SECOND AMENDATORY AGREEMENT

This **SECOND AMENDATORY AGREEMENT** is made between the **CITY AND COUNTY OF DENVER**, a municipal corporation of the State of Colorado (the "City"), and **DYNALECTRIC COMPANY,** a Delaware corporation whose legal address is 1420 Spring Hill Rd., Suite 500, McLean, VA 22102, and whose notice address is 345 Sheridan Blvd., Lakewood, Colorado 80266 (the "Contractor"), jointly "the Parties" and individually a "Party."

RECITALS:

WHEREAS, the City and the Contractor entered into an Agreement executed on July 13, 2022, and a Revival and Amendatory Agreement executed on May 9, 2023 (collectively, the "Agreement") to provide the services described in Exhibit A of the Agreement.

WHEREAS, the Parties now wish to amend the Agreement to increase the Maximum Contract Amount and to amend the Scope of Work.

NOW THEREFORE, in consideration of the premises and the Parties' mutual covenants and obligations, the Parties agree as follows:

1. All references to "**Exhibit A**" in the Agreement shall be amended to read: "**Exhibit A-1**". The Scope of Work marked as **Exhibit A-1** is attached hereto and incorporated herein by this reference.

2. All references to "**Exhibit B**" in the Agreement shall be amended to read: "**Exhibit B-1**". The Proposal Pricing Sheet marked as **Exhibit B-1** is attached hereto and incorporated herein by this reference.

3. In Section 4 of the Agreement, entitled "**COMPENSATION AND PAYMENT.**", Subsection A, entitled "**Maximum Contract Amount:**", is hereby deleted in its entirety and replaced with:

> "**A. Maximum Contract Amount:** The Maximum Contract Amount to be paid by the City to the Contractor for satisfactory completion of all Work authorized by the City and performed by the Contractor under this Contract shall in no event exceed the sum of **NINE HUNDRED FIFTY-FOUR THOUSAND NINE HUNDRED EIGHTY-EIGHT DOLLARS AND ZERO CENTS ($954,988.00)**, unless this Contract is modified to increase said amount by a duly authorized and written amendment to this Contract executed by the Parties in the same manner as this Contract. The Maximum Contract Amount stated herein is not intended, and shall not be construed, as a promise or guarantee to the

Contractor that the final price payable to the Contractor for all of the authorized Work will equal the Maximum Contract Amount."

4. As herein amended, the Agreement is affirmed and ratified in each and every particular.

5. This Second Amendatory Agreement will not be effective or binding on the City until it has been fully executed by all required signatories of the City and County of Denver, and if required by Charter, approved by the City Council.

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK; SIGNATURE PAGES FOLLOW.]

Contract Control Number: GENRL-202369525-02 [GENRL-202263055-02]
Contractor Name: DYNALECTRIC COMPANY

IN WITNESS WHEREOF, the parties have set their hands and affixed their seals at Denver, Colorado as of:

SEAL

CITY AND COUNTY OF DENVER:

ATTEST:

By: _____

_____

APPROVED AS TO FORM:

Attorney for the City and County of Denver

By: _____

REGISTERED AND COUNTERSIGNED:

By: _____

By: _____

Contract Control Number: GENRL-202369525-02 [GENRL-202263055-02]
Contractor Name: DYNALECTRIC COMPANY

By: DocuSigned by: Rob Long 6FA7989BD6B742A...

Name: Rob Long
(please print)

Title: President
(please print)

ATTEST: [if required]

By: _____

Name: _____
(please print)

Title: _____
(please print)

EXHIBIT A-1

SCOPE OF WORK

POLICE ADMINISTRATION BUILDING FIRE ALARM SYSTEM REPLACEMENT

A.1 OVERVIEW

The project will include the installation of a new fire alarm panel in Police Admin Building with full smoke detection (in non-sprinklered areas) and voice evacuation occupant notification throughout Levels 1 through 5 and Level 7 (approximately 123,000 SF) and occupant notification throughout the garage/basement levels (approx. 180,000 SF) as well as all supporting materials and demolition. The existing fire alarm panel for both the Police Administration Building (PAB) and the Pre-Arraignment Detention Facility (PADF) is located in PADF at 1351 Cherokee Street 80204 and near the end of its useful life. This project will focus on developing a stand-alone system for PAB under the ordinance of the appropriate Denver Building & Fire Code. The existing fire alarm panel in PADF will remain and provide continued monitoring for the facility.

A.2 SCOPE OF WORK

SECTION 210500 - FIRE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. This Section and the Drawings outline the general, but not specific, scope of the project's Fire Sprinkler System. The successful Contractor will be the Engineer of Record for the design of the system. The Design and Engineering of the Fire Sprinkler System shall be by the Fire Sprinkler Contractor. It is the Contractor's responsibility that the system meets all the requirements of NFPA and the Authority Having Jurisdiction.

B. This Section specifies Automatic Sprinkler Systems for buildings and structures. Materials and equipment specified in this Section include:

1. Pipe, Fittings, Valves and Specialties
2. Sprinklers and Accessories

C. Products furnished but not installed by the Contractor include sprinkler head cabinet with spare sprinkler heads. Furnish to the Owner's maintenance personnel for installation in an approved location.

D. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 7 Section "Joint Sealers" for materials and methods for sealing pipe penetrations

through basement walls and fire/smoke barriers.

2. Division 23 Section "Mechanical Identification" for labeling and identification of fire protection piping system and components.
3. Division 23 sections inclusive.

1.3 DEFINITIONS

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

B. Other definitions for Fire Protection Systems are listed in applicable NFPA Codes or Standards.

C. Working Plans as used in this Section means those documents (including drawings and calculations) prepared pursuant to the requirements contained in NFPA 13 for obtaining approval of the Authority Having Jurisdiction.

1.4 SYSTEM DESCRIPTION

A. The building is provided with an existing partial sprinkler system. The existing fire sprinkler protection on Level 6 is not in service. Provide a complete and working Fire Sprinkler System for Level 6 of the building. Recertify system.

B. Fire Sprinkler System is a "Wet-Pipe" system employing automatic sprinklers attached to a piping system containing water and connected to a water supply so that water discharges immediately from sprinklers opened by fire.

C. To remove existing code violations on the 6th Floor of PAB. The 6th Floor at PAB has been in an unfinish state since DOTI finished the construction of the new Crime Lab Facility over five years ago but did not complete the cleanup work on the 6th floor to make it compliant with DFD requirements. This includes cut electrical circuits, exposed wires, non-suspended conduits, holes in the drywall creating non-sprinkled void spaces. As part of our FAS project, we need to clean up the code violation issues on the floor for Dynalectric to pass DFD inspections. The department of General Services we will also be handling some of these code issues in house.

1.5 SUBMITTALS

A. The contractor is to prepare a submittal schedule that coincides with the overall construction schedule. This submittal schedule should include a list of individual products to be submitted under each specification section. This submittal schedule shall also include dates for anticipated review, shipment, and on-site delivery times of the submitted product.

B. Submittal shall be submitted to the Consultant for review and approval prior to submittal to the AHJ for approval.

C. Submittals shall be prepared by authorized equipment dealers, vendors, suppliers, or representative of the products submitted. Include contact and business information of the equipment dealers, vendors, suppliers and representatives. Products and equipment submitted shall also be representative of the products and equipment to be procured and installed.General product data and shop drawings downloaded from unaffiliated websites will not be reviewed or accepted.

1. After review, submittals shall be returned together with review comments and specific actions (if required) to be taken by the Contractor. Typical comments and actions will be:

   a. Reviewed – resubmittal not required.
   b. Rejected – resubmittal required.
   c. Revise and Resubmit – resubmittal required.
   d. Make Corrections as Noted – resubmittal not required unless corrections cannot be met.

D. The Engineer shall be given a submittal review time of ten (10) working days upon receipt of submittal. Previous submittal rejection or revision shall not compress this review time. It shall be the contractor’s responsibility to ensure these review and/or re-review times are incorporated into the submittal schedule with enough lead time as not to affect overall construction schedule.

E. Product data for each type sprinkler head, valve, piping and piping specialty, fire protection specialty, and any equipment installed in accordance with the Contract Documents.

F. Shop drawings and hydraulic calculations prepared in accordance with NFPA 13. Do notproceed with the installation of the work until the Architect/Engineer review of shop drawings is received.

G. Contractor shall stamp shop drawings indicating compliance with applicable codes and contract drawings. Contractor shall stamp drawing "Approved for Construction".

H. Product data, shop drawings, and hydraulic calculations shall be submitted to the Consultant as one-single package. Individual submittals received of any item will be returned without review

until all items are received.

I. Submit all submittal items required for each Specification Section. Submittals shall be prepared and submitted in accordance with the submittal schedule. The contractor is to determine and coordinate submittal review times, lead times and delivery times of submitted products as it coincides with the overall construction schedule. Submittals submitted in bulk or under a single division will not be review and will be sent back as “revise and resubmit”.

J. If more than one (1) re-submittals (either for shop drawings or for as-built drawings) are made by the Contractor, the Owner reserves the right to charge the Contractor for subsequent reviews by their consultants. Such extra fees shall be deducted from payments by the Owner to the Contractor.

K. Maintenance data for each type sprinkler head, valve, piping specialty, fire protection specialty specified, for inclusion in operating and maintenance manual specified in Division 1.

L. Welder's Qualification Certificate.

M. Test Reports and Certificates, including "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Materials and Test Certificate for Underground Piping" as described in NFPA 13.

N. Hydraulic calculations and drawings created by the Contractor and submitted to the Engineer shall have the signed stamp of a professional engineer registered in the State of Colorado and familiar with this type of installation and with previous similar experience or the signature with certification number of a Level 4 Senior Engineering Technician of the National Institute for Certification of Engineering Technology (practicing in the Fire Protection field) certifying that the Fire Sprinkler System has been hydraulically calculated in compliance with NFPA and governing codes.

O. Fire sprinkler piping design drawings shall show, and be coordinated with, all ductwork, air devices, lighting, electrical panels and structural elements of the Building.

P. Electronic submittals shall be packaged as a bookmarked multi-page single PDF.

1.6 REQUESTS FOR INFORMATION

A. All “Requests for Information” submitted by the Contractor shall include a proposed solution and an estimated cost/schedule impact. Any RFI’s that do not contain this required information will be sent back to the Contractor unanswered.

B. Schedule the work to provide the Engineer a minimum review time of five (5) business days upon receipt of RFIs to provide a response.

1.7 HYDRAULIC DESIGN

A. The Fire Sprinkler System shall be hydraulically calculated by the Contractor in compliance with NFPA 13.

B. The water supply curve shall be developed by deducting 10% up to 10 PSI from the static and residual pressures measured during the flow test. The final fire sprinkler system demand shall be below the water supply curve.

C. Velocities in pipes shall be shown on hydraulic calculations. Velocities in overhead piping shall not exceed 32 feet per second.

D. Allow 10 feet of loss for electric water flow switches or as recommended by the manufacturer and note on hydraulic calculations.

E. The Fire Sprinkler Contractor shall provide as many sets of hydraulic calculations as necessary, performed and submitted to prove that the most remote and demanding areas are calculated.

