



**Rehabilitation of the Elevator at the Will Branch of the
Yonkers Public Library**

**1500 Central Park Avenue
Yonkers, NY**

**BID DOCUMENTS
PROJECT SPECIFICATIONS
June 29, 2022**

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SECTION 011000

SUMMARY OF THE WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The title and location of the Work is printed on the cover of this Project Manual.
1. Remove all existing elevator related equipment, controllers, disconnect, devices, cab enclosure and platform, travel cables, limit switches, leveling unit and veins, cylinder and jack assembly, pump unit, starter panel, buffer support channels, spring buffers, doors, etc. as per the bid documents and drawings and specifications.
 2. Provide sump pit / pump and cover, GCFI outlet, pit ladder, pit stop switch, pit light fixture and wiring / conduit, machine room lighting panel, machine room fused main line, machine room new controller, machine room new pump unit, machine room new manual shut off valve, car frame platform and cab enclosure, travel cables, limit switches, travel lantern, pit rupture valve, pit cylinder and jack assembly, pit buffer support channels, pit spring buffers, cab doors, etc. as per the bid documents and drawings and specifications.
 3. Install new fire rated hollow metal door and frame and hardware at elevator machine room as per the bid documents and drawings and specifications.
 4. Remove existing, store and reinstall acoustical ceiling tiles and grid as per the bid documents and drawings and specifications.
 5. Provide and install new ceiling tiles and grid in machine room as per the bid documents and drawings and specifications.
 6. Provide and install new wall penetrations as required as per the bid documents and drawings and specifications.
 7. Provide electrical power for the equipment as specified in the contract documents.
 8. Provide and install all new fire alarm devices, relays, smoke detectors, heat detectors, connections between the existing fire alarm control panel (FACP) and the new FACP as per the bid documents and drawings and specifications.
 9. Provide and install all new conduits and power and control wiring, as per the electrical, mechanical and fire alarm drawings, and as required by the elevator drawings and specifications.

10. Provide and install all new sprinkler heads, piping, supports, valves, hangers, flow switches, etc. drawings and as required by the elevator drawings and specifications.
11. Provide and install new machine room air conditioning system with controller, and fan coil unit and air cooled condenser (ACC), condensate pump, exterior condenser pad, refrigerant piping, valves, refrigerant charging, supports, electrical power wiring and electrical control wiring etc. drawings and as required by the elevator drawings and specifications.
12. Provide and install all new submersible sump pump, waste plumbing piping, ACC condensate pump drain piping, piping supports, valves, hangers, etc. and as required by the plumbing drawings and specifications.

1.02 CONCURRENT PROJECTS

- A. Coordinate the work of this project, thru the Owner, to avoid conflicts with concurrent contracts.

1.03 RESTRICTED WORK PERIOD

- A. Do not perform the roofing and related Work on or after December 1st and up to, but not including April 1st unless approved otherwise, in writing, by the Owner. During this period, clear the roof of materials, equipment, and debris. Maintain the roof in a watertight condition.
- B. Do not perform Work requiring shut off of active heating piping and equipment on or after October 15th and up to, but not including May 1st unless approved otherwise, in writing, by the Owner.

1.04 ITEMS NOT INCLUDED

- A. The following items shown on the Drawings are not included in this Contract:
 1. Items indicated "NIC" (Not in Contract).
 2. Existing construction, except where such construction is to be removed, replaced, or altered.

1.05 CONFINED SPACE

- A. Comply with confined space and permit-required confined space as defined in Title 29, Part 1910, Section 146 of the Code of Federal Regulations (29CFR 1910.146).
- B. Comply with Safety Requirements for Confined Spaces (ANSI/ASSE Z117.1-2009).
- C. All spaces shall be treated as permit-required confined spaces until the Contractor and/or subcontractors are able to re-classify the space to a non-permit confined space as per 29CFR 1910.146 and ANSI/ASSE Z117.1-2009.

- D. Indicated confined spaces are not intended to limit or define Contractor's or subcontractors' regulatory compliance requirements. In addition to confined spaces indicated on the drawings, other confined spaces may be present or created by the work of this contract. Notify the Owner, in writing, of confined spaces created or eliminated during execution of the Work.
- E. For the purpose of inspecting ongoing work, furnish at no additional cost to the State, personnel, as directed, to allow the Owner to enter confined space and permit-required confined space in compliance with Title 29, Part 1910, Section 146 of the Code of Federal Regulations (29CFR 1910.146).

1.06 OCCUPANCY

- A. This is an occupied Facility. The building will be occupied and operational during execution of the Work. Ingress to and egress from the building shall be maintained at all times.

1.07 CONTRACTOR USE OF PREMISES

- A. Work hours shall be as established by the Facility authorities through the Owner.
- B. Inform the Owner of work area access requirements. The Owner will coordinate and schedule the requirements with Facility staff to obtain and ensure timely availability of work areas.
- C. Check in with the Facility Representative, as directed, at the beginning of each workday. Furnish information regarding where employees will be working during the day.
- D. Comply with the Facility's Visitor Identification Policy. A copy of the current policy will be distributed at the initial job meeting.
- E. The following items are not allowed on the Site or on Facility premises.
 - 1. Firearms, ammunition, weapons, and dangerous instruments (other than tools required for the Work).
 - 2. Alcoholic beverages and persons under the influence of same.
 - 3. Cannabis and persons under the influence of same. Cannabis, as used herein shall refer to any form of cannabis that has psychoactive properties.
 - 4. Illegal controlled substances and persons under the influence of same.
 - 5. Cameras (except with written permission from the Owner).
- F. Comply with Facility policies relating to smoking at the Site.
- G. Routes of ingress and egress within the building to the location of the Work shall be as directed by the Owner.
- H. Store materials and perform the Work so that pedestrian and vehicular traffic is not obstructed.

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- I. Do not diminish the level of life safety during performance of the Work.
- J. Remove furniture and portable equipment, which interferes with the execution of the Work, and store where directed. Reset such items when directed.
- K. Utility Outages and Shutdowns: Perform Work which will cause interruptions of utility services or branch services within the building at such times as directed by the Owner, on weekdays between the hours of 6:00 p.m. and 6:00 a.m. or on Saturdays or Sundays.
- L. Use of Existing Elevators:
 - 1. Elevators for transportation of workers and materials will be designated by the Owner. Arrange the time and duration of such use with the Owner. Do not exceed capacity of elevators. Provide padding or other protection for the car.
 - 2. During Periods of Exclusive Use:
 - a. Operate elevators. Prevent unauthorized persons from using elevators.
 - b. Where an existing elevator service contract exists, make arrangements through the Owner for repairs required due to misuse or negligence. Pay elevator service company's fees for repairs.
 - c. Where an existing elevator service contract does not exist, have repairs required due to misuse or negligence made by a qualified elevator company.
- M. Be responsible and accountable for employees, suppliers, subcontractors, and their employees, with regard to their use of the premises. Direct them to comply with the Facility Regulations and with the security and traffic regulations.
- N. Furnish Facility authorities with a telephone number or method to contact the supervisor for the Work in case of an emergency after work hours, including weekends and holidays.
- O. Comply with applicable federal and State of New York Right-to-Know Law provisions. Provide Safety Data Sheets (SDS) documents for products that have SDS data prior to use on the project site.
 - 1. Upload and maintain electronic SDS documents on the Submittals Website (SDS tab).
 - 2. SDS tab is organized by prime contracts. To be readily identified, name products with SDS by specification section number and product name.
 - 3. Supply and maintain one hard copy of the appropriate SDS on the project site and one hard copy with the Facility's Right-to-Know Information Officer.
- P. Direct employees to be watchful for people in or near the work area where safety hazards may be present. Notify the Facility Safety/Security Department, if necessary, to remove them from the work area or Site.
- Q. Report fire and other emergency situations to the Facility Safety/Security Department immediately.

1.08 FACILITY REGULATIONS

- A. Do not physically, verbally, or psychologically mistreat clients or other persons at the Facility.

1.09 REFERENCE SPECIFICATIONS AND STANDARDS

- A. Comply with the requirements of the various specifications and standards referred to in these Specifications, except where they conflict with the requirements of these Specifications. Such reference specifications and standards shall be the date of latest revision in effect at the time of receiving bids unless the date is given.

1.10 LAYING OUT

- A. Examine the Contract Documents thoroughly and promptly report any errors or discrepancies to the Owner before commencing the Work.
- B. Lay out the Work in accordance with the Contract Documents.

1.11 SPECIAL INSPECTIONS

- A. Special Inspections and tests are required by Chapter 17 of the Building Code of New York State (BCNYS). Inspections & Testing Services will be provided by the state unless otherwise noted.
- B. Contractors are responsible for notifying the Owners Representative regarding individual inspections listed in the **STATEMENT OF SPECIAL INSPECTIONS**. Contractors shall cooperate with the inspectors and testing agencies and sufficient notice and lead time (minimum 48 hours) must be allowed for inspection and testing to be performed.
- C. Where deficiencies are identified, the contractor must take corrective actions to comply with the contract documents or remedy the deficiencies in accordance with Article 9 of the General Conditions.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 011100

SAFETY

PART 1 GENERAL

1.01 SUMMARY

- A. This section requires compliance with applicable Safety codes, standards, and regulations, including but not limited to OSHA, Building Code of New York State, Fire Code of New York State, and Facility Regulations.

1.02 DEFINITIONS, ABBREVIATIONS

- A. OSHA: Occupational Safety and Health Administration.
- B. BCNYS: Building Code of New York State.
- C. EBCNYS: Existing Building Code of New York State.
- D. FCNYS: Fire Code of New York State.
- E. NFPA: National Fire Protection Association.
- F. NEC: NFPA 70E.

