inspection authority having jurisdiction prior to submittal to the engineer for approval.
- B. Shop drawings to be submitted for approval for the complete fire alarm system, including, but not limited to the following:
 - 1. A custom system wiring diagram (floor plan or riser layout indicating device type, location and associated wiring requirements and zoning).
 - 2. Equipment Data (cut sheets).
 - 3. A stamp of approval by the inspection authority having jurisdiction
 - 4. Fire alarm submittals shall include voltage drop, candela, etc. calculations as required by the authority having jurisdiction and contractor shall be responsible for obtaining system approval prior to submittal to the engineer complying with all submittal requirements of the authority having jurisdiction.
- C. Field Report: A field test report prepared by the manufacturer's representative shall be submitted to the engineer prior to the final site observation, certifying that the fire alarm system is installed and operating properly and has been thoroughly tested for verification of these conditions by the manufacturer's representative.

1.04 REQUIREMENTS OF REGULATORY AGENCIES / REFERENCES

- A. The fire alarm system components and installation shall, as a minimum, meet the requirements of UL, UBC, IBC, IFC, NFPA, and the authority having jurisdiction.

- B. The products provided by this section shall comply with the following applicable references (latest edition):
 - 1. NFPA 72 - National Fire Alarm Code.
 - 2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Connected Equipment Manufacturer Approval: Where equipment and components specified in this Section are used to provide communications for systems furnished under other contracts, obtain review of the equipment and component characteristics and approval for use with the connected system equipment by the connected equipment manufacturers.
- D. Manufacturer's Qualifications: Engage firms experienced and regularly engaged in manufacture and supply of system and components and capacities, whose products have been in satisfactory similar service for not less than three (3) years. Supplier: Authorized by the manufacturer(s) to conduct business in the area of the installation.
- E. Installer's Qualifications: Licensed to install in the state where the project is being constructed. Engage installer familiar and experienced with connections and terminations required and who has at least five (5) years of successful installation and experience a minimum of 4 projects of this type. The Owner has the right to contact these previous customers for verification of credibility as an installer.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Fire alarm equipment and systems shall be as manufactured by Gamewell, Edwards, Notifier, Faraday, Simplex, Silent Knight, Siemens, or approved equal.
 - 1. Each and all items of the Fire Alarm System shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by the Underwriters Laboratories, Inc. (UL), and shall bear the "U.L." label. Partial listing(s) will not be acceptable.
 - 2. In any instance where these specifications call for materials or construction of a better quality or larger size than required by the codes, the provisions of these specifications shall take precedence. The codes shall govern in case of direct conflict between the codes and the drawings.
 - 3. All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component.

- B. Where this system is to be an expansion of or an addition to an existing system, the responsibility of determining the compatibility (UL listing etc.) of the new system with the existing system shall be the manufacturer of the new equipment. This may require modifications of the existing equipment to be retained depending upon the system proposed, and all components within this specification may not be applicable.

2.02 OPERATION

- A. The system shall be a low voltage, detection and notification addressable, programmable, supervised, non-coded manual and automatic alarm system.
- B. The system shall perform the following functions upon receiving an alarm signal from any of the manual detection stations, automatic detection stations, or sprinkler flow switches.
 - 1. Cause all interior and exterior audible devices to sound and all visual devices to flash continuously throughout the facility or impacted zone, until manually reset.
 - a. Audio notification shall be capable of operating in both public and private modes.
 - b. System shall operate in Public mode in Independent Living, Traditional Assisted Living and General Public Corridors/Common Areas of the project.
 - c. System shall operate in Private mode in Specialized Assisted Living, Memory Care, Short Term and Long Term Skilled Nursing Care areas of the project.
 - 2. Cause the appropriate zone annunciators to energize continuously, until reset or acknowledged.
 - 3. Releases door hold opens.
 - 4. Releases electric door locks.
 - 5. Perform automatic shutdown of required equipment.
 - 6. Automatically transmit a signal to on site Facility Staff with location of Trouble or Alarm.
 - 7. Automatically transmit a signal to an off premise monitoring station.
 - 8. Operate required and indicated smoke and/or fire dampers.
 - 9. Interface with elevator systems for elevator recall as required.
- C. Area separation Fire Smoke Dampers shall, as a minimum, be provided with the following equipment and operate as indicated:
 - 1. Each damper shall be provided with a duct type, smoke detector.
 - 2. When fire smoke dampers are located in a corridor wall or ceiling, the corridor smoke detection system associated with the immediate adjacent corridor (to the damper), may be used to activate the fire smoke damper if and as approved by the authority having jurisdiction.
 - 3. The activation of a duct smoke detector shall cause the associated damper to close.