F. Design information shall be permanently affixed to the main riser as described in NFPA 13.

G. Water Flow Data: Refer to accompanying Bid Documents for water supply information. Water supply information is for bidding purposes only.

H. Before hydraulically calculating fire sprinkler system, the Fire Sprinkle Contractor shall verify exact water flow data with Local Water and/or Fire Department. A copy of the water flow test data from the Local Water and/or Fire Department shall accompany the hydraulic calculations.

I. Where a water flow test is used for the purposes of design, the test shall be conducted no more than 12 months prior to working plan submittal unless otherwise approved by the AHJ.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Installation and alterations of fire protection piping, equipment, specialties, and accessories, and repair and servicing of equipment shall be performed only by qualified installer. The term "qualified" means experienced in such work (experienced shall mean having a minimum of five (5) previous projects similar in size and scope to this project), familiar with all precautions required, and has complied with all the requirements of the Authority Having Jurisdiction. The Contractor shall be licensed for the design and installation for the specific type of system in the jurisdiction where the work is to be performed and the State of Colorado. Upon request, submit evidence of such qualifications to the Engineer. Refer to Division 1 Section "Definitions and Standards" for definitions for "Installers".

B. Qualifications for Welding Processes and Operators: Comply with the requirements of AWS D10.9, "Specifications of Qualifications of Welding Procedures and Welders for Piping and Tubing, Level AR-3".

1.9 SEQUENCING AND SCHEDULING

A. Schedule rough-in installations with installations of other building components.

B. Minimum time frame for notice of inspections, tests and meetings is five (5) days and list the persons to be notified.

1.10 EXTRA STOCK

A. Sprinkler Heads: For each style and temperature range (and length for dry heads) required, furnish additional sprinkler heads per NFPA 13.

1. Obtain receipt from Owner that extra stock has been received.

B. Wrenches: Furnish two (2) spanner wrenches for each type and size of valve connection and fire hose coupling.

PART 2 - PRODUCTS

2.1 MATERIALS AND PRODUCTS

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in fire protection systems.

B. All equipment used on this project shall be new and UL Listed, unless noted or specified otherwise.

2.2 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide fire protection system products from one of the following:

1. Gate Valves:

    a. Nibco
    b. Kennedy Valve, Division of ITT Grinnell Valve Co., Inc.
    c. Mueller
    d. Stockham
    e. Grinnell
    f. Milwaukee
    g. Or equal

2. Swing Check Valves:

    a. Mueller
    b. Kennedy Valve, Division of ITT Grinnell Valve Co., Inc.
    c. Viking
    d. Victaulic
    e. Globe
    f. Tyco Fire Products
    g. Reliable Automatic Sprinkler Company
    h. Or equal

3. Butterfly and Ball Valves:

    a. Grinnell
    b. Mueller
    c. Victaulic
    d. Milwaukee
    e. Or equal

4. Grooved Mechanical Couplings:

    a. Gruvlok
    b. Victaulic Company of America
    c. Or equal

5. Sprinkler Heads:

    a. Reliable Automatic Sprinkler Co., Inc.
    b. Viking Corp.
    c. Globe
    d. Tyco Fire Products
    e. Victaulic Company of America
    f. Or equal

6. Inspector's Test and Drain Module:

    a. Victaulic
    b. A.G.F.
    c. Or equal

7. Flexible Stainless Steel Hose Branch Line:

    a. UL Listed and FM approved for Fire Protection Use, Braided Hose only.

2.3 BASIC IDENTIFICATION

A. General: Provide identification complying with Division 23 Basic Mechanical Materials and Methods section "Mechanical Identification", in accordance with the following listing:

1. Fire Sprinkler Piping: Pipe markers.
2. Fire Sprinkler Valves: Valve tags.
3. Fire Sprinkler Signs: Provide the following signs:

    a. At each sprinkler valve, sign indicating what portion of system valve controls.
    b. At each outside alarm device, sign indicating what authority to call if device is activated.
    c. At door to each sprinkler control valves, sign reading **"FIRE CONTROL"**.
    d. At each drain or test, sign indicating its purpose.

B. Attach to the riser a metal sign indicating the name, address and telephone number of the Fire Sprinkler Contractor. Also indicate the date of installation.

2.4 BASIC PIPING SPECIALTIES

A. General: Provide piping specialties complying with Division 23 Basic Mechanical Materials and Methods section "Piping Specialties", in accordance with the following listing:

1. Pipe Escutcheons
2. Dielectric Unions
3. Drip Pans
4. Pipe Sleeves
5. Sleeve Seals
6. Fire Barrier Penetration Seals

2.5 BASIC SUPPORTS AND ANCHORS

A. General: Provide supports and anchors for fire protection system in compliance with NFPA 13.

1. Adjustable steel clevis hangers, adjustable steel band hangers, or adjustable band hangers, for horizontal-piping hangers and supports.
2. Two-bolt riser clamps for vertical piping supports.
3. Steel turnbuckles and malleable iron sockets for hanger-rod attachments.
4. Concrete inserts, top-beam C-clamps, side beam or channel clamps or center beam clamps for building attachments.
5. Concrete inserts and other type hangers penetrating into or through structural members shall be submitted (by the Fire Protection Contractor) to, and have the approval of, the Structural Engineer contracted for this project.
6. Powder driven studs shall not be allowed.
7. Hangers (which are acceptable for Project) and hanger spacing shall be in accordance with NFPA-13.

2.6 PIPE AND TUBING MATERIALS (INSIDE BUILDING)

A. General: Refer to Part 3 Article "Pipe Applications" for identification of systems where the below specified pipe and fitting materials are used.

B. Steel Pipe: ASTM A 53, A795 or A135, Schedule 40 or Schedule 10, U.S. manufacture, Black steel pipe, plain ends.

C. U.S. manufactured pipe is required.

D. Schedule 5 pipe shall not be allowed.

E. The Corrosion Resistance Ratio of the pipe shall be 1.00 or greater. Documentation shall be presented with product submittal.

F. Schedule 10 pipe shall only be allowed for pipe sizes 2-1/2 inch and larger.

2.7 FITTINGS (INSIDE BUILDING)

A. Cast Iron Threaded Fittings: ANSI B16.4, Class 125 standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

B. Malleable Iron Threaded Fittings: ANSI B16.3, Class 300, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1. Install steel pipe with threaded joints and fittings for 2-inch and smaller and where shown on drawings.

C. Steel Fittings: ASTM A234, seamless or welded, for welded joints.

D. Grooved Mechanical Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47 Grade 32510 malleable iron; or ASTM A53, Type F or Types E or S.

E. Grooved Mechanical Couplings: Consist of ductile or malleable iron housing, a synthetic rubber gasket of a central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure roll-grooved pipe and fittings. Grooved mechanical couplings includinggaskets used on dry-pipe systems shall be listed for dry-pipe service.

F. Grooved Mechanical Fittings and Couplings for the entire fire protection system shall be of the same manufacturer as submitted in shop drawing equipment review.

G. Cast Iron Threaded Flanges: ANSI B16.1, Class 250; raised ground face, bolt spot faced.

H. Cast Bronze Flanges: ANSI B16.24, Class 300; raised ground face, bolt holes spot faced.

I. Plain end, hooker type, or push-on fittings or couplings shall not be allowed.

J. Bushings and reducing couplings shall not be allowed.

K. UL listed and Factory Mutual approved segmentally welded fittings are acceptable.

L. Mechanical Tee's shall not be allowed.

2.8 JOINING MATERIALS

A. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.

B. Gasket Materials: Thickness, materials and type suitable for fluid or gas to be handled, and design temperatures and pressures.

2.9 GENERAL DUTY VALVES

A. Gate Valves - 2-Inch and Smaller: Body and bonnet of cast bronze, 175 pound cold water working pressure – non-shock, threaded ends, solid wedge, outside screw and yoke, rising stem, screw-in bonnet, and malleable iron handwheel. Valves shall be capable of being repacked under pressure, with valve wide open.

B. Gate Valves - 2-1/2 Inch and Larger: Iron body; bronze mounted, 175 pound cold water working pressure – non-shock. Valves shall have solid taper wedge; outside screw and yoke, rising stem; flanged bonnet, with body and bonnet conforming to ASTM A 126 Class B; replaceable bronze wedge facing rings; flanged ends; and a packing assembly consisting of a cast iron gland flange, brass gland, packing, bonnet, and bronze bonnet bushing. Valves shall be capable of being repacked under pressure, with valve wide open.

C. Butterfly Valves: 2-1/2 Inch to 8-inch shall be listed to 175 PSI with optional internal tamper switch. Body shall be ductile iron with a corrosion resistant coating. Seat shall be field replaceable without the use of special tools. The valve shall be provided with stem bushings to isolate the stem from the stem journal. The valve body shall be machined with a retaining lip forpositive retention of the seat to provide drip tight shutoff at full rated differential pressure withthe downstream piping removed.

D. Ball Valves: 1-1/2 Inch and smaller shall be threaded, forged brass construction, with teflon seats and blow out proof stem.

E. Ball Valves: 2-Inch to 3-inch shall be listed to 300 PSI with optional internal tamper switch. Body shall be ductile iron with corrosion resistant coating. Ball shall be 316 stainless steel.

F. Swing Check Valves: MSS SP-71; Class 175, cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, with a bronze disc or cast-iron disc with bronze disc ring, and flanged ends. Valve shall be capable of being refitted while the valve remains in the line.

2.10 BASIC METERS AND GAUGES

A. Provide meters and gauges as specified below.

1. UL Listed and FM Approved for fire protection service.
2. For water gauges 0-300 PSI range.
3. For air gauges, 0-80 PSI range graduated in 1 PSI increments with a 80 PSI -250 PSI retard range

2.11 ALARM DEVICE AND FIRE PROTECTION SPECIALTIES

A. General: Types and sizes shall mate and match piping and equipment connections. Provide fire protection specialties, UL listed, in accordance with the following listing. Provide sizes and types which mate and match piping and equipment connections.

B. Water Flow Indicators: Vane type waterflow detector, rated to 250 PSIG; designed for horizontal or vertical installation; have two (2) SPDT circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere 125 volts AC and 0.25 ampere 24 volts DC; complete with factory-set field-adjustable retard element to prevent false signals, tamper-proof cover which sends a signal when cover is removed, and with activation time retarding capability set at 30 seconds. The setting shall be verified through the Inspectors Test prior to Final Inspection.

C. Supervisory Switches: Provide products recommended by manufacturer for use in service indicated. SPST, normally closed contacts, designed to signal valve in other than full open position.

2.12 AUTOMATIC SPRINKLERS

A. Sprinkler Heads: Provide sprinkler heads with a temperature rating per NFPA 13. Sprinkler head K factor should be selected to optimize the hydraulics of the fire sprinkler system. A minimum K factor of 5.6 is to be used.