1.03 SUBMITTALS

- A. Provide a SITE SPECIFIC SAFETY PLAN no later than 15 days after approval of the Contract by the Owner. The plan must include at a minimum:
 - 1. Cover page including Project Name/Location/Project Number/Contractor Name/Potential Start/Finish Dates.
 - 2. Complete Scope of work.
 - 3. Roles and Responsibilities page identifying Supervision, list of the names of all competent and/or qualified persons, including their qualifications, for each activity requiring a competent person i.e. excavations, scaffolding, rigging, fall protection, etc.
 - 4. A program for implementing appropriate PPE as specified in the High 5. Hazard Assessment detailed in Subparagraph 1.04 A.11 below.
 - 5. A program for assuring employees have proper work attire, i.e. substantial sole safety-toed footwear, long pants, shirts with minimum 4-inch sleeves, etc.
 - 6. A 100% 6-foot conventional fall protection program which provides full body harnesses, lanyards (connectors), and anchorage points, or guardrails for all trades when working 6 feet above a lower level.
 - a. Exception:
 - 1) When the employer can demonstrate that it is infeasible or creates a greater hazard to utilize these systems, the employer shall develop and implement a Fall Protection Plan, which meets the requirements of paragraph (k)

1926.502. This plan must be approved before implementation by the applicable OGS Regional Safety Manager.

- 2) When working from portable ladders.
7. A program for raising employee awareness through the use of weekly Safety Talks (i.e. “Toolbox Talks” or “Tailgate Meetings”) on topics related to upcoming/relevant work on the project. Contractor shall be required to verify that all employees on site participated in meeting, with documentation submitted to the Owner.
8. Confined Space entry program and procedures for entry, when applicable.
9. A written Respirable Silica Protection Plan, including tasks for which employees could reasonably be expected to be exposed to harmful silica dust, and control methods that will be used to limit or eliminate exposure, as well as any PPE necessary to ensure protection.
10. Identify specific hazards related to this Project, and how employees will be protected from those hazards.
11. High Hazard Assessment’s detailing procedures for all high hazard work activities including, but not limited to:
 - a. All lifts involving cranes or material handling equipment.
 - b. Scaffolding where scaffold working deck is expected to be 10’ or higher from a lower level.
 - c. Demolition.
 - d. Excavations where anticipated depth is 5’ or more.
 - e. Hot work activities, which shall follow all applicable requirements stated in NFPA 51B.
 - f. Steel erection with specific fall protection requirements detailed.
 - g. Work at elevations, including roofing work.
 - h. Electrical work involving Lock Out - Tag Out (LOTO) procedures.
 - 1) High Hazard Assessments shall include a step-by-step breakdown of a given task, the hazards associated with each step, the controls that will be utilized to eliminate or minimize the hazards, and the PPE that will be used to protect from remaining hazards.
 - 2) All required certifications shall be provided for all applicable types of work with required training/certifications (i.e. Powder Actuated Tools, Aerial Lifts, Forklifts, Crane Operators License, etc.).
12. A project safety inspection program, with a minimum of one documented safety inspection per week, during the course of construction. Submit copies of all resultant inspection reports to the Owner on a weekly basis.
13. A program for providing proper care for injured employees, including the name of the employee with First Aid/CPR certification who will be on site at all times during the course of construction, to include local hospital/medical facility locations and contact information.
14. Provide an Emergency Action and Evacuation Plan, including Fire Protection and Emergency Response, when applicable.
 - a. Plan to include:
 - 1) Procedures for reporting a fire or other emergency.

- 2) Procedures for emergency evacuation, including type of evacuation and exit route assignments.
 - 3) Emergency Contact information.
 - 4) Procedures on how to alert workers of an emergency.
 - 5) Procedures to account for all employees after evacuation and muster/evacuation points.
 - 6) A list of all major fire hazards, to include type of fire protection equipment necessary to control hazard.
- B. Provide safety orientation training for each employee prior to their starting work on site. This orientation shall include, but not be limited to: Fitness for Duty (drug, alcohol, and cannabis policies), training on general safety hazards, site-specific safety policies and procedures, personal protective equipment, injury reporting and protocols, emergency evacuation and preferred medical providers, and HAZCOM (GHS Harmonization). Provide documentation of all safety orientation training for each new employee on the site, including all subcontractors, to the Owner.
- C. Accident Reporting: The Owner shall be immediately notified of any and all accidents. A copy of a written accident report shall be furnished to the Owner within 24 hours of an incident.
 1. After any incident on site resulting in an employee being injured or damage to property, a Post- Accident Review Investigation shall be held as soon as possible after any incident. As a minimum, this investigation will involve the injured person, his/her supervisor, the responsible project superintendent and/ or supervisor and the onsite safety supervisor. The contractor shall be responsible to provide a written Post-Accident Corrective Action Plan, which will detail immediate steps taken to correct any unsafe condition that led to injury/property damage, long-term actions to prevent repeat incidents from happening on the site, and roles and responsibilities of individuals who will be implementing the corrective measures, which will be reviewed for effectiveness and continually monitored for implementation.

1.04 STOP WORK ACTIVITY AUTHORITY

- A. Any Owner's Representatives have the authority to stop a work activity that exposes any Contractor employees to potentially serious injury and/or illness. The responsible Contractor shall immediately cease work, perform an assessment of the activity that is exposing employees to any Immediately Dangerous to Life or Health (IDLH) conditions, and take action necessary to satisfactorily address the unsafe condition(s), at no cost to the State. The activity may only resume when the Owner and respective Contractor's Safety Representative verify corrective measures have been satisfactorily completed. Any related impact to time of completion shall be considered within the Contractor's control.
- B. No site work, other than mobilization, shall commence until the Site-Specific Safety Plan is approved.

1.05 ADDITIONAL SAFETY POLICIES THAT WILL BE ADHERED TO THROUGHOUT THE CONSTRUCTION PHASE

- A. All contractors are required to utilize head (hardhat) and eye protection (safety glasses) at all times well within the project limits.
- B. Any employee exposed to equipment/vehicles shall be required to utilize an ANSI Level 2 Safety Work Vest.
- C. Contractors are strictly prohibited from utilizing any city-owned equipment or materials during construction.
- D. All tools/equipment on multi-trade projects shall bear identifiable markings as to which contractor the tool/equipment belongs to. If any tool/equipment on the project does not have contractor's markings, the tool shall be immediately removed from the site until owner claims the tool/equipment.
- E. Seatbelts shall be utilized when operating all heavy equipment designed to be operated in a seated position. When traveling in a vehicle, all employees shall be seated in a secured seat with a seatbelt in place.
- F. Inspections of scaffolding prior to use, and excavations prior to entry shall be documented by an on-site competent person. Documented inspection will be available on-site for inspection by the Owner.
- G. All electrical cords/water hoses, if feasible, shall be run overhead to avoid additional slip/trip hazards. If not feasible due to physical restrictions, cords/hoses shall be placed to avoid all walkways and work areas.
- H. All heavy equipment being utilized on site shall have a fire extinguisher of suitable size/rating within reach of operator.
- I. Any fuel-powered equipment shall have a fire extinguisher of suitable size/rating no closer than 10 feet and no further than 25 feet from the equipment.
- J. All electrical work shall be done when panels/lines/boxes have been de-energized and locked out, unless otherwise approved in writing by the Owner.
- K. An applicable sized Spill Kit shall be available on all jobsites where heavy equipment is being utilized.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and individual Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on the Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Coordination drawings.
 - 4. Requests for Information (RFIs).
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Refer to Section 011200 – Contract Summary of Work for certain areas of responsibility that are assigned to a specific discipline.

1.3 DEFINITIONS

- A. RFI: Request from the Owner, Design Professional, or Contractor seeking information from each other during construction.

1.4 COORDINATION

- A. Coordination for Single Contract Project: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. The Contractor shall utilize the bid milestone schedule included in the Contract Documents to prepare a CPM schedule in accordance with Section 013200 – Project Scheduling and Progress Documentation. The Contractor shall submit the proposed CPM schedule to the Owner within 10 days of the Notice to Proceed.
 - 2. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

3. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 4. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 5. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 6. Make adequate provisions to accommodate items scheduled for later installation.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Coordination of the Owner's Project Management CPM schedule.
 2. Coordination of the commissioning process and activities.
 3. Preparation of the schedule of values.
 4. Entering dates each required submission item listed on the Contractor's Submission Schedule will be submitted, coordinated with the CPM Schedule.
 5. Installation and removal of temporary facilities and controls.
 6. Delivery and processing of submittals.
 7. Progress meetings.
 8. Pre-installation conferences.
 9. Project closeout activities.
 10. Startup and adjustment of systems.
- C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1.5 COORDINATED COMPOSITE DRAWINGS

- A. Coordinated Composite Drawings, General: Prepare coordinated composite drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordinated composite drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordinated composite drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordinated composite drawings by multiple contractors in a sequence that best provides for coordination

- of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - d. Indicate required installation sequences.
 - e. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to the Design Professional indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Digital Data Files: Prepare coordination digital data files in accordance with the following requirements:
- 1. File Preparation Format: The Contractor shall coordinate with the Design Professional and use the same digital data software program, version, and operating system as the original Drawings.

1.6 CONTRACTOR PERSONNEL

- A. Key Personnel Names: Within 7 days after receipt of the Notice to Proceed, submit a list of key personnel assignments with resume and job qualifications, including project manager, project scheduler, job superintendent and other personnel in attendance at the Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers, and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to the Project.
- B. The Contractor shall personally supervise the work and shall have at all times a representative (job Superintendent or job/project Foreman) at the job site with the authority to act for the Contractor. The representative shall not be removed from the job without the Consultant's consent. If the Contractor's representative ceases to be acceptable to the Consultant, they shall be removed from the job within 24 hours of receipt of Consultant's request and be replaced immediately by one who is acceptable to the consultant. The representative shall have documentable elevator modernization experience and shall be fluent in the English language.
- C. A fulltime Superintendent will be provided for all times that the construction services are being performed OR the supervision of the project be shared between both a Superintendent and a job/project Foreman.
- D. The Contractor shall provide all necessary staffing commitment to ensure sufficient resources to complete project within schedule duration regardless of any other ongoing work.
- E. The Contractor shall provide a listing of project sub-contractors within 48 hours of Contract Award.

1.7 SUPERVISION

- A. The Contractor shall be held responsible for proper coordination of all phases of the work, including that of his sub-contractors.
- B. The Contractor shall comply with all the health and safety regulations of the governing codes, laws and ordinances. Contractor shall take all necessary steps and precautions to protect health and minimize danger from all hazards to life and property. The Contractor is responsible for conducting all work activity associated with this project in strict conformance with all applicable OSHA standards and/or local and state regulations. The Contractor is solely liable for enforcement of these safe practices in his operation.
- C. Before proceeding with any work, carefully check and field verify all pertinent dimensions and sizes and assume full responsibility for fitting the equipment and materials to the structure. Carefully check the existing spaces to verify that the equipment to be provided will fit into the space available. Should the equipment not fit the existing structure, all additional relocations and sub-framing members required to accommodate the elevators shall be provided as part of the work of this section. Submit all structural shop drawings and calculations for the Consultant's review.
- D. Contractor shall familiarize himself with the Contract Documents, installation procedures and construction schedules for those phases of work performed by his subcontractors. If the contractor's work or the work of any of his subcontractors depends upon the execution of the work of another subcontractor or upon his own work, he shall so coordinate all phases of work so as to avoid conflicts in installation procedures and construction schedules.
- E. As work progresses, Contractor shall consult with his subcontractors, examine the work installed by them and resolve all conflicts without expense to owner.

1.8 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, the Contractor shall prepare and submit an RFI in the form specified.
 - 1. Coordinate and submit RFIs in a prompt manner so as to avoid delays in the Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Design Professional.
 - 6. RFI number, numbered sequentially.
 - 7. RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.