4. The activation of a duct smoke detector shall send an alarm signal at the Fire Alarm Control Panel.
 5. The activation of a duct smoke detector shall send a signal to the HVAC control system(s), such that the ductwork's associated HVAC unit will be shut down as required. Shutdown sequence shall be programmed to avoid damage to the HVAC system and associated ductwork.
 6. Damper system operation and control shall be coordinated with the Mechanical Contractor.
 7. Duct Smoke Detectors and wiring shall be provided under this contract. Fire Smoke Dampers and their installation shall be provided by the Mechanical Contractor.
- D. HVAC equipment shutdown shall, as a minimum, be provided with the following equipment and operate as indicated:
1. Duct smoke detectors shall be provided in the return ductwork, at the HVAC unit, as recommended by the HVAC unit and the smoke detector manufacture.
 2. The activation of a duct smoke detector shall send an alarm signal at the Fire Alarm Control Panel.
 3. The activation of a duct smoke detector shall send a signal to the HVAC control system(s), to shut down the HVAC unit.
 4. Shutdown method shall be coordinated with the Mechanical Contractor.
 5. Duct Smoke Detectors and associated wiring shall be provided under this contract, unless indicated otherwise by these drawings or specifications.
 6. Where allowed by code and the local authority having jurisdiction (AHJ), the area/corridor smoke detection system may be utilized to send a signal to the HVAC system to activate HVAC shutdown sequences.
- E. System wiring zones for circuit isolation and testing purposes shall be as follows, as a minimum, and shall be coordinated with the authority having jurisdiction:
1. One (1) zone per floor for manual/automatic devices.
 2. One (1) zone per building "Care" area type. (i.e Independent Living, Assisted Living, Memory Care, Skilled Care, etc.)
 3. One (1) zone per HVAC system monitored/controlled.
 4. One (1) zone for monitoring of the Fire Protection System Building Main.
 5. One (1) zone for monitoring of each Fire Protection System internal building zone/system.
 6. One (1) zone for each elevator bank.

2.03 COMPONENTS

- A. Master fire equipment panel (with integral annunciator) shall, as a minimum, contain the following features:
1. Dead front modular construction (Flush, semi-flush, or surface mounted as indicated)
 2. Individual function control modules
 3. Supervised alarm relay coils
 4. Expandable
 5. Solid state
 6. Alarm overrides trouble
 7. Ground Detection
 8. Zone annunciator panel or Address Readout Indication
 9. Power supply with battery backup for 24 hours
 10. Alarm and trouble signals
 11. Audible alarm and trouble signals
 12. Trouble and alarm silence and reset switches
 13. L.E.D. indicating lights
 14. Built-in lamp test
 15. Auxiliary relays.
 16. System manager software to alert/notify staff via cellphone.
 17. Provisions for off-premise monitoring
 18. Complete system battery backup
- Note: Telephone service and connections, or similar for the off-premise monitoring shall not be included as part of this contract.
- B. Manual stations shall be flush mounted breakglass type of vandal resistant construction and provided with a general alarm key switch.
- C. Area system smoke detectors shall be photoelectric type with a LED alarm light, adjustable sensitivity, plug-in base, auxiliary relay contact, and a low-profile white enclosure. Provisions for elevator interface shall be provided as required. Detectors shall comply with UL 268.
- D. Area system carbon monoxide (CO) detectors shall be low level detection type with a LED alarm light, adjustable sensitivity, plug-in base, auxiliary relay contact, and a low-profile white enclosure.