B. Sprinkler Head Finishes: Provide heads with the following finishes:

1. Upright, Pendent and Sidewall Styles: Chrome plated, factory brass, in finish spaces, exposed to view; rough bronze finish for heads in unfinished spaces and not exposed to view. Heads shall be stainless steel where installed exposed to acids, chemicals, or other corrosive fumes.
2. Recessed Style: Bright chrome, with bright chrome escutcheon plate in areas with a finished ceiling. GEM Models FR948 and F948 recessed sprinklers are not acceptable.
3. See drawings for additional sprinkler type requirements.

C. Sprinkler Head Cabinet and Wrench: Finished steel cabinet, suitable for wall mounting, with hinged cover and space for spare sprinkler heads plus sprinkler head wrench. Provide amounts of each style per NFPA 13. Locate head cabinet on shop drawing submittal.

D. Plastic fire sprinkler escutcheons are not acceptable.

2.13 INSPECTOR'S TEST AND DRAIN ASSEMBLY

A. Provide an alarm test module of a manufacturer listed in Paragraph 2.2.

B. Comply with NFPA 13, for draining and testing of wet sprinkler system.

C. Test and drain piping shall be routed to existing main sprinkler drain. Location shall meet Owner's approval.

PART 3 - EXECUTION

3.1 PIPE APPLICATIONS

A. Install Schedule 40 steel pipe with threaded joints and fittings for piping 2-inch and smaller.

B. Install Schedule 10 steel pipe with roll-grooved ends and grooved mechanical coupling or with threaded joints and fittings for piping 2-1/2-inch and larger.

C. Acceptable alternates to Schedule 40 pipe shall be installed per manufacturer's recommendations.

3.2 PIPING INSTALLATIONS

A. Provide a minimum 5'-0" cover for all underground pipe installations. Install in accordance with AWWA C600.

B. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. So far as practical, install piping as indicated. Drawings are diagrammatic in character and do not necessarily indicate every required offset, valve, fitting, etc.

1. Deviations from approved "Working Plans" for sprinkler piping require written approval of the Authority Having Jurisdiction. Written approval shall be on file with the Engineer prior to deviating from the approved "Working Plans".

C. Install sprinkler piping to provide for system drainage in accordance with NFPA 13.

D. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes. Welded outlet branch pipe fittings are acceptable.

E. Install unions in pipe 2-inch and smaller, adjacent to each valve. Unions are not required on flanged devices or in piping installations using grooved mechanical couplings.

F. Install flanges or flange adapters on valves, apparatus, and equipment having 2-1/2 inch and larger connections.

G. For welded pipe, all cutouts (coupons) shall be removed prior to installation.

H. Hangers and Supports: Comply with the requirements of NFPA 13. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions for rigid systems. Provide protection from damage where subject to earthquake in accordance withNFPA 13.

I. Install mechanical sleeve seal at pipe penetrations in basement and foundation walls. Refer to Division 23 Section "Basic Piping Materials and Methods".

J. All piping penetrating walls to structure shall be sleeved and sealed per Division 23.

K. Install test connections sized and located in accordance with NFPA 13 complete with shutoff valve. Test connections may also serve as drain pipes.

L. Install pressure gauge on the riser assembly or sprinkler main near each test connection. Provide gauge with a connection not less than 1/4-inch and having a soft metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and where they will not be subject to freezing.

M. The Fire Sprinkler Contractor shall be responsible for the coordination of his installation with all other contractors and existing building elements.

N. Protect adjacent area where pipe cutting and threading takes place (e.g. floors, ceilings, walls, etc.).

O. There shall be no fire sprinkler piping in Electrical Rooms, other than piping serving sprinklers directly in that room, or installed over any electrical panels.

P. Provide spring-loaded check valve at top of drain risers.

Q. Install hangers straight and true and piping parallel to building lines.

3.3 PIPE JOINT CONSTRUCTION

A. Welded Joints: AWS D10.9, Level AR-3.

B. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
2. Align threads at point of assembly.
3. Apply appropriate tape or thread compound to the external pipe threads.
4. Assemble joint to appropriate thread depth. When using a wrench on valves, place the wrench on the valve end into which the pipe is being threaded.
5. Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

C. Flanged Joints: Align flange surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

D. Mechanical Grooved Joints: Roll grooves on pipe ends dimensionally compatible with the couplings.

E. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

3.4 VALVE INSTALLATIONS

A. General: Install fire protection specialty valves, fittings and specialties in accordance with the manufacturer's written instructions, NFPA 13 and the Authority Having Jurisdiction.

B. Gate Valves: Install electronically supervised-open indicating valves so located to control all sources of water supply except fire department connections. Where there is more than one (1) control valve, provide permanently marked identification signs indicating the portion of the system controlled by each valve.

3.5 SPRINKLER HEAD INSTALLATIONS

A. Any sprinklers with any paint on them, as a result of the painting of the sprinkler piping, shall be replaced. The sprinkler system shall then be hydrostatically tested again at the Contractor's expense.

B. Sprinkler heads shall be positioned so as to comply with NFPA 13 for any obstructions.

C. Run piping concealed above heated furred ceilings and in joists to minimize obstructions. Expose only heads.

D. Protect sprinkler heads against mechanical injury with standard guards.

E. Provide heads in "pocketed" areas caused by exposed duct, piping or beams.

F. Sprinkler heads shall be located in the center of all 2-foot x 2-foot ceiling tiles, quarter points, and along the centerline lengthwise of 2-foot x 4-foot ceiling tiles.

G. Use proper tools to prevent damage during installations.

H. Install sprinkler piping in a manner such that mechanical equipment, ceiling tiles or lights can be accessed and easily removed.

I. Minimum fire sprinkler head temperature rating for sprinklers in electrical rooms shall be 212 degree F. Keep sprinklers as far from transformers and/or panels as spacing allows.

3.6 INSTALLATION OF BASIC IDENTIFICATION

A. General: Install mechanical identification in accordance with Division 23 Basic Mechanical Materials and Methods section "Mechanical Identification".

B. Install fire sprinkler signs on piping in accordance with NFPA 13 requirements.

3.7 INSTALLATION OF METERS AND GAUGES

A. Install meters and gauges in accordance with Division 23 Basic Mechanical Materials and Methods section "Meters and Gauges".

3.8 FLEXIBLE STAINLESS STEEL HOSE BRANCH LINE

A. Install per requirements associated with the listing of U.L. and Factory Mutual for installation in suspended or sheet rock ceilings. Provide factory brackets to maintain listing of installation for applicable sprinkler head type connection.

3.9 FIELD QUALITY CONTROL

A. Flush, test and inspect Sprinkler Piping Systems in accordance with NFPA 13.

B. The Fire Sprinkler Contractor shall conduct and bear the costs of all necessary tests of the Fire Sprinkler Work, furnish all labor, power and equipment. All piping shall be tested with water as required, the tests witnessed by the Authority Having Jurisdiction.

C. The Fire Sprinkler Piping shall be tested under a hydrostatic pressure of not less than 200 PSIG, for a duration of not less than two (2) hours.

D. Replace piping system components which do not pass the test procedures specified, and retest repaired portion of the system at Fire Sprinkler Contractor's expense.

E. All piping tests (pneumatic and hydrostatic) shall be conducted prior to the application of any painting materials. This will prevent hidden leaks and/or repainting of repaired/altered piping.

3.10 SYSTEM CERTIFICATION

A. The Contractor shall provide the Owner with written certification prior to final inspection, that all new equipment:

1. Has been visually inspected and functionally tested as required by the specifications.
2. Is installed entirely in accordance with the manufacturer's recommendations within the limitations of the system's UL listings and NFPA criteria.
3. Is in proper working order.

3.11 FINAL INSPECTION AND TESTING

A. The Contractor shall make arrangements with the Owner for final inspection and witnessing of the final acceptance tests. The Fire Sprinkler Contractor, the Alarm System Contractor and the Owner will conduct the final inspection and witness the final acceptance test.

B. All tests and inspections required by the referenced Codes and Standards, and the Owner shall be performed by the Contractor.

C. The inspecting committee as referenced above will visit the job site to inspect the work and witness the final acceptance tests when they have been advised by the Contractor that the work is completed and ready for test. If the Work is not complete or the test is unsatisfactory, the Contractor shall be responsible for the Consultant's extra time and expenses for re-inspection and witnessing the re-testing of the work. Such extra fees shall be deducted from payments by the Owner to the Contractor.

D. After the system has been inspected and tested, a certificate, "Contractor's Material and Test Certificate Sprinkler System - Water Spray System", shall be provided by the Contractor and shall be signed by him or his representative, the Owner's representative and by a representativeof the Fire Department if appropriate. Sufficient copies shall be prepared to ensure theEngineer, Owner, all Inspecting Authorities and the Contractor have a copy for their files. The Contractor shall prepare one (1) test report for each inspection performed whether successful ornot.

E. The signing of the Certificate by the Owner's representative shall in no way prejudice any claim against the Contractor for faulty material, poor workmanship, or failure to comply with Inspecting Authority's requirements or Local Ordinances.

F. Contractor shall provide at least five (5) working days notice for all tests.

G. All sprinkler supervisory initiating devices shall be functionally tested to verify proper operation.

H. All supervisory functions of each initiating device shall be functionally tested.

I. Receipt of all alarm and trouble signals, initiated during the course of the testing, shall be verified at the Fire Alarm Control Panel.

3.12 OPERATION AND MAINTENANCE MANUAL

A. The Contractor shall provide the Owner with a loose-leaf manual containing:

1. A detailed description of the systems.
2. A detailed description of routine maintenance required or recommended or which would be provided under a maintenance contract including a maintenance schedule and detailed maintenance instructions for each type of device installed.
3. Manufacturer's Data Sheets and Installation Manuals/Instructions for all equipment installed.
4. A list of recommended spare parts.
5. Service Directory.
6. Full size reproducibles of the Record Drawings (stamped and signed per Section 1.6).
7. Hydraulic Calculations (stamped and signed per Section 1.6).

B. Within fifteen (15) days of the completion of the work, three (3) copies of the manual shall be submitted for approval.

3.13 RECORD DRAWINGS

A. The Contractor shall provide and maintain on the site an up-to-date record set of approved shop drawing prints which shall be marked to show each and every change made to the sprinkler system from the original approved Shop Drawings. This shall not be construed as authorization to deviate from or make changes to the shop drawings approved by the Owner without written instruction from the Owner in each case. This set of drawings shall be used only as a record set.

B. Upon completion of the Work, the record set of prints shall be used to prepare complete, accurate final record drawings reflecting any and all changes and deviations made to the sprinkler system.

C. The Owner, at his option and at the Contractor's expense, may require revised hydraulic calculations depending on the extent and nature of field changes.

D. The Record Drawings and Hydraulic Calculations shall have the signed stamp of a Professional Engineer registered in the State of Colorado or the signature with certification number of a Level 4 Senior Engineering Technician of the National Institute for Certification of Engineering Technology certifying the Record Drawings and the Hydraulic Calculations accurately represent the completed Fire Protection System.

3.14 GUARANTEE PERIOD

A. Guarantee: The Contractor shall guarantee all materials and workmanship for a period of one (1) year beginning with the date of final acceptance by the Owner. The Contractor shall be responsible during the design, installation, testing and guarantee periods for any damagecaused by him (or his subcontractors) or by defects in his (or his subcontractor's) work,materials, or equipment.