10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the date of Substantial Completion or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: The Owner's generated form with substantially the same content as indicated above.
- D. Design Professional's Action: The Design Professional will review each RFI, determine action required, and respond. Allow a reasonable amount of working days for the Design Professional's response for each RFI. RFIs received by the Design Professional after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the date for Substantial Completion or the Contract Sum.
 - e. Requests for interpretation of the Design Professional's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 2. The Design Professional's action may include a request for additional information, in which case the Design Professional's time for response will date from time of receipt of additional information.
 3. The Design Professional's action on RFIs that may result in a change to the date of Substantial Completion or the Contract Sum may be eligible for the Contractor to submit a Claim in accordance with procedures in General Conditions, Article 10 – Claims and Disputes.
 - a. If the Contractor believes the RFI response warrants change in the date of Substantial Completion or the Contract Sum, notify the Owner in writing within fifteen (15) days of receipt of the RFI response.
- E. On receipt of the Design Professional's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify the Owner and Design Professional within five days if the Contractor disagrees with response.

- F. RFI Log: Coordinate and cooperate with the Owner to prepare, update and maintain the use of the Contract Manager RFI log. The RFI log will include not less than the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Design Professional.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Design Professional's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.9 PROJECT MEETINGS

- A. General: The Owner will schedule and conduct meetings at the Project site, unless otherwise indicated.
1. Attendees: The Owner will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
 2. Agenda: The Owner will prepare the meeting agenda and distribute the agenda to all invited attendees.
 3. Minutes: The Contractor will record significant discussions and agreements and distribute the meeting minutes to everyone concerned.
- B. Construction Kick-off Meeting: The Owner will schedule and conduct a construction kick-off meeting before starting construction, at a time convenient to the Owner and Design Professional, upon issuance of the Notice to Proceed.
1. The meeting shall review responsibilities and personnel assignments.
 2. Attendees: The Owner, Owner's Commissioning Authority, Design Professional, and their consultants; the Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the meeting shall be familiar with the Project and authorized to make binding decisions on matters relating to the Work.
 3. Agenda: The meeting agenda will include items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.

- k. Submittal procedures.
 - l. Sustainable design requirements.
 - m. Preparation of As-builts and turnover documents.
 - n. Use of the premises.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
 - bb. Safety.
4. Minutes: The Contractor will record and distribute meeting minutes.
- C. Progress Meetings: The Owner will conduct progress meetings at regular weekly intervals. The frequency may be changed to address current conditions.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: The Owner's Commissioning Authority, and Design Professional, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with the Project and authorized to make binding decisions on matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of the Project. The Contractor will provide:
 - a. The Project Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to the Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next scheduled progress meeting period.
 - 2) Provide a 2-week look-ahead schedule.
 - 3) Provide RFI log
 - 4) Provide Shop Drawing/ Submissions log
 - b. Review present and future needs of each entity present, including the following:

- 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
4. Minutes: The Contractor will provide the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Coordinate with the Owner to revise the Project Schedule after each progress meeting where revisions to the schedule have been made or recognized. The Owner will issue revised schedule concurrently with the report of each meeting.
- D. Preinstallation Meetings: The Owner may conduct pre-installation meetings at the Project site before each construction activity that requires coordination with other construction and major assemblies of the Work requiring tight control and coordination.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow shall attend the meeting. The Owner to advise the Contractor, Design Professional and Owner's Commissioning Authority of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.

- l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 3. The Contractor will record significant meeting discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: The Contractor will distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the meeting cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the meeting at earliest feasible date.
- E. Project Closeout Conference: The Owner may schedule and conduct a Project closeout conference, at a time convenient to the Owner and Design Professional, but no later than thirty (30) days prior to the scheduled inspection date for Substantial Completion.
1. The Owner will conduct the conference to review requirements and responsibilities related to the Project closeout.
 2. Attendees: The Owner, Design Professional, and their consultants; the Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with the Project and authorized to make binding decisions on matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay the Project closeout, including the following:
 - a. Submission of turnover documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Requirements for demonstration and training.
 - d. Preparation of Contractor's punch list.
 - e. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - f. Coordination of separate contracts.
 - g. Owner's partial occupancy requirements.
 - h. Installation of Owner's furniture, fixtures, and equipment.
 - i. Responsibility for removing temporary facilities and controls.
 4. Minutes: The Contractor will record and distribute meeting minutes.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013200

PROJECT SCHEDULING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and individual Specification Sections and Bid Milestone Schedule, apply to this Section.

1.2 SUMMARY

- A. This is a single prime contract therefore the Contractor is responsible for the scheduling and documentation requirements as outlined in this section.
- B. Section includes administrative and procedural requirements to plan, schedule and document the progress of construction during the performance of the Work, including the following:
 - 1. Project schedule and reports.
 - 2. Material location reports.
 - 3. Field condition reports.
 - 4. Special reports.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in both electronic (PDF) file format and as electronic backup file in native software format.
- B. Project Schedule: Schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (baseline or updated) and date on label.
- C. Material Location Reports: Submit at monthly intervals.
- D. Field Condition Reports: Submit at time of discovery of differing conditions.
- E. Special Reports: Submit at time of unusual event.
- F. Qualification Data: For project scheduler.

1.4 QUALITY ASSURANCE

- A. Prescheduling Conference: The Owner may conduct conference at the Project site to comply with requirements in Section 01310 - Project Management and Coordination. Review methods and procedures related to the Project Schedule, including, but not limited to, the following:
1. Review software limitations and content and format for reports.
 2. Verify availability of qualified personnel needed to develop and update schedule.
 3. Discuss coordination, including phasing, work stages, area separations, interim milestones and Beneficial Occupancy.
 4. Review delivery dates for Owner-furnished products.
 5. Review time required for review of submittals and resubmittals.
 6. Review requirements for tests and inspections by independent testing and inspecting agencies.
 7. Review time required for completion and startup procedures.
 8. Review and finalize list of construction activities to be included in schedule.
 9. Review submittal requirements and procedures.
 10. Review procedures for updating schedule.

1.5 COORDINATION

- A. Coordinate preparation and processing of Project Schedules and Reports with the performance of the Work.
- B. Coordinate Project Schedule with the Contractor's Submission Schedule, progress reports, and other required schedules and reports.
1. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 PROJECT SCHEDULE, GENERAL

- A. Project Schedule:
1. Include milestones indicated in the Contract Documents in the Project Schedule, including, but not limited to, the Notice to Proceed, interim milestones, Substantial Completion, and Contract close-out.
 2. Substantial Completion date shall not be changed by submission of a schedule that shows an early completion date, unless approved by the Owner.
 3. No time for weather will be apportioned for foreseeable occurrences in a specific regional area. The Contractor shall be responsible to determine reasonable averages and make allowances in the performance of the Work.
- B. Activities: Treat each numbered activity as a consumable resource for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 15 days, unless specifically allowed by the Owner.
 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 - Submittal Procedures in schedule. Coordinate submittal review times in the schedule with dates entered in the Contractor's Submission Schedule.
 4. Startup and Testing Time: Include not less than 15 days for startup and testing.
 5. Punch List Inspections.
 6. Close Out Activities.
 7. Substantial Completion: Indicate completion on the date established for Substantial Completion, and allow time for the Owner's administrative procedures necessary to execute the Notice of Substantial Completion (NOSC).
 8. Incomplete Work items and Contract Closeout: Include not more than 60 days for incomplete Work items and Contract Closeout Requirements.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents, or approved by the Owner prior to use and show how date constraints affect the sequence of the Work.
1. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.
- D. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered RFIs.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
- E. Recovery Schedule: When periodic update indicates the Work is 15 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which the Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required achieving compliance, and dating by which recovery will be accomplished, subject to Owner's approval.
- F. Computer Scheduling Software: Prepare schedules using current version of MS Project.
- G. Changes in the Work: For each proposed change and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall schedule.
- H. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed, including the reason each adjustment was necessary.
2. Changes in early and late finish dates.
3. Changes in activity durations in workdays.
4. Changes in the critical path.
5. Changes in total float or slack time.
6. Changes in the duration for Substantial Completion.

2.2 REPORTS

- A. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 PROJECT WORK SCHEDULE

- A. Within one (1) week of being awarded the project, the Contractor shall furnish a project work schedule.
- B. The Contractor shall adhere to all weekend work times as stipulated by the local municipality.
- C. Any work items identified in the Contract Documents as Out of Hours may include performing work on weekends. This includes occupied staff spaces that may need to be picked up on weekends; The Contractor will have no claim for extra rate if work is performed on weekends.
- D. Schedule and Reports Updating: Prior to each scheduled progress meeting, update schedule to reflect actual construction progress and activities. Issue schedule and reports two days before each regularly scheduled progress meeting.
 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the CPM reports of each such meeting. As a minimum, schedule update submissions shall occur bi-weekly.
 2. Include reports with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final remaining duration for each activity.
- B. Distribution: Submit one electronic copy, in format specified, to the Owner and distribute copies of approved schedule and reports to the Owner, Design Professional, separate contractors, testing and inspecting agencies, and other parties identified by the Owner with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules and reports to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and individual Specification Sections and Contractor's Submission Schedule, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require the Design Professional's responsive action. Action submittals are those submittals indicated in individual specification sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require the Design Professional's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual specification sections as informational submittals.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.
- D. Required Submittal List: The Design Professional itemizes the list of submission items needed to be submitted by the Contractor in order to insure the design intent will be satisfied and inclusive of all Project turnover documents and/or Contract Closeout Requirements.
- E. Contractor's Submission Schedule: The itemized list of project submission requirements printed as a report. The Contractor enters the date each item needs to be submitted in order to meet the CPM schedule and returns this document to the Owner.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: The Contractor's Submission Schedule is attached to this section, prepared by the Design Professional. The Contractor is to coordinate and cooperate with the Owner and Design Professional to arrange in chronological order by dates required by the construction schedule. Coordinate time required for review, ordering, manufacturing, fabrication, and

delivery to establish dates. Coordinate additional time required for making corrections or modifications to submittals noted by the Design Professional and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate the Contractor's Submission Schedule with list of subcontracts, the schedule of values, and coordinated CPM schedule.
2. Initial Submittal: Submit in accordance with start-up CPM schedule. Include submittals required during the first 10 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently in accordance with the complete CPM schedule.
 - a. Coordinate with the Owner and Design Professional revised Contractor's Submission Schedule to reflect changes in current status and timing for submittals.

- B. Format for Submittals: Submit required submittals in electronic (PDF) file format.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Design Professional's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by the Design Professional for the Contractor's use in preparing submittals.

Coordination: Coordinate preparation and processing of submittals with the performance of the Work.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Commissioning Authority will review submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the Design Professional review and approval.
 3. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 4. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 5. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Submit Operation and Maintenance Manuals concurrent with action submittal.
 - b. The Owner or Design Professional reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Processing Time: Allow time for submittal review, including time for re-submittals, as follows. Time for review shall commence on the Design Professional's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. The Design Professional will advise the Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Re-submittal Review: Allow 15 days for review of each re-submittal.
 4. Sequential Review: Where sequential review of submittals by the Design Professional's consultants, the Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- C. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by the Design Professional.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Design Professional.
 - d. Name of Construction Manager (if applicable).
 - e. Name of Contractor.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Submittal number including revision identifier.
 - 1) Submittal number shall be the submittal item number and Submittal Package number designated in the Contractor's Submission Schedule.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- D. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Provide means for insertion to permanently record the Contractor's review and approval markings and action taken by the Design Professional.
 4. Include the following information on an inserted cover sheet:
 - a. Project name.
 - b. Date.
 - c. Name and address of Design Professional.
 - d. Name of Construction Manager (if applicable).