- E. Thermal detectors shall be 135 degree rate of rise or 200 degree fixed temperature addressable type, low profile type with a white enclosure.
- F. Duct smoke detectors shall be photoelectric type with adjustable sensitivity, an auxiliary SPDT relay contact, key operated rest-test switch, sampling tubes extending the width of the duct, visual indicate of detector activation and duct-mounted housing. Detectors shall comply with UL 268A.
- G. Duct type heat detectors shall be addressable, adjustable, bimetallic type with an L.E.D. alarm light, test switch.
- H. Residential Unit Detector/Alarm:
 - 1. Single station smoke detector/alarm shall be 120-volt photoelectric type with battery backup, a L.E.D. alarm light and a low-profile white enclosure. Gentex S1209
 - 2. Single station carbon monoxide detector/alarm shall be 120-volt low level CO detection type with battery backup, a L.E.D. alarm light and a low-profile white enclosure. Gentex CO1209
 - 3. Where carbon monoxide and smoke alarms are required, a combination device may be utilized. Gentex GN-503
 - 4. Detector/alarm devices located in designated units for the visual and hearing impaired shall be provided with both audio and visual notification capabilities. Gentex GXS-120
 - 5. All detector/alarm devices within a single respective unit shall be interlocked such that activation of any one alarm will cause all detectors to go into alarm within that respective unit.
- I. Fire protection flow, supervisory, post indicator valve, tamper switches and bells and/or beacons shall be provided by the sprinkler contractor and connected under this contract. Locations and quantities of these devices may not be shown on the drawings as the information will not be available until the fire protection system is approved by the authority having jurisdiction via the shop drawing process.
- J. Fire protection dry system air compressors shall be provided by the sprinkler contractor and connected under this contract. Locations and quantities of these devices may not be shown as the information may not be available until the fire protection system is approved by the authority having jurisdiction via the shop drawing process.
- K. Interior and exterior horns shall be combination flush, candela and DB adjustable, electronic sounder type horn units with visual strobes labeled "FIRE", meeting ADA requirements.
 - 1. Provide combination units that allow sounders and strobes to operate independently so that horns may be silenced from the fire alarm control panel while strobe devices continue to flash.
 - 2. Units shall have with a red finish on a cast aluminum housing.
 - 3. Locations are to be as indicated on the drawings with the candela and DB ratings to be determined by the manufacturer to meet the indicated location.
 - 4. With approval, the manufacturer shall modify the locations and quantities to be assured of proper coverage and meet the requirements of the authority having jurisdiction.

- L. Resident unit horns shall be flush mounted, low frequency type horns with a red finish, and provisions for an adjustable candela optional strobe light.
 - 1. Locations are to be as indicated on the drawings with the candela and DB and candela settings ratings to be determined by the manufacturer to meet the indicated location.
 - 2. With approval, the manufacturer shall modify the locations and quantities to be assured of proper coverage.
- M. Door holders shall be flush magnetic wall type with an aluminum housing and a brushed finish.
- N. Remote annunciators, where called for, shall be of the flush mounted LED type with locations as called for on the drawings or as directed by the engineer and the authority having jurisdiction.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All fire alarm wiring shall be enclosed in a conduit system, except in accessible ceilings and hollow wall cavities where UL listed plenum rated red colored cable assemblies may be utilized.
- B. System wiring shall be enclosed in conduit where required by code for "high rise" applications.
- C. Conductors shall be terminated with Sta-Kon type connectors.
- D. Device shall be installed at the following heights or as noted on the architectural or electrical drawings with the exact location coordinated with the geometry of the space.
 - 1. Manual stations 48"
 - 2. Interior horns 80" (to bottom of strobe) or ceiling mounted
 - 3. Door holders 72"
 - 4. Remote annunciator 60"

3.02 SUPERVISION

- A. The manufacturer shall supervise the final connection and installation of the system and upon completion, shall provide the architect/engineer with written certification that the system, as a minimum, is installed as specified and is functioning properly.

3.03 TESTING

- A. The fire alarm system shall be tested under "simulated" alarm conditions prior to the acceptance of the owner.

END OF SECTION

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