B. Emergency Service: During the installation and warranty period, the Contractor shall provide emergency repair service for the sprinkler system within four (4) hours of a request by the Owner for such service. This service shall be provided on a twenty-four (24) hour per day, seven (7) days per week basis.

3.15 TRAINING

A. The Contractor shall conduct two (2) training sessions of four (4) hours each to familiarize the building personnel with the features, operation and maintenance of the sprinkler systems. Training sessions shall be scheduled by the Owner at a time mutually agreeable to the Contractor and the Owner.

3.16 WATER DAMAGE

A. The Fire Sprinkler Contractor shall be responsible for any damage to the work of others, to building and property/materials of others caused by leaks in automatic sprinkler equipment, unplugged or disconnected pipes or fittings, and shall pay for necessary replacement or repair of work or items so damaged during the installation and testing periods of the automatic sprinkler work.

3.17 WORK BY OTHERS

A. Electrical Contractor shall wire all water flow switches and tamper switches on valves to central alarm panel, and shall also wire alarm bells or light/horn.

END OF SECTION 210500

SECTION 230000 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including the General Conditions of the Contract for Construction, AIA A201 1987 Edition, specification sections apply to the Division 23 specifications and drawings.

B. Related Sections: Refer to all sections in Division 23. Refer to Division 26 specification section and Division 26 drawings.

1.2 SUMMARY

A. This Section specifies the basic requirements for mechanical installations and includes requirements common to more than one (1) section of Division 23. It expands and supplements the requirements specified in sections of Division 23.

B. The Contractor shall coordinate and co-operate with Owner at all times for all new to existing connections, system shutdowns and restart-up, flushing and filling both new and existing systems**.**

C. The Contractor shall be responsible for the maintenance operation and servicing of all new mechanical systems which are to be used by the Owner during the time of any occupancy and use of any areas within the construction limitations before final completion or acceptance of the systems. A written record of maintenance, operation and servicing shall be turned over to the Owner prior to final acceptance**.**

D. Refer to AIA Document A 201-1987, Paragraph 9.6.6, 9.9 and 11.3.11.

1.3 PROJECT CONDITIONS

A. The Contractor may attend a pre-bid walk-thru and shall make themselves familiar with the existing conditions. No additional costs to the Owner shall be accepted for additional work for these existing conditions.

B. Field verify all existing conditions prior to submitting bids.

C. Report any existing damaged equipment or systems to the Owner prior to any work.

D. Protect all mechanical and electrical work against theft, injury or damage from all causes until it has been tested and accepted.

E. Be responsible for all damage to the property of the Owner or to the work of other contractors during the construction and guarantee period. Repair or replace any part of the Work which may show defect during one (1) year from the final acceptance of all work. Provided such defectis, in the opinion of the Architect, due to imperfect material or workmanship and not due to the Owner's carelessness or improper use.

1.4 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

B. Furnish hinged steel access doors with concealed latch, whether shown on drawings or not, in all walls and ceilings for access to all concealed valves, shock absorbers, air vents, motors, fans, balancing cocks, and other operating devices requiring adjustment or servicing. Refer to Division 1 for access door specification and Division 23 for duct access door requirements.

C. The minimum size of any access door shall not be less than the size of the equipment to be removed or 24-inch x 24-inch if used for service only.

D. Furnish doors to trades performing work in which they are to be built, in ample time for building-in as the work progresses. Whenever possible, group valves, cocks, etc., to permit use of minimum number of access doors within a given room or space.

E. Factory manufactured doors shall be of a type compatible with the finish in which they are to be installed. In lieu of these doors, shop fabricated access doors with DuroDyne hinges may be used.

F. Access doors in fire-rated walls and ceilings shall have equivalent UL label and fire rating.

1.5 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment shop drawings and manufacturer's requirements for actual provided equipment for rough-in requirements.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

A. Refer to AIA Document A201 (1987) Edition, "REGULATIONS AND LAWS" and "GOVERNING LAW."

B. Execute and inspect all work in accordance with all Underwriters, local and state codes, rules and regulations applicable to the trade affected as a minimum, but if the plans and/or specifications call for requirements that exceed these rules and regulations, the greater requirement shall be followed. Follow recommendations of NFPA, SMACNA, EPA, OSHA and ASHRAE.

C. Comply with standards in effect at the date of these Contract Documents, except where a standard or specific date or edition is indicated.

D. The handling, removal and disposal of regulated refrigerants shall be in accordance with U.S. EPA, state and local regulations.

E. After entering into contract, Contractor will be held to complete all work necessary to meet these requirements without additional expense to the Owner.

1.7 REQUIREMENTS OF LOCAL UTILITY COMPANIES

A. Comply with rules and regulations of local utility companies. Include in bid the cost of all valves, valve boxes, meter boxes, meters and such accessory equipment which will be required for the project.

1.8 PERMITS AND FEES

A. Refer to AIA Document A201 (1987) Edition, "TAXES," "PERMITS, FEES AND NOTICES" and "USE OF SITE".

B. Contractor shall arrange for and pay for all inspections, licenses and certificates required in connection with the Work.

1.9 MECHANICAL INSTALLATIONS

A. Drawings are diagrammatic in character and do not necessarily indicate every required offset, valve, fitting, etc.

B. Drawings and specifications are complementary. Whatever is called for in either is binding as though called for in both.

C. Drawings shall not be scaled for rough-in measurements or used as shop drawings. Where drawings are required for these purposes or have to be made from field measurement, take the necessary measurements and prepare the drawings.

D. Before any Work is installed, determine that equipment will properly fit the space; that required piping grades can be maintained and that ductwork can be run as contemplated without interferences between systems, with structural elements or with the work of other trades.

E. Coordinate the installation of mechanical materials and equipment above and below ceilingswith suspension system, light fixtures, and other building components.

1. Coordinate ceiling cavity space carefully with all trades. In the event of conflict, install mechanical and electric systems within the cavity space allocation in the following order of priority.

    a. Plumbing waste, vent piping and roof drain mains and leaders
    b. Supply, return and exhaust ductwork
    c. Fire sprinkler mains and leaders
    d. Electrical conduit
    e. Domestic hot and cold water, medical gas piping
    f. Pneumatic control piping
    g. Fire sprinkler branch piping and sprinkler runouts

F. Verify all dimensions by field measurements.

G. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.

H. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

I. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

J. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

K. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.

L. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

M. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

1.10 CUTTING AND PATCHING

A. This Article specifies the cutting and patching of mechanical equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.

B. Refer to AIA Document A201 (1987) Edition, "CUTTING AND PATCHING".

C. Do not endanger or damage installed work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.

E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

F. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Uncover work to provide for installation of ill-timed work;
2. Remove and replace defective work;
3. Remove and replace work not conforming to requirements of the Contract Documents;
4. Remove samples of installed work as specified for testing;
5. Install equipment and materials in existing structures;
6. Upon written instructions from the Engineer, uncover and restore work to provide for Engineer observation of concealed work.

G. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, and other mechanical items made obsolete by the new work.

H. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

I. Provide and maintain an approved type of temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

J. Locate, identify, and protect mechanical and electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. **When services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.**

1.11 TEMPORARY FACILITIES

A. Use of Permanent Building Equipment for Temporary Heating or Cooling:

1. Permanent building equipment shall not be used without written permission from the Owner. If this equipment is used for temporary heating or cooling, it shall be adequately maintained per manufacturer's instructions and protected with filters, strainers, controls, reliefs, etc. The guarantee period shall not start until the equipment is turned over to the Owner for his use.

B. Refer to AIA Document A 201-1987, Paragraph 9.6.6, 9.9 and 11.3.11.

1.12 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Materials and equipment of equivalent quality may be substituted for those scheduled oridentified by name on the drawings if so reviewed by the Engineer and Owner prior to bidding. This may be done by submitting to the Engineer, at least seven (7) working days prior to the bid date, a letter in triplicate requesting prior review. This submittal shall include all data necessary for complete evaluation of the substitution and publication in written Addenda.

1.13 MECHANICAL SUBMITTALS

A. Refer to the Conditions of the Contract (General and Supplementary), Division 1 and AIA Document A201, "SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES".

B. The contractor is to prepare a submittal schedule that coincides with the overall construction schedule. This submittal schedule should include a list of individual products to be submitted under each specification section. This submittal schedule shall also include dates for anticipated review, shipment and on-site delivery times of the submitted product.

C. The Engineer shall be given a submittal review time of ten (10) working days upon receipt of submittal. Previous submittal rejection or revision shall not compress this review time. It shall be the contractor’s responsibility to ensure these review and/or re-review times are incorporated into the submittal schedule with enough lead time as not to affect overall construction schedule.

D. The manufacturer's material or equipment listed in the schedule or identified by name on the drawings are the types to be provided for the establishment of size, capacity, grade and quality. If alternates are used in lieu of the scheduled names, the cost of any changes in construction required by their use shall be borne by Contractor.

E. Submittals shall be prepared by authorized equipment dealers, vendors, suppliers, or representative of the products submitted. Include contact and business information of the equipment dealers, vendors, suppliers and representatives. Products and equipment submitted shall also be representative of the products and equipment to be procured and installed.General product data and shop drawings downloaded from unaffiliated websites will not be reviewed or accepted.

F. All equipment shall conform to the State and/or Local Energy Conservation Standards.

G. Submittal of shop drawings, product data, and samples will be accepted only when submitted by and stamped by the Contractor. Data submitted from subcontractors and material suppliers directly to the Engineer will not be processed unless prior written approval is obtained by the Contractor.

H. Submit all submittal items required for each Specification Section. Submittals shall be prepared and submitted in accordance with the submittal schedule. The contractor is to determine and coordinate submittal review times, lead times and delivery times of submitted products as it coincides with the overall construction schedule. Submittals submitted in bulk or under a single division will not be reviewed and will be sent back as “revise and resubmit”.

I. If more than one (1) re-submittals (either for shop drawings or for as-built drawings) are made by the Contractor, the Owner reserves the right to charge the Contractor for subsequent reviews by their consultants. Such extra fees shall be deducted from payments by the Owner to the Contractor.

J. Before starting Work, prepare and submit to the Engineer all shop drawings and descriptive equipment data required for the project. Unless each item is identified with specification section and sufficient data to identify its compliance with the specifications and drawings, the item will be returned without action or "Revise and Resubmit". Continue to submit shop drawings after each Engineer's action, until a "Reviewed" action is received. The Contractor shall submit the total number of sets as called for in Division 23 to the Engineer for final distribution. Submittals shall include the following specified materials and, in addition, any materials not listed below but which are specified in the individual sections of Division 23 which follow.

1. Pipe Markers
2. Process piping
3. Valves, including pressure relief and pressure regulating
4. Pumps
5. Tanks, including expansion and fuel storage
6. Thermometers and pressure gauges
7. Boilers, burners, trim and feed equipment
8. Piping specialties, including hot water and steam
9. Supports, anchors and seals
10. Expansion compensators
11. Flexible pipe connectors
12. Water flow meters
13. Insulation, including plastic pipe fitting insulation covers and manufacturer's installation instructions
14. Heat exchangers
15. Terminal heat transfer units
16. Air conditioning equipment and specialties
17. Fans, ductwork, dampers, louvers, grilles, registers and diffusers
18. Automatic control systems

K. Wiring diagrams, control panelboards, motor test data, motors, starters and controls for electrically operated equipment furnished by mechanical trades.