- e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Name of subcontractor.
 - h. Name of supplier.
 - i. Name of manufacturer.
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Other necessary identification.
5. Include the following information as keywords in the electronic file metadata:
- a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- E. Options: Identify options requiring selection by the Design Professional.
- F. Deviations: Identify deviations from the Contract Documents on submittals.
- G. Additional Copies: Unless the Design Professional observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- H. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. The Design Professional will return submittals, without review, received from sources other than the Contractor.
- 1. Transmittal Form: Use the Contractor's office form.
 - 2. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Indication of full or partial submittal.
 - j. Drawing number and detail references, as appropriate.
 - k. Transmittal numbered consecutively.
 - l. Submittal and transmittal distribution record.
 - m. Remarks.
 - n. Signature of transmitter.
 - 3. On an attached separate sheet, prepared on the Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by the Design Professional on previous submittals, and deviations from requirements in the Contract

Documents, including minor variations and limitations. Include same identification information as related submittal.

- I. Re-submittals: Make re-submittals in same form and format.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from the Design Professional's action stamp.
- J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- K. Use for Construction: Use only final submittals that are marked with approval notation from the Design Professional's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Submit electronic submittals via email as electronic (PDF) files, to the Design Professional. If applicable, the Design Professional will forward submittals to the Commissioning Authority for systems being commissioned. The Owner may request paper copies of certain submittals for onsite coordination.
 - a. The Design Professional, through the Owner, will return annotated file. Annotate and retain one copy of file as an electronic Project turnover document file.
 - b. The Commissioning Authority through the Design Professional will return annotated file.
 - 2. Operation and Maintenance Manual Submittals: Submit concurrent with the Action Submittal, as related in individual Specification Sections.
 - 3. Closeout Submittals: Comply with requirements specified in Section 017700 – Contract Closeout Requirements and as listed in the Contractor's Submission Schedule.
 - 4. Permits, Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Permits, Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Submittal Package number and Submittal Item number.
 - b. Manufacturer's catalog cuts.
 - c. Manufacturer's product specifications.
 - d. Standard color charts.
 - e. Statement of compliance with specified referenced standards.
 - f. Testing by recognized testing agency.
 - g. Application of testing agency labels and seals.
 - h. Notation of coordination requirements.
 - i. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data concurrent with Samples.
 6. Submit Product Data in electronic (PDF) file format.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Submittal Package number and Submittal Item number.
 - b. Identification of products.
 - c. Schedules.
 - d. Compliance with specified standards.
 - e. Notation of coordination requirements.
 - f. Notation of dimensions established by field measurement.
 - g. Relationship and attachment to adjoining construction clearly indicated.
 - h. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Submittal Package number and Submittal Item number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: For turnover purpose, submit six full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. The Design Professional, through the Owner, will return submittal with options selected.
 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit six sets of Samples. The Design Professional, through the Owner, will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a turnover sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least six sets of paired units that show approximate limits of variations.
- E. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
 4. Submit subcontract list in PDF electronic file, to the Owner.
- F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- G. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- H. OSHA Certificates: Upon the Owner's request, submit certificates of the OSHA 10-hour Construction Safety and Health Course – S1537-A, for all laborers, workers and mechanics working on site.
- I. Installer Certificates: Upon the Owner's request, submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- J. Manufacturer Certificates: Upon the Owner's request, submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- K. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- L. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- M. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to the Design Professional.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date

of the Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 DESIGN PROFESSIONAL'S ACTION

- A. General: The Design Professional will not review submittals that do not bear the Contractor's approval stamp and will return them without action.
- B. Action Submittals: The Design Professional will review each submittal, make marks to indicate corrections or modifications required, and return it through the Owner. The Design Professional will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Informational Submittals: The Design Professional will review each submittal and will return it if it does not comply with requirements.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from the Design Professional.
- E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
- G. On projects that have commissioning, the Commissioning Authority will receive copies of the submittals through the Design Professional and will provide comments on the submittals via the Design Professional.

3.3 CONTRACTOR'S SUBMITTAL SCHEDULE

- A. The Contractor's Submission Schedule: The Contractor's Submission Schedule, prepared by the Design Professional is attached following the end of this section. The Contractor shall provide the dates each item needs to be submitted to the Owner no later than 10 days after receipt of Notice to Proceed. The schedule shall include the date of all shop drawings, samples, materials that shall be submitted and the date approval is required. The Contractor shall adhere to the submittal processing time as describe in paragraph 1.5 above when developing the submittal schedule. The Contractor is to coordinate and cooperate with the Owner and Design Professional to complete scheduling in accordance with the approved CPM schedule.

END OF SECTION

SECTION 014000

QUALITY AND CODE REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections and New York State (NYS) Statement of Special Inspections and Tests, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit the Contractor's other quality assurance and quality control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for the Contractor to provide quality assurance and quality control services required by the Owner or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections:
 - 1. Section 01320 – Project Scheduling, for developing a schedule of required tests and inspections.
 - 2. Individual Specification Sections, for specific inspections and tests requirements.

1.3 DEFINITIONS

- A. Quality Assurance Services: Activities, actions, and procedures performed during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements.

- C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Field Quality Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- G. Installer/Applicator/Erector: The Contractor or another entity engaged by the Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
- H. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality Control Plan: For quality assurance and quality control activities and responsibilities.
- B. Contractor's Quality Control Manager Qualifications: For supervisory personnel.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.

3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality control service.

1.6 CONTRACTOR'S QUALITY CONTROL PLAN

- A. Quality Control Plan, General: Submit quality control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to the Owner. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality assurance and quality control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality assurance and quality control procedures similar in nature and extent to those required for Project.
 1. Project quality control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: Include in quality control plan a comprehensive schedule of the Work requiring tests or inspections, including the following:
 1. The Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and the Contractor-elected tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the "NYS Statement of Special Inspections and Tests."
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work the Owner has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.8 PERMITS, LICENSES, AND CERTIFICATES:

- A. The Contractor shall obtain, maintain and pay for all applications, permits, filings, and licenses necessary for the execution of the Work and for the use of such Work when completed as required by any and all authorities having jurisdiction. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of authorities having jurisdiction bearing on performance of the Work.
- B. The Contractor shall promptly assist the Owner in securing all approvals from authorities having jurisdiction. Without limitation, the Contractor shall assist the Owner in making application for Project approval, variances or other approvals, Letters of Completion, Temporary Certificates of Occupancy, and Certificates of Occupancy, including completion of all necessary applications and supporting documentation.
- C. The Contractor shall comply with all regulations governing conduct, access to the premises, operation of equipment and systems and conduct while in or near the premises and shall perform the Work in such a manner as not to unreasonably interrupt or interfere with the conduct of business of the Institution.
- D. For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, material certificates/affidavits, approvals, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- E. Municipal Permits: The Contractor shall secure and pay for a building permit and all work permits, applications, filings, and approvals that are associated with the Work of the Contract and pay all other permits, fees, licenses and inspections necessary for the proper execution and completion of the Contract as required by applicable authorities having jurisdiction.
 - 1. The Contractor shall secure required building permit or work permits and approvals prior to commencement of the Work, provide a copy to the Owner and post a copy of the permit at the Project site.
 - 2. The Contractor shall be responsible to maintain updated permits and approvals.
 - 3. Upon Substantial Completion of the Work of the Contract, the Contractor shall secure all required approvals from applicable authorities having jurisdiction. The Contractor shall provide a copy to the Owner.

1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
- F. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329, and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
- G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by the Owner.
 - 2. Notify the Owner seven days in advance of dates and times when mockups will be constructed.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain the Owner's approval of mockups before starting work, fabrication, or construction. Allow seven days for initial review and each re-review of each mockup.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Demolish and remove mockups when directed by the Owner.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality control services are indicated as the Owner's responsibility, the Owner will engage a qualified testing agency to perform these services.

1. The Owner will furnish the Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to the Owner are the Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not.
 1. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of the Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as the Contractor's responsibility, engage a qualified testing agency to perform these quality control services.
 - a. Contractor shall not employ same entity engaged by the Owner, unless agreed to in writing by the Owner.
 3. Notify testing agencies at least 24 hours in advance of time (excluding weekends and holidays) when Work that requires testing or inspecting will be performed.
 4. Where quality control services are indicated as the Contractor's responsibility, submit a written report, in duplicate, of each quality control service.
 5. Testing and inspecting requested by the Contractor and not required by the Contract Documents are the Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 - Submittal Procedures.
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Re-inspecting:
 1. Regardless of whether original tests or inspections were the Contractor's responsibility, provide quality control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents, or costs attributable to the Contractor's lack of coordination in properly scheduling the Work requiring testing and inspection will be charged to Contractor and the Contract Sum will be adjusted by Change Order.
- F. Testing Agency Responsibilities: Cooperate with the Owner and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify the Owner and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
 5. Does not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of the Contractor.
- G. Associated Services: The Contractor shall cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. The Contractor shall provide the following:
1. Access to the Work, including equipment required to access the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to the Owner, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 NYS SPECIAL INSPECTIONS AND TESTS

- A. Special Inspections and Tests: The Owner will engage a qualified testing agency to conduct special inspections and tests required by authorities having jurisdiction as the responsibility of the Owner, as indicated in the NYS Statement of Special Inspections and Tests, attached to this Section, and as follows:

1. Notifying Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 2. Submitting a written report of each test, inspection, and similar quality control service to the Owner with copy to the Contractor and to authorities having jurisdiction. Frequency of reporting shall be determined in consultation with the Owner.
 3. Submitting a final report of special tests and inspections at Substantial Completion, this includes a list of unresolved deficiencies.
 4. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents or code requirements.
 5. Retesting and re-inspecting corrected work.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve a Contractor of responsibility for compliance with the Contract Document requirements.
1. Specified tests, inspections, and related actions do not limit Contractor's quality control procedures that facilitate compliance with the Contract Document requirements.
 2. Inspections and tests performed by the testing agency shall in no way relieve the Contractor of the responsibility to construct in accordance with the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to the Design Professional.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for the Owner's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are the Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

END OF SECTION

SECTION 014100

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 COMPLIANCE

- A. Comply with applicable regulatory requirements and various codes referenced in these specifications. Where conflicts exist between local, State, and/or Federal regulatory requirements, codes, or these specifications, advise the Owner. The Owner will assist in resolving the conflicts to the satisfaction of the regulatory agencies prior to commencing the Work.

1.02 UNIFORM CODE, ENERGY CODE, AND CONTRACTOR QUALIFICATIONS

- A. All Work shall comply with OSHA (including site-specific safety plans required on all projects), and the New York State Uniform Fire Prevention and Building Code (the "Uniform Code"), which includes the publications incorporated by reference in Title 19 NYCRR Part 1219 through 1228:
 - 1. 2020 Building Code of New York State (the "Building Code")
 - 2. 2020 Plumbing Code of New York State (the "Plumbing Code")
 - 3. 2020 Mechanical Code of New York State (the "Mechanical Code")
 - 4. 2020 Fuel Gas Code of New York State (the "Fuel Gas Code")
 - 5. 2020 Fire Code of New York State (the "Fire Code")
 - 6. 2020 Property Maintenance Code of New York State (the "Property Maintenance Code")
 - 7. 2020 Existing Building Code of New York State (the "Existing Building Code")
 - 8. All other standards referenced in 19 NYCRR Parts 1219 through 1228.
- B. The contractor shall be aware of, and comply with, contractor requirements identified in the above-referenced codes and standards; for example, but not limited to:
 - 1. OSHA (Occupational Safety and Health Administration).
 - 2. 2020 Building Code Chapter 33 Safeguards During Construction.
 - 3. 2020 Existing Building Code Chapter 15 Construction Safeguards.
 - 4. 2020 Fire Code Chapter 33 Fire Safety During Construction and Demolition
 - 5. 2020 Fire Code Chapter 35 Welding and Other Hot Work (which governs safety during construction).
- C. All Work shall comply with the 2020 Energy Conservation Construction Code of New York State ("Energy Code") promulgated pursuant to Article 11 of the New York State Energy Law. The Energy Code is contained in 19 NYCRR, Part 1240, and in the publications incorporated by reference in 19 NYCRR Part 1240. The publications incorporated by reference in 19 NYCRR Part 1240 include:
 - 1. The publication entitled "2020 Energy Conservation Construction Code" published by International Code Council, Inc.
 - 2. The publication entitled "ANSI / ASHRAE / IES Standard 90.1-2016, Energy Standard for Buildings Except Low-Rise Residential Buildings"

published by American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.

3. The other referenced standards mentioned and/or referred to in 19 NYCRR Part 1240.

- D. Electrical Work: Conform to the requirements of the National Electrical Code (NEC), as referenced in the Uniform Code, unless otherwise shown or specified. The Owner will be the sole judge of the interpretation of these rules and requirements.
- E. Elevator Work; conform to:
 1. Safety Code for Elevators and Escalators, ASME A17.1, as referenced in the Uniform Code.

1.03 REQUIRED PERMITS AND INSPECTIONS

- A. No Work shall commence without a Construction Permit issued by the AHJ.

1.04 LISTINGS

- A. Equipment and materials for which Underwriters' Laboratories, Inc. (UL) provides product listing service, shall be listed and bear the listing mark.
 1. Alternately, any product listed and bearing the mark from one of the other Nationally Recognized Testing Laboratories (NRTL – as recognized by OSHA) shall be an acceptable alternative to being UL listed and marked, if the listed product has been tested to the applicable standard.

1.05 FIRE-RESISTANT CONSTRUCTION MATERIALS AND ASSEMBLIES

- A. Conform to the fire rating classifications based upon the test methods and acceptance criteria in the "Standard for Fire Tests of Building Construction and Materials" for which Underwriters' Laboratories, Inc. (UL) provides listings.
 1. Materials and assemblies shall comply with the acceptance criteria, detailed description of the assembly, its performance in the fire test, and other pertinent details such as specification of materials, Classification coverage, and alternate assembly details.
 2. Alternatively, fire resistance rating classifications by other issuing organizations listed in the New York State Uniform Fire Prevention and Building Code are acceptable.

1.06 FIRE ALARM AND SECURITY WORK

- A. The Work to install, modify, repair, or service Fire Alarm Systems and/or Security Systems shall be performed in accordance with the requirements of Article 6-D (Business of Installing Security or Fire Alarm System) of the New York State General Business Law.
 1. Fire Alarm Work: New York State Fire Alarm License is required for installation.

City of Yonkers
Will Library Elevator Upgrade

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

- A. General: Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the Owner, the Design Professionals, occupants of the Project, testing agencies, and authorities having jurisdiction.
- B. Electric Power Service from Existing System: Electric power from the Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage; including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.
 - 1. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- C. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations,

and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of the work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air filtration system discharge.
4. Other dust-control measures.
5. Waste management plan.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations and requirements of authority having jurisdiction for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ANSI A117.1.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before the Owner's acceptance, regardless of previously assigned responsibilities. Temporary use of permanent facilities during construction may be allowed at the sole discretion of the Owner.
- B. The work will be conducted in an un-occupied building in a park used by the public. The contractor shall isolate the work area from the public at all times.
- C. Barriers shall be erected to prevent egress of the public through the work area. The contractor shall submit plans for barriers and signage one (1) week in advance to the Owner's representative for approval.
- D. The Contractor's work shall never interfere with the normal operations of the facility by the public or its staff.

1.7 DELIVERY OF MATERIALS AND EQUIPMENT

- A. Location for short term and long term storage of materials and equipment will be identified by the Owner. The contractor is responsible to store his materials in a neat and safe manner and secured within the locations assigned for storage.
- B. Equipment and materials shall be stored off the ground, under fire retardant tarps. The contractor shall provide wall and floor protection with tempered Masonite.

- C. Delivered materials which are damaged or unsuitable for installation shall be removed from the job site and replaced with acceptable materials.
- D. The contractor shall provide a flagman to be present during the transport of equipment into and within the building.
- E. The contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger the safety of the structure.
- F. Any building element or component that is not part of this contract that is disturbed by the execution of the work by the contractor shall be returned to the existing condition.
- G. Contractor shall provide at least 72 hours advanced notification to the owner for the delivery of project materials.

1.8 MATERIALS

- A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- B. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
- C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively

1.9 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 2 - EXECUTION

2.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- D. Rubbish Removal:
 - 1. The Contractor shall:
 - a. Keep the Work free from rubbish at all times.

- b. Clean all enclosed structures daily.
 - c. Remove rubbish from the site at least once per week.
2. The Contractor shall not:
- a. Burn rubbish.
 - b. Drop or throw rubbish from one (1) level to another inside or outside any building. All rubbish shall be lowered by way of chutes, taken down by hoists, or lowered in receptacles.

2.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service. Arrange with utility company, the Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Electric Power Service: Connect to the Owner's existing electric power service. Maintain equipment in a condition acceptable to the Owner. Obtain all required permits.
- C. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - ii. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - iii. Install lighting for the Project identification sign
- E. Water Service: Connect to the Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to the Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- F. Sanitary Facilities: Use of building facilities is permitted. All restrooms shall be kept in operation during construction. Contractor will be solely responsible for maintaining cleanliness of restrooms arising out of their use and those of their subcontractors.
- G. NOT APPLICABLE: Heating and Cooling.
- H. NOT APPLICABLE: Ventilation and Humidity Control.
- I. NOT APPLICABLE: Isolation of Work Areas in Occupied Facilities:
- J. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 2. Maintain support facilities until Substantial Completion inspection date is scheduled. Remove before Substantial Completion. Personnel remaining after

Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

- K. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as specified in the Contract Documents.
 2. Maintain and touch-up signs so they are legible at all times.
- Temporary Signs: Provide other signs as required to inform public and individuals seeking entrance to the Project. Provide temporary, directional signs for construction personnel and visitors.

2.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- D. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- E. Protection Plan: Provide a Protection Plan for occupied spaces and unoccupied spaces.
- F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- G. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.
1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
 2. Construct dustproof partitions with fire rated gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
 3. Where fire-resistance-rated temporary partitions are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 4. Insulate partitions to control noise transmission to occupied areas.
 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 6. Protect air-handling equipment.
 7. Provide walk-off mats at each entrance through temporary partition

H. Fire Safety during Construction: Comply with all requirements identified herein as well as the more stringent requirements of the applicable codes (New York State Building and Fire Codes).

1. No smoking: Smoking shall be prohibited throughout the project/construction site. "No Smoking" signs shall be conspicuously posted at all entrances and throughout the site.
2. The Contractor is responsible for all fire safety efforts until completion and acceptance of the Work described in the Contract Documents that include but are not limited to the following:
 - a. Training. Job site personnel shall be trained in fire safety practices and procedures and the proper use of fire protection equipment, including hand-held fire extinguishers, hose lines, fire alarm and sprinkler systems.
 - b. Fire Protection Devices. Fire protection and detection equipment shall be maintained and serviced.
 - c. Hot Work Operations. Welding, cutting, open torches, torch-applied roof system activities, and other hot work operations shall be conducted under a permit system. A fire watch and fire extinguishers shall be provided. The Contractor shall confirm ANY scope condition where brazing or burning/use of Hot Work will be required on project. The Contractor must provide adequate Dedicated Fire Watch coverage at all times while such work is being performed.

I. The Work includes the conduct of demolition and construction activities at high roof elevations. The Contractor is responsible for exercising all necessary precaution and providing all necessary personal protective equipment and safety devices for employees to ensure a safe working environment.

2.4 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Remove standing water from decks.

6. Do not install material that is wet.
7. Discard, replace or clean stored or installed material that begins to grow mold.
8. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

2.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves right to take possession of the Project identification signs.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 – Contract Closeout Requirements.

END OF SECTION

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections and Contractor's Submittal Schedule, apply to this section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in the Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Sections:
 - 1. Section 013000 – Submittal Procedure, for product submittals.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work of the Contract and purchased new for the Project. The term "product" includes the terms "material," "equipment," and "system."
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Procurement Exemption Approval Product Specification: A specification in which a specific manufacturer's product is named including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes as a single source or sole source provider.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Design Professional's Action: If necessary, the Design Professional will request additional information or documentation for evaluation within one week of receipt of a comparable product request. The Design Professional will notify the Contractor through the Owner of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 013300 - Submittal Procedure.
 - b. Use product specified if the Design Professional does not issue a decision on use of a comparable product request within time allocated.
- B. Procurement Exemption Approval Product Specification Submittal: Comply with requirements in Section 013300 - Submittal Procedure. Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If the Contractor is given option of selecting between two or more products for use on the Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, the Design Professional will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at the Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to the Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger the Project structure.
3. Store products that are subject to damage by the elements under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store foam plastic protected from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. The owner will not be responsible for any contractor materials and equipment stored on-site.
8. All contractor material shall be stored on Masonite and covered with fire-retardant tarps.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to the Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for the Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Refer to individual specification sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 013300 – Submittal Procedure.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. The Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," the Design Professional will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. Provide products that do not contain asbestos.