L. Identify each item with specification section and sufficient data to certify its compliance with the specifications.

M. Electronic submittals shall be packaged as a bookmarked multi-page single PDF file and shall not be over 5MB. Electronic Submittals over 5MB will not be accepted and will be returned un-reviewed.

1.14 REQUESTS FOR INFORMATION

A. All “Requests for Information” submitted by the Contractor shall include a proposed solution and an estimated cost/schedule impact. Any RFI’s that do not contain this required information will be sent back to the Contractor unanswered.

B. Schedule the work to provide the Engineer a minimum review time of five (5) business days upon receipt of RFIs to provide a response.

1.15 MECHANICAL COORDINATION DRAWINGS

A. Review in detail all floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate with all trades and integrate all installations. Indicate locations where space is limited, and where sequencing and coordination of installations are of importance to the efficient flow of the work.

1.16 PRODUCT LISTING

A. Prepare listing of major mechanical equipment and materials for the project, within two (2) weeks of signing the Contract Documents and transmit to the Mechanical Engineer.

B. Unless otherwise specified, all materials and equipment shall be of domestic (USA) manufacture and shall be of the best quality used for the purpose in commercial practice.

C. Provide all information requested.

D. Submit this listing as a part of the submittal requirement specified in Division 1, "PRODUCTS AND SUBSTITUTION".

E. When two (2) or more items of same material or equipment are required (pumps, valves, air conditioning units, etc.) they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flangedand grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in work, except as otherwise indicated.

F. Provide products which are compatible within systems and other connected items.

1.17 NAMEPLATE DATA

A. Provide permanent operational data nameplate on each item of mechanical equipment, indicating manufacturer, product name, model number, serial number, efficiency rating (i.e.EER, etc.) capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

1.18 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage, dirt, dust and moisture.

C. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

D. Provide factory-applied plastic end-caps on each length of pipe and tube, except for concrete, corrugated metal, hub-and-spigot, clay pipe. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

E. Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.

F. Protect flanges, fittings, and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.19 RECORD DOCUMENTS

A. Keep a complete set of record document prints or electronic mark-ups in custody during entire period of construction at the construction site.

B. Mark drawing prints to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.); RFI's; change orders; concealed control system devices. Changes to be noted on the drawings shall include final location of any piping or ductwork relocated more than 1'-0" from where shown on the drawings.

C. Mark Equipment Schedules on the drawings with changes to Manufacturer, Model Number, and data based on reviewed shop drawings.

D. At the completion of the project, mark all valve tag numbers on the drawings and turn these drawings over to the General Contractor for his submission to the Engineer. This Contract will not be considered completed until these record drawings have been received and reviewed by the Engineer.

1.20 LUBRICATION OF EQUIPMENT

A. Contractor shall properly lubricate all mechanical pieces of equipment which he provided before turning the building over to the Owner. He shall attach a linen tag or heavy duty shipping tag on the piece of equipment showing the date of lubrication and the type and brand of lubricant used.

B. Furnish the Engineer with a typewritten list in quadruplicate, of each item lubricated and type of lubricant used, no later than two (2) weeks before completion of the project, or at time of acceptance by the Owner of a portion of the building and the mechanical systems involved.

1.21 DEMOLITION

A. During the demolition phase of this Contract, it is the responsibility of this Contractor to carefully remove existing equipment, piping, fixtures and related items either as shown on the demolition drawings as being removed, or as required for the work. These items shall be removed from the premises.

B. The location of existing equipment, pipes, and other components shown on the drawings has been taken from existing drawings and is, therefore, only as accurate as that information. All existing conditions shall be verified from field measurements with necessary adjustment being made to the drawing information.

C. If asbestos material, in any form, is discovered by this Contractor in the process of his work, he shall report such occurrence to the Owner immediately. The Owner will determine the action to be taken for the asbestos removal, which is not a part of the work to be done under this Division.

1.22 WARRANTIES

A. Refer to AIA Document A201 (1987) Edition, "WARRANTY", "PERFORMANCE BOND AND PAYMENT BOND" for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements. In any case, the entire mechanical system shall be warranted no less than one (1) year from the time of acceptance bythe Owner.

B. Compile and assemble the warranties specified in Division 23, into a separated set of vinyl covered, three-ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item to include product or equipment to include date or beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

1.23 CLEANING

A. Refer to AIA Document A201 (1987) Edition, "CLEANING UP".

END OF SECTION 230000

SECTION 230100 - M&E COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Carefully coordinate the interface between Division 23 (Mechanical) and Division 26 (Electrical) before submitting any equipment for review or commencing installation.

B. Responsibility: Unless otherwise indicated, all motor and controls for Division 23 equipment shall be furnished, set in place and wired in accordance with the following schedule:

COORDINATION SCHEDULE

ITEM	Furnished Under	Set in Place Under	Power Wiring Under	Control Wiring Under
Valve Motors Damper Motors, Solenoid Valves, etc. (Note 2)	23	23	--	23
EP Valves or Switches, P.E. Switches, etc. (Note 2)	23	23	26	23
Fire Alarm System	26	26	26	26
Smoke Detectors Including Relays for Fan Control (Note 3)	26	23	26	23
Fire/Smoke Dampers	23	23	26	26

Notes:

(1) If furnished as part of factory wired equipment, furnish and set in place under Division 23, wiring and connections under Division 26.

(2) If float switches, line thermostats, P.E. switches, time switches, or other controls carry the FULL LOAD CURRENT to any motor, they shall be furnished and set in place under Division 23, but they shall be connected under Division 26. If they do not carry the FULL LOAD CURRENT to any motor, they shall be furnished, set in place and wired under Division 23.

(3) Wiring from alarm contacts to alarm system by Division 26; all control function wiring by Division 23. Division 23 to coordinate locations with Division 26.

C. Control Wiring:

1. Consists of wiring in pilot circuits of contactors, starters, sensors, controllers, and relays, and wiring for valve and damper operators.

D. Connections:

1. Make connections to all controls directly attached to ducts, piping and mechanical equipment with flexible connections.

E. Starters:

1. Provide magnetic starters for all three phase motors and equipment complete with:

a. Control transformers.
b. 120V holding coils.
c. Integral hand-off auto switch.
d. Auxiliary contacts required for system operation plus one (1) spare.

F. Remote Switches and Pushbutton Stations:

1. Provide all remote switches and/or pushbutton stations required for manually operated equipment (if no automatic controls have been provided) complete with pilot lights of an approved type lighted by current from load side of starter.

G. Special Requirement:

1. Motor, starters and other electrical equipment installed in moist areas or areas of special conditions, such as explosion proof, shall be designed and approved for installation in such areas with appropriate enclosure.

H. Identification:

1. Provide identification of purpose for each switch and/or pushbutton station furnished. Identification may be either engraved plastic sign or permanent mounting to wall below switch, or stamping on switch cover proper. All such identification signs and/or switch covers in finished areas shall match other hardware in the immediate area.

I. Control Voltage:

1. Maximum allowable control voltage is 120V. Fully protect control circuit conductors in accordance with National Electrical Code.
2. Fully coordinate the requirements of each division with regard to supplying a complete DDC Control System. J-Boxes and control transformer connections shall be provided under Division 26. The transformers shall be furnished and set in place under Div. 23.

PART 2 - PRODUCTS

2.1 MOTOR HORSEPOWER

A. In general, all motors 3/4 HP and above shall be three phase, all motors less than 3/4 HP shall be single phase.

B. Voltage and phase of motors as scheduled on the electrical drawings shall take precedence in the case of a conflict between the mechanical and electrical drawings or general conditions 2.1 A., above.

C. Work under Division 23 includes coordinating the electrical requirements of all mechanical equipment with the requirements of the work under Division 26, before ordering the equipment.

1. If motor horsepowers are changed under the work of Division 23, without a change in duty of the motor's driven device, coordination of additional electrical work (if any) and additional payment for the work (if any) shall be provided under the section of Division 23 initiating the change. Increases or decreases in motor horsepower from that specified shall not be made without written approval from the Architect.

PART 3 - EXECUTION - Not used.

END OF SECTION 230100

SECTION 233300 - DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Types of Ductwork Accessories required for project include the following:

1. Combination Fire/Smoke Dampers

1.2 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of ductwork accessories, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Industry Standards: Comply with ASHRAE recommendations pertaining to construction of ductwork accessories, except as otherwise indicated.

C. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers" and UL Standard 555S "Motor-Driven Fire/Smoke Dampers".

D. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of ductwork accessories.

E. SMACNA Compliance: Comply with "Fire Damper and Heat Stop Guide" for the installation of fire, smoke, and fire/smoke dampers.

F. All fire dampers, smoke dampers, fire/smoke dampers and radiation dampers shall meet the latest local building code requirements.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction, and installationinstructions.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawings for each type of ductwork accessory showing interfacing requirements with ductwork, method of fastening or support, and methods of assembly of components. Include details of construction equipment and accessories being provided.

C. Submittals for all damper types specified in this section shall include a schedule for each damper indicating net free area, actual face velocity and pressure drop (at sea level) based on net free area and the maximum air quantity which will be passing through the damper. Submittals without this information will be rejected.

D. Record Drawings: At project closeout, submit record drawings of installed systems products, in accordance with requirements of Division 1.

E. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data, product data, and shop drawings in maintenance manual; in accordance with requirements of Division 1.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Smoke, Static/Dynamic Fire, and Combination Fire/Smoke Dampers:

a. Air Balance, Inc.
b. Ruskin
c. Greenheck
d. Pottorff
e. NCA Industries, Inc.

2.2 COMBINATION FIRE/SMOKE DAMPERS

A. General: Fire/Smoke dampers with airfoil blades meeting the requirements of UL Standard 555 6th Edition and 555S 4th Edition.

B. Rating: UL 555 fire resistance rating of 1-1/2 hours.

C. Operating Temperature: UL 555S elevated temperature rating of 250 degree F.

D. Leakage: UL 555S Class II Leakage Rating.

E. Differential Pressure: Minimum UL 555S differential pressure rating of 4-inch w.g.

F. Velocity: Minimum UL 555S velocity rating of 2000 fpm.

G. Frame: Structural galvanized steel hat channel. Top and bottom frame members on dampers less than 7-inch high shall be low profile design to maximize the free area of these smaller dampers. Four-piece construction with 1-1/2 inch minimum integral overlapping gusset reinforcements in each corner to assure square corners and provide maximum resistance to racking.

H. Blades: 16 Gauge galvanized steel with full-length structural reinforcement and a double skin airfoil shape. . Each blade shall be symmetrical relative to its axle pivot point, presenting identical performance characteristics with air flowing in either direction through the damper. Provide symmetrical blades of varying size as required to completely fill the damper opening.