B. Product Selection Procedures:

1. Product: Where Specifications include a procurement exemption approval and name a single source, sole source, manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for the Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications include a procurement exemption approval and name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for the Contractor's convenience will not be considered.
3. Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

C. Visual Matching Specification: Where Specifications require "match sample", provide a product that complies with requirements and matches sample. The Owner's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's full range", select a product that complies with requirements. The Design Professional will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: The Architect or Engineer will consider the Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, the Design Professional may return requests without action, except to record noncompliance with these requirements:
1. Action Submittal shall be provided in accordance with Submittal Procedures within 60 days after Notice to Proceed.
 2. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 3. Detailed comparison of qualities of proposed product with those named in the Specifications, including attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 4. Evidence that proposed product provides specified warranty.
 5. List of similar installations for completed projects with project names and addresses and names and addresses of design professionals and owners, if requested.
 6. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017320

REMOVALS, CUTTING, AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Responsibility: Each Contractor is responsible for the cutting and patching to permit installation or performance of Work of their contract.
- C. Related Sections include the following:
 - 1. Individual Specification Sections.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of Work of the contract.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of Work of the contract.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: At each occurrence, describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be

- relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 7. Design Professional's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
- C. Fire Rated Elements: Do not cut and patch fire rated elements (i.e. floors, walls, roofs, shafts, etc.) in a manner that results in reducing their capacity to perform as intended or that results in decreased fire rating.
- D. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, which results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.
- E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Design Professional's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- F. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including other trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials, unless specified otherwise in other Sections.
- C. Fire Rated Elements: Provide firestopping products/systems specified in system design listings by approved testing agencies that conform to the construction type, penetrating item, annular space requirements and fire rating involved in each separate assembly. Refer to applicable Individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting or patching to minimize interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
 6. Fire Rated Elements: Install firestopping systems to comply with applicable Individual Specification Sections and firestopping manufacturer's written installation instructions and published drawings for products and applications.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 017700

CONTRACT CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections and Notice of Substantial Completion (NOSC) Form, apply to this section.

1.2 SUMMARY

- A. Section includes administrative requirements for preparation and submission of final Contract Closeout Documents, including, but not limited to, the following:
 - 1. Contract Closeout Meeting
 - 2. Notice of Substantial Completion (NOSC) Requirements
 - a. List of Incomplete Work Items
 - b. Contract Turnover Documents
 - 1) As-built Drawings
 - 2) As-built Specifications
 - 3) As-built Schedule
 - 4) Permits, Licenses, Certificates
 - c. General Guarantee
 - d. Operation and Maintenance Manuals
 - 3. Final Cleaning
 - 4. Contract Closeout
- B. Related Sections:
 - 1. Section 01400 – Quality and Code Requirements
 - 2. Section 01783 – As-built Documents

1.3 CONTRACT CLOSEOUT MEETING

- A. Contract Closeout Meeting: The Owner will schedule and conduct a Contract closeout meeting, at a time convenient to the Owner and Design Professional, but no later than thirty (30) days prior to the scheduled inspection date for Substantial Completion.
 - 1. The Owner will conduct the meeting to review requirements and responsibilities related to Contract closeout.
 - 2. Attendees: Representatives of the Owner, testing agency, commissioning authority, Design Professional, and their consultants; Contractor and its superintendent; major

- subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to make binding decisions on matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Contract closeout, including the following:
 - a. Status of Contract Turnover Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Requirements for submitting final operation and maintenance manual.
 - d. Requirements for Permits, Licenses and Certificates.
 - e. Preparation of Contractor's list of incomplete Work items.
 - f. Procedures for processing Application for Payment at Substantial Completion and final payment.
 - g. Submittal procedure.
 - h. Responsibility for removing temporary facilities and controls.
 4. Minutes: The Owner or Design Professional will record and distribute meeting minutes.

1.4 NOTICE OF SUBSTANTIAL COMPLETION (NOSC)

- A. Substantial Completion: After the Work of the Contract is determined by the Owner, to be at Substantial Completion, the Contractor shall submit a written request to the Owner for a date of inspection.
- B. Documentation: The Notice of Substantial Completion (NOSC) form shall be executed at the end of inspection documenting incomplete Work items and submission of documents in accordance with this section that includes but is not limited to:
 - a. Preparation of a list of Work to be completed and corrected, the value of Work items on the list, and completion date of each Work item.
 - b. Submittal of contract turnover documents.
 - c. Termination and removal of temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - d. Completion of final cleaning requirements.
- C. SAMPLE FORM - NOTICE OF SUBSTANTIAL COMPLETION

NOTICE OF SUBSTANTIAL COMPLETION																															
CONTRACT NUMBER: _____		CONTRACTOR: _____																													
CONTRACT NAME: _____		LOCATION: _____																													
PROJECT MANAGER (PM): _____		DESIGN PROFESSIONAL (DP): _____																													
<p>With the exception of the list of incomplete Work and Status of Contract Turnover Documents, the Owner accepts the Work as Substantial Completion on (date) _____, in accordance with the General Conditions.</p>																															
ITEM	LIST OF INCOMPLETE WORK	SCHEDULED COMPLETION DATE																													
1.	_____	_____																													
2.	_____	_____																													
3.	_____	_____																													
4.	_____	_____																													
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Final Cleaning																															

1.5 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Submit list of incomplete items in *EXCEL* spreadsheet electronic format. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 2. Include the following information at the top of each page:
 - a. Project name & number.
 - b. Date.
 - c. Name of Contractor & Contract number.
 - d. Page number.
- B. Reinspection: Submit a written request for reinspection. On receipt of request, the Owner will either proceed with inspection or notify the Contractor of unfulfilled requirements. After inspection, the Owner will notify the Contractor of items, either on the Contractor's list or additional items identified, that must be completed or corrected.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis to proceed with commencement of Contract Closeout Documents.

1.6 CONTRACT TURNOVER DOCUMENTS

- A. Procedure: Contract turnover documents shall be transmitted to the Owner or if stated to the Design Professional, fifteen (15) days prior to requesting inspection date for Substantial Completion.
- B. As-built Drawings: Transmit one paper copy set of marked-up As-built Drawings to the Design Professional, with copy of transmittal to Owner. Print each Drawing, whether or not changes and additional information were recorded.
- C. As-built Specifications: Transmit one paper copy set of marked-up as-built specifications, including addenda and contract modifications to the Design Professional, with copy of transmittal to Owner.
- D. As-built Schedule: Submit one electronic (PDF) copy, certified by the Contractor, of the schedule that reflects the exact manner in which the project was actually constructed, to the Owner.
- E. Permits, Licenses and Certificates Documents: Submit one copy of original permits, licenses, certifications, inspection reports, material certificates/affidavits, approvals, and related documents required by authorities having jurisdiction to obtain Letter of Completion, Certificate of Occupancy, or Code Compliance Certificate. Coordinate and respond to requirements from

the Owner, Municipality and all other authorities having jurisdiction for issuance of approval/documents required for the Owner use and occupancy.

1. Cooperate and help coordinate with agency testing materials as specified in Section 014000 – Quality and Code Requirements. Testing Agency is required to submit final report of special inspections.

F. Miscellaneous Record Submittals: Refer to Individual Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one electronic (PDF) copy of each submittal.

G. Reports: Submit written report indicating items incorporated in Contract Documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

1.7 OPERATION AND MAINTENANCE MANUALS

A. Final Manuals Submittal: Submit an electronic copy of a compiled set of complete Operation and Maintenance Manuals in final form as indicated in Section 017823 – Operation and Maintenance Manuals, to the Owner fifteen (15) days prior to requesting date of inspection for Substantial Completion.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with allowable VOC levels.

PART 3 - EXECUTION

3.1 DEMOBILIZATION

A. Deliver tools, spare parts, extra materials, and similar items to location designated by the Owner. Label with manufacturer's name and model number where applicable.

B. Make final changeover of permanent locks and deliver keys to the Owner. Advise the Owner's personnel of changeover.

- C. Terminate and remove temporary facilities from the Project site, along with mockups, construction tools, and similar elements.

3.2 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for contract turnover document purposes. Post changes and modifications to contract turnover documents as they occur; do not wait until the end of the Project.
- B. Maintenance of Turnover Documents and Samples: Store turnover documents and Samples in the field office apart from the Contract Documents used for construction. Contract turnover documents shall not be used for construction purposes. Maintain turnover documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to contract turnover documents for the Owner's reference during normal working hours during performance of Contract.

3.3 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations as applies to Work of the contract.
 - a. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - b. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances.
 - c. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - d. Sweep concrete floors broom clean in unoccupied spaces.
 - e. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain. Replace if soil or stains remain after shampooing.
 - f. Remove labels that are not permanent.
 - g. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
 - h. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - i. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

j. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in all other applicable sections.

3.4 CONTRACT CLOSEOUT

- A. Provide Close Out Materials in the following format prior to the final acceptance of the work in this section:
1. (3) hardcopy Binders which must include a table of Contents listing each item as a section from the attached highlighted listing
 2. (3) accompanying CD-ROM copies containing all Close Out materials in the Hard Copy Binder.
 3. Electronic files of each Close Out item listed on the attached, highlighted checklist document.
- B. Close-out Checklist: The items listed in Table 017700-1 are to be provided to the DP before final acceptance of the work.

Item	Description	Status	Party
1	Work Permit		GC
2	Record Drawings in CAD		GC
3	Punchlist items completed; GC to provide form with acceptance by DP and Owner (sign-offs required).		GC
4	Copies of Warranties and Guarantees.		GC
5	Release of Liens (GC and sub-contractors) received.		GC
6	Approved Building Department sign-off .		GC

TABLE 01770-1 DP = Design Professional
GC = General Contractor

END OF SECTION

SECTION 017823

OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections and Contractor's Submission Schedule, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance manual for systems, subsystems, and equipment.
 - 2. Product maintenance data.
 - 3. Systems and equipment maintenance data.
- B. Related Sections:
 - 1. Section 013300 – Submittal Procedures
 - 2. Section 017700 – Contract Closeout Requirements

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Required Manuals: see Section 017700 – Contract Closeout Requirements for additional requirements.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to the Design Professional.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Organize the manual into separate sections by CSI number based on the table of contents of the project manual, for each system and subsystem, and a separate section for each piece of equipment not part of a system. The manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents:
 - a. Operation data.
 - b. Product maintenance data.
 - c. Systems and equipment data
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Design Professional.
 - 7. Names and contact information for major consultants to the Design Professional that designed the systems contained in the manuals.
 - 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one media volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents by CSI Section number and then by system, subsystem, and equipment. .
- E. Manuals, Electronic Copy: Submit electronic (PDF) copy of the manual, to the Design Professional, concurrent with Action Submittal.

2.2 OPERATION DATA

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Section and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Operating standards.
 3. Operating procedures.
 4. Operating logs.
 5. Wiring Diagrams.
 6. Control diagrams.
 7. Piped system diagrams.
 8. License requirements including inspection and renewal dates.
 9. Precautions against improper use.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.3 PRODUCT MAINTENANCE DATA

- A. Content: Organize data into a separate section, within the O & M Manual, for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in section identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Guarantees: Include copies of warranties and guarantees lists of circumstances and conditions that would affect validity of warranties.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE DATA.

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in a separate section within the O & M Manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

- C. **Manufacturers' Maintenance Documentation:** Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. **Maintenance Procedures:** Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available
- E. **Maintenance and Service Schedules:** Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. **Scheduled Maintenance and Service:** Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. **Maintenance and Service Record:** Include manufacturers' forms for recording maintenance.
 - 3.
- F. **Spare Parts List and Source Information:** Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. **Warranties:** Include copies of warranties and lists of circumstances and conditions that would affect validity of warranties.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. **Operation and Maintenance Documentation** shall be provided for review, concurrent, with Action Submittal specified in Individual Specification Section.
 - 1. Correct or modify the manual to comply with the Design Professional's comments. Submit copies of each corrected manual within 15 days of receipt of Design Professional's comments and prior to commencing demonstration and training.

- B. Product Maintenance Data: Assemble a complete set of maintenance data, in a separate section, within the O & M Manual, indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Data: Assemble a complete set of operation and maintenance data, in a separate section, within the O & M Manual, indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate section within the O & M Manual, for each system and subsystem, in the form of an instructional manual for use by operating personnel.
- D. Manufacturers' Data: Where manual contain manufacturers' standard printed data; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in As-built Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.

END OF SECTION

SECTION 017830

AS BUILT DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for As-built documents, including the following:
 - 1. As-built Drawings
 - 2. As-built Specifications
 - 3. As-built Schedule
 - 4. Record Product Data
 - 5. Miscellaneous record submittals
- B. Related Sections:
 - 1. Section 01320– Construction Progress Documentation
 - 2. Section 01300 – Submittal Procedure; Required Submittal List
 - 3. Section 01770 – Contract Closeout Requirements
- C. Administrative and procedural requirements for contract turnover documents as provided in Individual Specifications Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Required Documents: Section 01770 – Contract Closeout Requirements, describes administrative requirements for submission, number and type of copies required for contract closeout requirements.

PART 2 - PRODUCTS

2.1 AS-BUILT DRAWINGS

- A. As-built Drawings: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings onsite. Review As-built Drawings and shop drawings monthly with the Owner, for approval.

1. Preparation: Daily mark As-built Drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up As-built Drawings.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities
 - e. Revisions to routing of piping and conduits
 - f. Revisions to electrical circuitry
 - g. Duct size and routing
 - h. Actual equipment locations.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order.
 - k. Changes made by Bulletin.
 - l. Changes made following the Owner's written orders.
 - m. Details not on the original Contract Drawings.
 - n. Field records for variable and concealed conditions.
 - o. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up as-built prints.
4. Mark as-built sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
7. Upon completion of the work, create electronic versions of the project record documents. Black and white documents are to be scanned into TIFF format using CCIT Group 4 compression. Documents with color, which include black line documents with color notations, are to be scanned into TIFF format using a minimum of 8 colors and "packbit" compression.
 1. The scanned images are to be put on a compact disc (CD) using ISO 9660 format. Name the electronic files with the same name as the drawing. Create a folder on the CD for each trade and one for Shop Drawings.
 2. Label the CD with the project number, name, and title as it appears on the project manual cover. If there is more than one CD include notation to that effect on the label; i.e., 1 of 3, 2 of 3, 3 of 3. The project record documents and CD(s) are to be turned over to the Owner.

2.2 AS-BUILT SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - 5. Note related Change Orders, record Product Data, and turnover Drawings where applicable.

2.3 AS-BUILT SCHEDULE

- A. Final Schedule: Submit to the Owner a final schedule update. The As-built Schedule shall reflect the exact manner in which the project was actually constructed including actual start and finish dates, activities, sequences and logic.
 - 1. The Contractor shall certify the final schedule update as being a true reflection of the way the project was actually constructed.

2.4 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to the Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, As-built Specifications, and As-built Drawings where applicable.

2.5 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by Individual Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals.
 - 1. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Maintain Change Log: Maintain and submit written change log to the Owner, monthly for review indicating items incorporated in contract turnover documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.
- B. Recording: Maintain one copy of each submittal during the construction period for contract turnover document purposes. Post changes and modifications to contract turnover documents as they occur; do not wait until the end of the Project.
- C. Maintenance of Turnover Documents and Samples: Store turnover documents and Samples in the field office apart from the Contract Documents used for construction. Contract turnover documents are not to be used for construction purposes. Maintain turnover documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to contract turnover documents for the Owner's reference during normal working hours during performance of Contract.

END OF SECTION

**SECTION 020700
SELECTIVE REMOVALS AND DEMOLITION**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of Work

Removal and demolition of selected items from selected areas of the building as indicated in the contract documents and as necessary to facilitate the work of this contract whether or not specifically indicated in the contract documents.

1.02 SUBMITTALS

A. Shop Drawings

For that part of the Work that is not considered minor alterations or ordinary repairs, submit shop drawings and associated calculations. Demolition drawings and sequencing shall be signed and sealed by a Professional Engineer licensed in the State of New York and Design Drawings of such shall be filed with the Building Department.

B. Schedule

Submit a schedule indicating proposed methods and sequence of operations for selective removals and demolition Work, prior to commencement of operations. The sequence of operations shall be planned, in detail, to ensure uninterrupted progress of school sessions.

C. Submit details and procedures for dust and noise control.

D. Signed receipt for salvaged items delivered to the Owner.

E. Quality Control Submittals

1. Contractor Qualifications

a. Provide proof of Contractor and Professional Engineer qualifications specified under "Quality Assurance".

b. Provide proof of Refrigerant Recovery Technician qualifications

F. Sustainability Submittals

1. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

2. Statement of the measures taken to reduce air with dust and particulate matter.

1.04 RESPONSIBILITY, PROTECTION, DAMAGES, RESTRICTIONS

A. Condition of Space

The Owner assumes no responsibility for actual condition of the space in which removals and demolition Work is performed.

B. Protections

Provide temporary barricades and other forms of protection required to protect the Owner's property, personnel, and general public from injury due to selective removals and demolition work.

1. Provide protective measures as required to provide free and safe passage of the Owner's personnel and the general public.
2. Protect from damage existing finish work that is to remain in place and which becomes exposed during operations.
3. Protect floors with masonite or other suitable covering.

C. Damages

Promptly repair any and all damages to all property and finishes caused by the removals and demolition work; to the Owner's satisfaction and at no extra cost to the Owner.

D. Explosives

The use of explosives is prohibited.

E. Power-driven Tools (for interior removals and demolition).

Only hand-held electric power-driven tools conforming to the following criteria shall be used to cut or drill concrete and masonry:

1. Electric Chiselling Hammer
 - a. Power Data 115 Volts AC
7-8 Amps
Three-wire grounded connection
 - b. Percussion 2400-2600 Impacts/Minute
 - c. Type/Size Hand-held (+ 18-inch length)
 - d. Unit Weight 12-15 pounds (minus chisel bit)

2. Electric Hammer Drill
 - a. Power Data 115 Volts AC
5-8 Amps
Three-wire grounded connection
 - b. Percussion 2400-3200 Impacts/Minute
 - c. Type/Size Hand-held (+ 18-inch length)
 - d. Unit Weight 12-15 pounds (minus chisel bit)
 - e. Speed Data 0-0500 RPM (Under load)

1.05 QUALITY ASSURANCE

A. Qualifications

1. Company specializing in performing the Work of this Section shall have a minimum of 3 years experience and shall have worked on 3 projects of similar size.
2. Preparation of details of demolition of items not constituting minor alterations or ordinary repairs shall be under the direct supervision of and bear the seal of a Licensed Professional Engineer of the State of New York experienced in the design of such work, who shall also be responsible for construction supervision of such. Minor alterations or ordinary repairs shall not include:
 - a. The cutting away of any load bearing or required fire rated wall, floor, or roof construction, or any portion thereof.
 - b. The removal, cutting, or modification of any beams or structural supports;
 - c. The removal, change, or closing of any required exit;
 - d. The addition, rearrangement, relocation, removal or replacement of any parts of the building affecting loading or exit requirements, or light, heat, ventilation, or elevator requirements or accessibility requirements, or any fire suppression or fire protection system;
 - e. Additions to, alterations of, or rearrangement, relocation, replacement, repair or removal of any portion of a standpipe or sprinkler system, water distribution system, house sewer, private sewer, or drainage system, including leaders, or any soil, waste or vent pipe, or any gas distribution system;
 - f. Any plumbing work other than the repair or replacement of plumbing fixtures, piping or faucets from the exposed stop valve to the inlet side of a trap;
 - g. The alteration or repair of a sign for which a permit is required; or
 - h. Any other work affecting health or the fire or structural safety of the building or the safe use and operation of the service equipment therein.

3. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements

1. Work of this Section shall conform to all requirements of the Code and all applicable regulations and guidelines of all governmental authorities having jurisdiction, including, but not limited to, safety, health, and anti-pollution regulations. Where more stringent requirements than those contained in the Code or other applicable regulations are given in this Section, the requirements of this Section shall govern.
2. Conform to the requirements of "Safety and Health Standards, Subpart P - Excavations, Trenching and Shoring" - OSHA.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to commencement of the selective removals and demolition Work, inspect the areas in which the Work will be performed. Determine and list the existing conditions of rooms or area surfaces and equipment. After the Work in each respective area is completed, determine if adjacent surfaces or equipment have been damaged as a result of the Work; if so, the damage shall be corrected at the Contractor's expense.
- B. Create a safety zone around the demolition area as follows:
 1. Institute and maintain measures to prevent persons other than workers from entering areas where demolition work is occurring, debris is stored, or equipment is located.
 2. Where demolition work occurs on the exterior of a building, institute and maintain a safety zone around the site to prevent persons other than workers from entering such safety zone.

3.02 REMOVALS AND DEMOLITION WORK

- A. For work not considered minor alterations or ordinary repairs, or where indicated in the contract documents, engage the services of a third party Registered Professional Engineer (not a direct employee) to prepare the details and sequencing of the demolition. These submittal documents must be kept at the site.
- B. Perform selective demolition work in a systematic manner and use such methods as are required to complete the work indicated, and in accordance with the Specifications and governing City, State, and Federal regulations.
- C. When walls, partitions, floors, and ceilings (or portions thereof) are indicated to be removed; unless indicated otherwise:

1. Remove all items attached to the surfaces of the construction to be removed.
 2. Remove all plumbing piping, fixtures, accessories and rough-in occurring on or in the construction to be removed; cap piping and/or re-route lines as indicated or required.
 3. Remove all connectors, piping, ductwork and other HVAC items and accessories occurring on or in the construction to be removed; cap and/or re-route piping and ductwork as indicated or required.
 4. Remove all electrical wiring, to include, but not limited to, lighting, communications, alarms and all related appurtenances, conduits, devices, fixtures, and other electrical items and accessories occurring on or in the construction to be removed; disconnect power and remove wiring and conduit back to source.
- D. Carefully remove items, equipment and materials to be retained by the Owner and deliver them to locations indicated in the Article titled "Ownership of Materials".

3.03 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish and other materials resulting from the removals and demolitions from the building immediately; transport and legally dispose of materials off-site. Disposal method shall be in accordance with City, State, and Federal regulations. Items to be retained by the Owner shall be delivered to locations indicated in the Article titled "Ownership of Materials".
- B. Burning of removed materials is not permitted.