I. Blade Stops: Blade stops at top and bottom of damper frame shall occupy no more than 1/2-inch of the damper opening area to allow for maximum free area and to minimize pressure loss across the damper.

J. Linkage: Concealed in jamb.

K. Seals: Extruded silicone rubber permanently bonded to the appropriate blade edges.

L. Jamb: Flexible stainless steel compression type.

M. Axles: Minimum 1/2-inch diameter plated steel.

N. Bearings: Stainless steel sleeve type rotating in polished extruded holes in the damper frame.

O. Actuator: Normally closed, 120V, 60 Hz electric motor mounted outside the air stream**]** that meets IBC 15-second operation requirement and is tested for minimum of one (1) year of holding with no evidence of spring return failure.

1. Actuators shall return to fully open (normal) position when reset.
2. Provide actuators as manufactured by Belimo, or equal.

P. Sleeve: Factory supplied as a single assembly with an integral factory sleeve.

Q. Retaining Angles: Factory supplied and sized to provide installation overlap in accordance with the manufacturer's UL listing.

R. Duct Transition Connection: The Contractor is responsible for selecting and installing the appropriate duct transition.

S. All factory wiring to be done in accordance with N.E.C. (NFPA 70). Refer to Detail on Drawings; Sequence of Operation on Mechanical Drawing and/or Electrical portion of the Contract Documents for full coordination of equipment and controls. Coordinate actuator mounting arrangement with Drawings (i.e. right or left mounting).

T. Heat-Activated Temperature Release Device: Control close and lock damper during test, smoke detection, power failure, or fire conditions through actuator closure spring. At no time shall actuator disengage from damper blades. Allow damper to be automatically reset remotely or manually reset locally after test, smoke detection, or power failure. 165 Degree F release temperature.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to the Engineer.

3.2 INSTALLATION OF DUCTWORK ACCESSORIES

A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

C. Provide duct access doors whether shown or not for inspection and cleaning before and after all filters, coils, fans, automatic dampers, at fire dampers (minimum 16-inch x 24-inch in ducts larger than 18-inch), fire/smoke dampers, upstream of duct smoke detectors and elsewhere as indicated. Review locations prior to fabrication. Provide multiple access doors for largeductwork to provide adequate reach to equipment.

D. Install fire dampers and smoke dampers in accordance with manufacturer's instructions.

E. Provide fire dampers and smoke dampers at locations shown, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction.

F. Where fire and smoke dampers are installed in fire and smoke rated construction, provide firestopping between fire and fire smoke damper sleeve and substrate.

G. To install 2' x 2' duct access hatches on level B1. These will be installed so Facilities can access the new fire dampers that are being installed as part of the project.

3.3 FIELD QUALITY CONTROL

A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

B. Test every fire and fire/smoke damper for proper operation, provide letter to the Architect/ Engineer certifying this work is complete and all dampers are functioning properly.

3.4 ADJUSTING AND CLEANING

A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.

B. Label access doors in accordance with Division 23 Section "Mechanical Identification".

C. Final positioning of manual dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing".

D. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.5 EXTRA STOCK

A. Furnish extra fusible links to Owner, one (1) link for every ten (10) installed of each temperature range; obtain receipt.

END OF SECTION 233300

SECTION 284621.11 - ADDRESSABLE FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes fire alarm systems for buildings and structures. This section and the drawings outline the general, but not specific, scope of the project's fire alarm system. The successful contractor will be the Engineer of Record for the design of the system. The design and engineering of the fire alarm system shall be by the fire alarm contractor. It is the contractor's responsibility that the system meets all the requirements of NFPA and the Authority Having Jurisdiction (AHJ).

B. Related Requirements:

1. Division 01

1.3 ACRONYMS

A. EMT: Electrical Metallic Tubing.

B. FACP: Fire Alarm Control Panel.

C. FM: FM Global

D. LED: Light Emitting Diode.

E. HLI: High Level Interface.

F. IMC: Intermediate Metal Conduit

G. NICET: National Institute for Certification in Engineering Technologies.

H. NRTL: Nationally Recognized Testing Laboratory.

1.4 DEFINITIONS

A. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.5 SYSTEM DESCRIPTION

A. Noncoded, UL Listed, addressable system; multiplexed signal transmission dedicated to fire alarm service only with voice/strobe evacuation.
   1. New fire alarm control panel shall be capable of monitoring the status of the existing Siemens MXL fire alarm control panel located in the Pre-Arraignment Detention Facility (PADF) building.

B. Automatic sensitivity control of certain smoke detectors.

C. All components provided shall be listed for use with the selected system.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 PERFORMANCE REQUIREMENTS

A. System shall comply with applicable codes, NFPA 72 and local amendments.

B. Premises protection includes a primarily Group B Occupancy with two levels of S-2 parking as well as incidental assembly spaces and mechanical and storage spaces throughout. The building is Type I-B construction and is approximately 315,530 square feet in area including the basement parking levels and the mechanical penthouse. The building is not classified as a high rise and is partially sprinklered.

1.7 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire alarm signal initiation shall be by one or more of the following devices and systems:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Automatic sprinkler system water flow.
5. Preaction system.
6. Dry system pressure flow switch.
7. Fire pump running.

B. Fire alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances, including voice evacuation messages.
2. Identify alarm and specific initiating device at fire alarm control panel.
3. Transmit an alarm signal to the remote alarm receiving station.
4. De-energize electromagnetic door holders.
5. Unlock electric door locks in designated egress paths.
6. Release fire and smoke doors held open by magnetic door holders.
7. Activate voice/alarm communication system.
8. Recall elevators to primary or alternate recall floors.
9. Activate elevator power shunt trip.
10. Activate emergency lighting control.
11. Activate emergency shutoffs for gas and fuel supplies.
12. Record events in the system memory.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. Duct smoke detector.
3. Activation of smoke detectors at the top of stairway shafts.
4. High- or low-air-pressure switch of a dry-pipe or preaction sprinkler system.
5. Elevator shunt trip supervision.
6. Fire-pump loss of power.
7. Fire-pump power phase reversal.
8. User disabling of zones or individual devices.
9. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, or Ethernet module.
4. Loss of primary power at the FACP.
5. Ground or a single break in internal circuits of the FACP.
6. Abnormal ac voltage at the FACP.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at the FACP or annunciator.
10. Voice signal amplifier failure.

E. System Trouble and Supervisory Signal Actions:

1. Activate audible and visible signals at the FACP.
2. Identify specific device initiating the event at fire alarm control panel.
3. Record the event on system printer.
4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
5. Transmit system status to building management system.
6. Display system status on graphic annunciator.

1.8 ACTION SUBMITTALS

A. General Submittal Requirements:

1. Submittals shall be prepared by authorized equipment dealers, vendors, suppliers, or representative of the products submitted. Include contact and business information of the equipment dealers, vendors, suppliers and representatives. Products and equipment submitted shall also be representative of the products and equipment to be procured and installed. General product data and shop drawings downloaded from unaffiliated websites will not be reviewed or accepted.
2. The Engineer shall be given a submittal review time of ten (10) working days upon receipt of submittal. Previous submittal rejection or revision shall not compress this review time. It shall be the contractor’s responsibility to ensure these review and/or re-review times are incorporated into the submittal schedule with enough lead time as not to affect overall construction schedule.

a. After review, submittals shall be returned together with review comments and specific actions (if required) to be taken by the Contractor. Typical comments and actions will be:

1) Reviewed – resubmittal not required.
2) Rejected – resubmittal required.
3) Revise and Resubmit – resubmittal required.
4) Make Corrections as Noted – resubmittal not required unless corrections cannot be met.

3. Product data and shop drawing submittals shall be submitted in conjunction with one another. Submittals that are received individually will be returned without review until both are received.
4. Submittals shall be approved by the Consultant prior to submitting them to the AHJ for permit.
5. If more than one (1) re-submittals (either for shop drawings or for as-built drawings) are made by the Contractor, the Owner reserves the right to charge the Contractor for subsequent reviews by their consultants. Such extra fees shall be deducted from payments by the Owner to the Contractor.
6. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire alarm system design.
b. NICET certified, fire alarm technician; Level IV minimum or a Professional Engineer registered in the State of Colorado and familiar with this type of installation.
c. Approved to design fire alarm systems in the City and County of Denver.

7. Shop drawings shall be signed by signed and stamped by a Professional engineer registered in the State of Colorado at the time of submittal to the Consultant.

B. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

C. Shop Drawings: For fire alarm system.

1. Comply with recommendations and requirements in Chapter 7, "Documentation" and Chapter 10, "Fundamentals" in NFPA 72.
2. System Operation Description: Include a detailed description for the project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer’s standard descriptions for generic systems are not acceptable.
3. Device Address List: Coordinate with final system programming.
4. System Riser Diagram: Include a detailed riser diagram with device addresses, conduit sizes, cable and wire types and sizes. Include type and number of system components on each circuit.
5. Include plans, elevations, sections, details, and attachments to other work.
6. Floor Pans: Include floor plans that indicate the use of all rooms; locations of alarm initiating devices, locations of alarm notification appliances and locations of fire alarm control panel, annunciators, transponders and notification power supplies.
7. Include a graphic map adjacent to each fire alarm control panel and remote annunciator. Graphic maps shall be correctly oriented for their installed location. Graphic maps shall be approved by the Owner and AHJ prior to installation.

8. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring. Show wiring color code.
9. Visible Notification Appliances: Include candela ratings for visible alarm notification appliances.
10. Audible Notification Appliances: Include sound level ratings for audible alarm notification appliances.
11. Detail assembly and support requirements.
12. Include voltage drop calculations for notification appliance circuits.
13. Include battery-size calculations.
14. Include input/output matrix.
15. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
16. Include performance parameters and installation details for each detector.
17. Verify that each duct smoke detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
18. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.

    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring required for HVAC unit shutdown on alarm.
    c. Locate detectors according to manufacturer's written recommendations.
    d. Show air-sampling detector mounting location and pipe routing.

19. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
20. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

1.9 REQUESTS FOR INFORMATION

A. All “Requests for Information” submitted by the Contractor shall include a proposed solution and an estimated cost/schedule impact. Any RFI’s that do not contain this required information will be sent back to the Contractor unanswered.

B. Schedule the work to provide the Engineer a minimum review time of five (5) business days upon receipt of RFIs to provide a response.

1.10 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Field quality-control reports.

1.11 Sample Warranty: For special warranty.

1.12 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

   a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
   b. As-Built drawings shall be provided in PDF and AutoCAD format.
   c. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documentation" section in Chapter 7, "Fundamentals", in NFPA 72.
   d. Complete wiring diagrams showing connections between all devices andequipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
   e. Riser diagram.
   f. Device addresses.
   g. Record copy of site-specific software.
   h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

      1) Equipment tested.
      2) Frequency of testing of installed components.
      3) Frequency of inspection of installed components.
      4) Requirements and recommendations related to results of maintenance.
      5) Manufacturer's user training manuals.

   i. Manufacturer's required maintenance related to system warranty requirements.
   j. Abbreviated operating instructions for mounting at fire alarm control panel and each annunciator unit.
   k. Installation instructions for each device installed.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.13 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
3. Smoke Detectors, Heat Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.

5. Manual Pull Stations: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
6. Relay Modules, Monitor Modules, Control Modules, Isolation Modules: Quantity equal to 10 percent of amount of each type installed, but no fewer than on unit of each type.
7. Keys and Tools: One extra set for access to locked or tamperproofed components.
8. Audible and Visual Notification Appliances: One of each type installed.
9. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

1.14 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire alarmLevel II or higher technician.

C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL.

1.15 PROJECT CONDITIONS

A. The existing PAB building is served by the Siemens MXL fire alarm control panel installed in PADF. The existing system shall remain installed within the PADF building and shall be removed from the PAB building and the shared parking levels unless otherwise noted on the plans. The new PAB fire alarm system will monitor the existing fire alarm control panel in PADF.

B. Perform a full test of the existing system prior to starting work. Document, in writing, any equipment or components not functioning as designed.

C. Interruption of Existing Fire alarm Service: Do not interrupt fire alarm service to facilitiesoccupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of fire alarm service.
2. Do not proceed with interruption of fire alarm service without Owner's written permission.

D. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.16 SEQUENCING AND SCHEDULING

A. Equipment Removal: After acceptance of new fire alarm system, remove existing disconnected fire alarm equipment and wiring. Under no circumstances shall any existing portion of the system be abandoned in place.

1.17 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire alarm system equipment and components that fail in materials or workmanship within specified warranty period.

1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
2. Warranty Period: One year from date of Substantial Completion.
3. As-built: Drawings shall be maintained by the awarded contractor for the duration of the warranty period to ensure complete system accuracy.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fire Alarm Control Panel:

a. Bosch Security Systems, Inc.
b. Edwards United Technologies
c. Fike Corporation
d. Fire-Lite Alarms, Inc.; a Honeywell Company.
e. Gamewell - FCI by Honeywell.
f. Johnson Controls
g. Mircom Technologies, Ltd.
h. Notifier
i. Potter Electric Signal Company, LLC.
j. Siemens Industry, Inc.; Fire Safety Division.
k. SilentKnight; a Honeywell Company.
l. Engineer approved equivalent. Approval shall be obtained prior to project bid

2. Fire Alarm Wire and Cable:

a. Comtran Corporation.
b. Helix/HiTemp Cables, Inc.; a Draka USA Company.
c. West Penn Wire/CDT; a division of Cable Design Technologies.
d. Engineer approved equivalent. Approval shall be obtained prior to project bid.

3. Equipment

a. Proprietary equipment by FACP Manufacturer; or
b. Fenwal Controls
c. Keltron Corporation.
d. Protectowire Company, Inc.

4. Audible and Visual Signals:

a. Proprietary equipment by FACP Manufacturer; or
b. Commercial Products Group.
c. Federal Signal Corporation.
d. Gentex Corporation.

e. System Sensor.
f. Wheelock; a Brand of Eaton
g. Engineer approved equivalent. Approval shall be obtained prior to project bid.

2.2 FIRE ALARM CONTROL PANEL

A. General Requirements for Fire Alarm Control Panel:

1. Field-programmable, microprocessor-based, modular, power-limited design withelectronic modules, complying with UL 864 and listed and labeled by an NRTL.

a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
b. Include a real-time clock for time annotation of events on the event recorder.
c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
d. The FACP shall be listed for connection to a central station signaling system service.
e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.

2. The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliances by building communication zone.
3. Addressable control circuits for operation of notification appliances and mechanical equipment: The FACP shall be listed for releasing service.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire alarm control panel and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, two line(s) of 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

C. Initiating Device, Notification Appliance, and Signaling Line Circuits:

1. Pathway Class Designations: NFPA 72, Class B.
2. Pathway Survivability: Level 0.
3. Install no more than 100 addressable devices on each signaling-line circuit.

D. Serial Interfaces:

1. One dedicated RS 485 port for central station operation using point ID DACT.

a. The dial-in port shall allow remote access to the FACP for programming changes and system diagnostic routines. Access by a remote terminal shall be by encrypted password algorithm.

2. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
3. One USB port for PC configuration.
4. One RS 232 port for voice evacuation interface.

E. Actuation of alarm notification appliances, emergency voice communications, annunciation, elevator recall, and actuation of suppression systems shall occur within 10 seconds after the activation of an initiating device.

F. Electrical monitoring for the integrity or wiring external to the FACP for mechanical equipment shutdown and magnetic door holding circuits is not required, provided a break in the circuit will cause the doors to close and mechanical equipment to shut down.

G. Notification Appliance Circuit:

1. Audible appliances shall sound in a three pulse temporal pattern, as defined in NFPA 72.
2. Visual alarm appliances shall flash in synchronization where more than two appliances are in the same field of view, as defined in NFPA 72.

H. Elevator Shutdown: Heat detector operation in the elevator machine room or hoistway shuts down elevator power by operating a shunt trip in a circuit breaker feeding the elevator. Heat detector activation operates building notification appliances and annunciator.
1. Heat detectors shall be located within two feet of each sprinkler in the space and shall have a lower temperature and faster RTI as compared to the sprinkler.
2. Verify elevator requirements based on elevator provided and AHJ requirements.

I. Elevator Recall: Smoke detectors at the following locations shall initiate automatic elevator recall.

1. Elevator recall shall be initiated only by one of the following alarm initiating devices:

a. Elevator lobby detectors.
b. Smoke detector in elevator machine room.
c. Smoke detectors in elevator hoistway.

2. Elevator controller shall be programmed to move the cars to the alternate recall floor if elevator lobby detectors located on the designated recall floors are activated.
3. Waterflow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.

a. Waterflow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.

J. Remote Smoke detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and changethose settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory and print out the final adjusted values on system printer.

K. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

L. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire alarm control panel.

1. Indicate number of alarm channels for automatic, or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711.

    a. Allow the application of, and evacuation signal to, indicated number of zones and, at the same time, allow voice paging to the other zones selectively or in any combination.
    b. Programmable tone and message sequence selection.
    c. Standard digitally recorded messages for "Evacuation" and "All Clear."
    d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire alarm control panel.

2. Status Annunciator: Indicate the status of various voice/alarm speaker zones.
3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

M. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals and digital alarm radio transmitters shall be powered by 24-V dc source.

1. Alarm current draw of entire fire alarm system shall not exceed 80 percent of the power-supply module rating.
2. Power supply shall have a dedicated fused safety switch for this connection at the fire service entrance equipment. Paint the switch box red and identify it with “FIRE ALARM SYSTEM POWER”.

N. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch. System shall have sufficient power to operate the system on standby for a period of 24 hours, followed by 15 minutes of alarm.

1. Batteries: Sealed lead calcium.
2. Battery and Charger Capacity: Comply with NFPA 72.

O. Surge Protection: Install surge protection on normal as power for the FACP and its accessories. Comply with Division 26 Section “Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits” for auxiliary suppressors.

P. Alarm Silencing, Trouble and Supervisory Alarm Reset: Manual reset at the FACP after initiating devices are restored to normal.

1. Silencing switch operation halts alarm operation of notification appliances and activates an “alarm silence” light. Display of identity of the alarm zone or device is retained.
2. Audible and visual notification appliances shall both stop upon activation of the silencing switch.
3. Subsequent alarm signals from other devices or zones reactivate notification appliances until the silencing switch is operated again.

Q. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. Enabling of this mode shall require entry of a password. The FACP and annunciators shall display a test indication while the test is underway. If testing ceases while in walk test mode, after a preset delay, the system shall automatically return to normal.

R. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.3 PREACTION SYSTEM

A. Initiate Presignal Alarm: This function shall cause an audible and visual alarm and indication at the FACP. Activation of an initiation device connected as part of a preaction system shall be annunciated at the FACP only, without activation of the general evacuation alarm.

2.4 MANUAL FIRE ALARM BOXES

A. General Requirements for Manual Fire alarm Boxes: Comply with UL 38. Boxes shall befinished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate and alarm, pull lever type; with integral addressable module arranged to communicate manual station status (normal, alarm, or trouble) to fire alarm control panel
2. Station Reset: Key- or wrench-operated switch.
3. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24 Vdc, nominal.
2. Detectors shall be two wire type.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire alarm control panel.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Latching: Detectors latch in the off-normal state and require manual reset of the system to restore them to normal.
6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
7. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire alarm control panel or calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire alarm control panel.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire alarm control panel and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire alarm control panel, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire alarm control panel and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire alarm control panel, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-controlcircuit.
7. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
8. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power on status. Provide remote status and alarm indicator and test station; coordinate location with Owner and Architect prior to installation.

2.6 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

1. Temperature sensors shall test for and communicate the sensitivity range of the device.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.

1. Mounting: Twist-lock base interchangeable with smoke detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire alarm control panel.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F.

1. Mounting: Twist-lock base interchangeable with smoke detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire alarm control panel.

2.7 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

C. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear ornominal white polycarbonate lens mounted on an aluminum faceplate. The word “ALERT” is engraved in minimum 1-inch-high letters on the lens.

1. Rated Light Output: As indicated on design drawings.

a. 15/30/75/110 cd, selectable in the field.
b. 135/150/177/185 cd, selectable in the field.

2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, white.

D. Voice/Tone Notification Appliances:

1. Comply with UL 1480.
2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
3. High-Range Units: Rated 2 to 15 W.
4. Low-Range Units: Rated 1 to 2 W.
5. Mounting: Flush or surface mounted and bidirectional.
6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.8 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnets: Require no more than 3 W to develop 25-lbf holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V ac or dc
4. Rating: 120-V ac

B. Material and Finish: Match door hardware.

2.9 GRAPHIC ANNUNCIATOR

A. Graphic Annunciator Panel: Mounted in an aluminum frame with nonglare, minimum 3/16-inch thick, clear acrylic cover over graphic representation of the facility. Detector locations shall be represented by red LED lamps. Normal system operation shall be indicated by a lighted, green LED. Trouble and supervisory alarms shall be represented by an amber LED.

1. Comply with UL 864.
2. Operating voltage shall be 24-V dc provided by a local 24-V power supply provided with the annunciator.
3. Include built-in voltage regulation, reverse polarity protection, RS 232/422 serial communications, and a lamp test switch.
4. Surface mounted in a NEMA 250, Type 1 cabinet, with key lock and no exposed screws or hinges.
5. Graphic representation of the facility shall be a CAD drawing and each detector shall be represented by an LED in its actual location. CAD drawing shall be at 1/8-inch per foot scale or larger.
6. The LED representing a detector shall flash two times per second while detector is an alarm.

2.10 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall, to circuit-breaker shunt trip for power shutdown.

1. Allow the control panel to switch the relay contacts on command.
2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

D. Control Module:

1. Operate notification devices.

2. Operate solenoids for use in sprinkler service.

2.11 RADIO ALARM TRANSMITTER

A. Transmitter shall comply with NFPA 1221 and 47 CFR 90.

B. Description: Manufacturer's standard commercial product; factory assembled, wired, and tested; ready for installation and operation.

1. Packaging: A single, modular, NEMA 250, Type 1 metal enclosure with a tamper- resistant flush tumbler lock.
2. Signal Transmission Mode and Frequency: VHF or UHF 2-W power output, coordinated with operating characteristics of the established remote central receiving station designated by Owner.
3. Normal Power Input: 120-V ac.
4. Secondary Power: Integral-sealed, rechargeable, 12-V battery and charger. Comply with NFPA 72 requirements for battery capacity; submit calculations.
5. Antenna: Omnidirectional, coaxial half-wave, dipole type with driving point impedance matched to transmitter and antenna cable output impedance. Mount to building structure where indicated. Wind-load strength of antenna and mounting hardware and supports shall withstand 100 mph with a gust factor of 1.3 without failure.
6. Antenna Cable: Coaxial cable with impedance matched to the transmitter output impedance.
7. Antenna-Cable Connectors: Weatherproof.
8. Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.

C. Functional Performance: Unit shall receive alarm, supervisory, or trouble signal from fire alarm control panel or from its own internal sensors or controls and shall automatically transmit signal along with a unique code that identifies the transmitting station to the remote central receiving station. Transmitted messages shall correspond to standard designations for fire-reportingsystem to which the signal is being transmitted and shall include separately designated messages in response to the following events or conditions:

1. Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.
2. System Test Message: Initiated manually by a test switch within the transmitter cabinet, or automatically at an optionally preselected time, once every 24 hours, with transmission time controlled by a programmed timing device integral to transmitter controls.
3. Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source, derangement of the wiring of the transmitter, or any alarm input interface circuit or device connected to it.
4. Local Fire Alarm System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.
5. Local Fire Alarm System Alarm Message: Actuated when the building system goes into an alarm state. Identifies device that initiated the alarm.
6. Local Fire Alarm System, Supervisory-Alarm Message: Actuated when the buildingalarm system indicates a supervisory alarm.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed before installation begins.

B. Examine rough in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

A. Comply with currently adopted version of NFPA 72, and requirements of the authorities having jurisdiction for installation and testing of fire alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before all other trades have completed cleanup shall bereplaced.
2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.
1. Remove PAB and Parking garage fire alarm system components from existing FACP located in PADF. Provide monitoring of existing FACP in PADF by the new PAB FACP.

C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.

D. Manual Fire alarm Boxes:

1. Install manual fire alarm box in the normal path of egress within 60 inches of the exit doorway.
2. Mount manual fire alarm box on a background of a contrasting color.
3. The operable part of manual fire alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.

E. Smoke or Heat Detector Spacing:

1. Comply with the "Smoke Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke detector spacing.
2. Comply with the "Heat Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed the rating of the detector.

4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A or Annex B in NFPA 72.
5. HVAC: Locate detectors not closer than 36 inches from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.

F. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover. Shipping covers are not listed for protection against contamination during construction.

G. Duct Smoke Detectors: Comply with NFPA 72. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.

1. Do not install smoke detector in duct smoke detector housing during construction. Install detector only during system testing and prior to system turnover.

H. Elevator Shafts: Coordinate heat detector temperature rating and location with sprinkler rating and location.

I. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler waterflow switch, and valve-tamper switch that is not readily visible from normal viewing position.

J. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install audible notification appliances on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

K. Visible Alarm-Indicating Devices: Install visible notification appliance adjacent to each audible notification appliance such that the entire lens is between 80 inches and 96 inches and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.

L. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 WIRING INSTALLATION

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

B. Wire size shall be as recommended by the fire alarm system manufacturer.

C. Pathways shall be installed in EMT. Exposed EMT shall be painted red enamel.

D. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

E. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by the manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system’s wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure type terminal blocks or plug connectors.

F. Color Coding: Color code fire alarm conductors differently from the normal building power wiring. Use one color for alarm circuit wire and a different color code for supervisory circuits. Color code audible alarm indicating circuits differently from alarm initiating circuits. Use differentcolors for visible alarm indicating devices. Coordinate with Owner for standard color coding

G. Paint fire alarm system junction boxes and covers red.

3.4 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, connect hardware and devices to fire alarm system.

1. Verify that hardware and devices are listed for use with installed fire alarm system before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated HVAC duct systems.
2. Magnetically held-open doors.
3. Alarm initiating connection to elevator recall system and components.
4. Alarm initiating connection to activate emergency lighting control.
5. Alarm initiating connection to activate emergency shutoffs for gas and fuel supplies.
6. Supervisory connections at valve supervisory switches.
7. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
8. Supervisory connections at elevator shunt-trip breaker.
9. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
10. Supervisory connections at fire-pump engine control panel.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals.

B. Install framed instructions in a location visible from fire alarm control panel.

3.6 GROUNDING

A. Ground fire alarm control panel and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire alarm control panel.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by Consultant.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection shall be based on completed record Drawings and system documentation that is required by NFPA 72.
    b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of Chapter 14, "Inspection, Testing and Maintenance", in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with the "Test Methods" table in the "Testing" section of Chapter 14, "Inspection, Testing and Maintenance", in NFPA 72.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test visible appliances for the public operating mode according to manufacturer's written instructions.
5. Detectors that are outside of their marked sensitivity range shall be replaced.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" and the "Inspection and Testing Form" located in NFPA 72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

3.8 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire alarm system.

END OF SECTION 284621.1

A.3 COOPERATIVE PURCHASING:

The City and County of Denver encourages and participates in cooperative purchasing endeavors undertaken by or on behalf of other governmental jurisdictions, pursuant to Denver Revised Municipal Code Sec. 20-64.5. To the extent other governmental jurisdictions are legally able to participate in cooperative purchasing endeavors, the City and County of Denver supports such cooperative activities. Further, it is a specific requirement of this proposal or Request for Proposal that pricing offered herein to the City and County of Denver may be offered by the vendor to any other governmental jurisdiction purchasing the same products.

The vendor(s) must deal directly with any governmental agency concerning the placement of purchase orders, freight charges for destinations outside of the Denver Metro area, contractual disputes, invoicing, and payment. The City and County of Denver shall not be liable for any costs, damages incurred by any other entity.

A.4 BACKGROUND CHECKS AND DISQUALIFICATION:

Because of the nature of the proposed contract for the City, Contractor, at its expense, must conduct, or have previously conducted a background check for each of its employees, as well as for the employees of its subcontractors, who will provide services to the City. Background checks are to be conducted through an independent background check vendor and must include the following:

- Social Security Number Trace;
- Federal Criminal Records (includes wants, warrants, arrests, convictions, and incarcerations);
- Colorado Criminal Records (includes wants, warrants, arrests, convictions, and incarcerations);
- Criminal Records from other States if the employee disclosed, or the background check identifies, that the employee lived in another state in the last seven years (includes wants, warrants, arrests, convictions, and incarcerations); and
- National Sexual Offender Registry Search.

The background check shall include all convictions for the last seven years and may include additional convictions beyond seven years when permitted and/or required by law.
Because of the sensitive nature of the work proposed under this RFP, the City shall automatically disqualify from employment under this contract persons with felony convictions. Alternatively, the Director of Purchasing may require that a fidelity bond, or such other assurance in such amount as deemed appropriate, be provided to the City as a condition precedent to grant permission where an employee's prior conviction would otherwise preclude their participation under the contract.
All Contractor employees are required to self-disclose to the Contractor any criminal charges and convictions and nolo contendere pleas (not contest pleas) that occur while providing services to the City within three business days of the conviction, charge, or plea. Contractor is required to inform the City of any criminal charges or convictions or nolo contendere pleas (no contest pleas) that arise while an employee is on assignment with the City. Contractor must inform the City within one business day of the Contractor having knowledge of the charge, conviction, or plea. The City will determine, in its sole discretion, whether the employee will remain on a City assignment.
Contracts for work at the following locations require NCIC background checks:

- Police Academy
- Denver Animal Shelter
- Traffic Operations
- DPD Police Precincts

Other City locations may also require a NCIC background check. These background checks will be administered by the City and will be at no cost to the Contractor. Contractor employees will be required to provide their social security numbers to the City. Contractors will be provided entrance cards for each facility. Contractors are not allowed to share cards to provide services. The background check(s) must be conducted successfully prior to initial access and/or involvement by employees. Employees who separate from the Contractor's employment must undergo another background check prior to renewed access and/or involvement in providing services to the City. The City also has the ability to audit the Contractor's background check process, to ensure compliance with City standards, at any time. Additionally,

Failure by the Contractor to comply with the terms of this Section may result in the termination of its contract with the City.

A.5 INVOICING REQUIREMENTS:

Vendor must be capable of providing invoices that include the following details:

- Invoice number
- Invoice date
- Service date(s) or service period
- Purchase Order (PO) number (will be provided to vendor when assigned)
- Service location (Building name and address)
- Facility Code (list will be provided to the vendor)
- Itemized charges, including unit of measurement
- Total charge

Vendor shall also provide monthly statement billing (as required).

A.6 VENDOR'S PERFORMANCE:

The Executive Director of General Services of his/her authorized representative will decide all questions which may arise to the quality and acceptability of any work performed under the contract. If, in the opinion of the Executive Director of General Services or his/her authorized representative, performance becomes unsatisfactory, the City shall notify the Vendor. Repeated incidences of unsatisfactory performance will result in cancellation of the agreement for default.

EXHIBIT B-1: PROPOSAL PRICING SHEET

PROPOSAL ITEMS: See EXHIBIT A- Scope of Work

Note to Supplier: The price submitted in the "Project Cost" shall include all outlined.

Base Bid

Item No.	Description	Quantity	Unit Cost
1	Fire Sprinkler Systems	Lump Sum	~~$50,284.00~~ $65,284.00
2	Mechanical and Electrical Coordination	Lump Sum	$2,875.00
3	Ductwork/ Combination Fire/Smoke Dampers	Lump Sum	~~$14,375.00~~ $29,375.00
4	Addressable Fire Alarm Systems	Lump Sum	$815,367.00
5	Bidirectional Antenna (BDA) Survey	Lump Sum	$1,725.00
6	Two-way communication phones in elevator lobbies	Lump Sum	$34,845.00

2nd amendment to increase the contract maximum amount $30,000.00 from $924,988.00 to $954,988.00 in order to cover costs related to removing code violations on level 6 ($15,000.00) and installing duct access hatches on level B1 ($15,000.00).

TOTAL PROJECT COST	~~$ 919,471.00~~ $ 949,471.00

Line item pricing to include but not limited to all materials, equipment, shipping, handling costs, on-site labor, etc. Excludes all asbestos testing, monitoring, and abatement activities and costs.

The cost for Performance and Payment Bond will not be taken under consideration for the evaluation of the proposal

Cost for Performance and Payment Bond for above PROJECT COST	Percentage charged by Surety company: 0.60 %	$ 5,517.00

DELIVERY: Prices quoted shall be F.O.B. 1331Cherokee Street, Denver, CO 80204, unloaded and installed.

Estimated Completion Time after Receipt of Order 3 0 5 Calendar Days

Vendor to unload, if applicable. Separate shipping and handling charges on invoices are not acceptable. Proposed pricing must incorporate all shipping and handling costs.