3.04 CLEAN-UP AND REPAIR

- A. Upon completion of removals and demolition Work, remove tools, equipment and all remaining demolished materials from the site.
- B. Repair all damaged areas caused by the removals and demolition Work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.
- C. All areas in which Work was performed under this Section shall be left "broom-clean" daily.

3.05 OWNERSHIP OF MATERIALS

- A. All equipment, materials, and items removed shall remain the property of the Owner, if desired; equipment, material and items not desired to be re-used or retained by the Owner shall be removed from the site by the Contractor. The Owner will designate which equipment, materials and items will be retained.

END OF SECTION

SECTION 033001

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 REFERENCES

- A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of Specifications for Structural Concrete for Buildings ACI 301-16 of the American Concrete Institute.

1.02 DEFINITIONS (Amendments to ACI 301, Section 1.2):

- A. Exposed Construction: Exposed to view.

1.03 SUBMITTALS

- A. Submittals Package: Submit product data for design mix(es) and materials for concrete specified below at the same time as a package.
- B. Shop Drawings: Placing drawings for bar reinforcement.
- C. Product Data:
 - 1. Concrete design mix(es) with name and location of batching plant.
 - 2. Portland Cement: Brand and manufacturer's name.
 - 3. Air-entraining Admixture: Brand and manufacturer's name.
 - 4. Water-reducing Admixture: Brand and manufacturer's name.
 - 5. Aggregates: Name and location of source, and DOT test numbers.
 - 6. Chemical Hardener (Dustproofing): Brand and manufacturer's name, and application instructions.
- D. Samples:
 - 1. Bar Supports: Full size.
- E. Quality Control Submittals:
 - 1. Certificates: Affidavit required under Quality Assurance Article.

1.04 QUALITY ASSURANCE

- A. Concrete batching plant shall be currently approved as a concrete supplier by the New York State Department of Transportation.
- C. Certifications: Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.
 - 1. Fabricator's and Erector's Qualifications Data: Name and experience of fabricator and erector.

- D. Source Quality Control: The Client's Representatives reserves the right to inspect and approve the following items, at his own discretion, either with his own forces or with a designated inspection agency:
 - 1. Batching and mixing facilities and equipment.
 - 2. Sources of materials.

1.05 STORAGE

- A. Store materials so as to insure the preservation of their quality and fitness for the Work. Materials, even though accepted prior to storage, are subject to inspection and shall meet the requirements of the Contract before their use in the Work.

PART 2 PRODUCTS

2.01 MATERIALS (Amendments to ACI 301, Section 4, for Normal Weight Concrete and Section 7, for Lightweight Concrete):

- A. Water-reducing Admixture: ASTM C 494, Type A, and on the New York State Department of Transportation's current "Approved List".
- B. Chemical Curing and Anti-Spalling Compound: ASTM C-309, Type 1D, Class B, with a minimum 18 percent total solids content. No thinning of material allowed.
 - 1. SureCure Emulsion, Kaufman Products, Inc. 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
 - 2. Cure & Seal 25 percent (J-22UV) by Dayton Superior Corp., 1125 Byers Rd., Miamisburg, OH 45342, (800) 745-3700.
 - 3. MasterKure CC 200 WB by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.
- C. Chemical Hardener (Dustproofing): Colorless aqueous solution of magnesium-zinc fluosilicate. Approved products include:
 - 1. MasterKure HD 300WB by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.
 - 2. Surfhard by The Euclid Chemical Co., 19218 Redwood Rd., Cleveland, OH 44110, (216) 531-9222.
 - 3. Liqui-Hard by W.R. Meadows, Inc., PO Box 543, Elgin, IL 60121, (847) 683-4500.
 - 4. FluoHard by L & M Construction Chemicals, Inc., 14851 Calhoun Rd., Omaha, NE 68152, (402) 453-6600.
 - 5. Armortop by Anti Hydro International, Inc., 265 Badger Ave., Newark, NJ 07108, (800) 777-1773.
 - 6. Diamond by Kaufman Products, Inc., 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
- D. Epoxy Bonding Agent (Adhesive): 100 percent solids epoxy-resin-base bonding compound, complying with ASTM C 881, Types I, II, IV and V, Grade 2

(horizontal areas) or Grade 3 (overhead/vertical areas), and Class B (40-60 degrees Fahrenheit) or Class C (60 degree Fahrenheit and above).

1. SurePoxy HM Series by Kaufman Products, Inc., 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
2. Sikadur Hi-Mod 32 by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071, (800) 933-7452.
3. MasterEmaco ADH 327 RS by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

2.02 PROPORTIONING (Amendments to ACI 301, Sections 4 & 7):

- A. Compressive Strength: As required by ACI 318-14 Table 19.3.2.1. "Requirements for concrete by exposure class".
- B. Weight: Normal.
- C. Durability: Concrete shall be air-entrained. Design air content shall be according to ACI 318-14 Table 19.3.2.1 "Requirements for concrete by exposure class", and ACI 318-14 Table 19.3.3.1 "Total air content for concrete exposed to cycles of freezing and thawing", with an allowable tolerance of plus or minus 1.5 percent for total air content. Entrained air shall be provided by use of an approved air-entraining admixture. Air-entrained cement shall not be used.
- D. Slump: Maximum 4 inches; minimum 1 inch before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.
- E. Admixtures: Do not use admixtures in concrete unless specified or approved in writing by the Client's Representatives.

2.03 REINFORCEMENT (Amendments to ACI 301, Section 3):

- A. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.
- B. Bar Supports: Galvanized steel or AISI Type 430 stainless steel, and without plastic tips.
- C. Tie Wire: Black annealed wire, 16-1/2 gage or heavier.

2.04 JOINTS AND EMBEDDED ITEMS (Amendments to ACI 301, Section 5.3.2.6):

- A. Obtain bond at construction joints by the use of bonding agent (adhesive) in accordance w/section 5.2.1.7 or the use of cement grout.

2.05 PRODUCTION (Amendments to ACI 301, Section 5):

- A. Provide ready-mixed concrete, either central-mixed or truck-mixed.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Do not use items of aluminum for mixing, chuting, conveying, forming or finishing concrete, except magnesium alloy tools may be used for finishing.
- B. Keep excavations free of water. Do not deposit concrete in water.
- C. Hardened concrete, reinforcement, forms, and earth which will be in contact with fresh concrete shall be free from frost at the time of concrete placement.
- D. Prior to placement of concrete, remove all hardened concrete spillage and foreign materials from the space to be occupied by the concrete.

3.02 FORMWORK (Amendments to ACI 301, Section 2):

- A. The formwork shall be designed for loads, lateral pressure, and allowable stresses outlined in Chapter 4 - Design of "Guide to Formwork for Concrete" (ACI 347-14).
- B. All formwork shall be removed after the concrete has sufficiently hardened, except in inaccessible spaces where approved.
- C. After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 3/4 inch from the formed surfaces of concrete.

3.03 PLACING REINFORCEMENT (Amendments to ACI 301, Section 3):

- A. At the time concrete is placed, reinforcement shall be free of mud, oil, loose rust, loose mill scale, and other materials or coatings that may adversely affect or reduce the bond.

3.04 PLACING CONCRETE (Amendments to ACI 301, Section 5):

- A. Operation of truck mixers and agitators and discharge limitations shall conform to the requirements of ASTM C 94.
- B. Do not allow concrete to free fall more than 4 feet.

3.05 FINISHING FORMED SURFACES (Amendments to ACI 301, Section 5.3.3):

- A. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:
 - 1. Rough Form Finish for concrete surfaces not exposed to view.
 - 2. Smooth Form Finish for concrete surfaces exposed to view.

3.06 CURING AND PROTECTION (Amendments to ACI 301, Section 5.3.6):

- A. Maintain concrete surfaces in a moist condition for at least 7 days after placing, except where otherwise indicated. Do not use curing compound.

3.07 CHEMICAL HARDENER (DUSTPROOFING)

- A. Apply chemical hardener to all troweled finished interior floors which are to be left exposed.
- B. Do not apply chemical hardener until concrete has cured the number of days recommended in manufacturer's instructions.
- C. Prepare surfaces and apply chemical hardener in accordance with manufacturer's printed instructions and recommendations.

3.08 FIELD QUALITY CONTROL (Amendments to ACI 301, Section 1):

- A. Make available to the Client's Representatives's Representatives whatever test samples are required to make tests. Furnish shipping boxes for compression test cylinders.

END OF SECTION

SECTION 055000

METAL FABRICATIONS

PART 1 GENERAL

1.01 REFERENCES

- A. Except as shown or specified otherwise, the Work of this Section shall meet the requirements of the following:
 - 1. Design, Fabrication, and Erection: "Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design" adopted by the American Institute of Steel Construction, June 1, 1989 (AISC Specification).
 - a. Design and Fabrication of Cold-Formed Shapes: "Specification for the Design of Cold-Formed Steel Structural Members", by the American Iron and Steel Institute (AISI Specification).
 - 2. Welding: "Structural Welding Code - Steel, AWS D1.1", or "Structural Welding Code - Sheet Steel, AWS D1.3", by the American Welding Society (AWS Codes).
- B. Organizations:
 - 1. AISC: American Institute of Steel Construction, One East Wacker Dr., Suite 700, Chicago, IL 60601-1802, 866-275-2472, www.aisc.org.
 - 2. AISI: American Iron and Steel Institute, 1140 Connecticut Ave., NW, Suite 705, Washington, D.C. 20036, (202) 452-7100, www.steel.org.
 - 3. AWS: American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126, (800) 443-9353, www.aws.org.
 - 4. ANSI: American National Standards Institute, 1819 L Street, NW, 6th Floor, Washington, DC 20036, (202) 293-8020, www.ansi.org.
 - 5. ASME: ASME International, 3 Park Ave., New York, NY 10016-5990, (800) 843-2763, www.asme.org.
 - 6. ASTM: ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA, 19428-2959, (610) 832-9500, www.astm.org.
 - 7. MPI: The Master Painters Institute Inc., 2808 Ingleton Ave., Burnaby, BC, V5C 6G7, (888) 674-8937, www.specifypaint.com.
 - 8. SSPC: The Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh PA 15222-4656, (877) 281-7772, www.sspc.org.

1.02 SUBMITTALS

- A. Shop Drawings: Show application to project. Furnish setting drawings and templates for installation of bolts and anchors in other Work. Indicate shop and field welds by standard AWS welding symbols in accordance with AWS A2.4.

- B. Product Data: Catalog sheets, specifications, and installation instructions for each fabricated item specified, except submit data for fasteners only when directed.
- C. Quality Control Submittals:
 - 1. Certificates: Copy of certificates required under Quality Assurance Article.

1.03 QUALITY ASSURANCE

- A. Certificates:
 - 1. Affidavit by the structural steel manufacturer certifying that structural steel items meet the contract requirements.
 - a. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
- B. Galvanizing: Stamp galvanized items with galvanizer's name, weight of coating, and applicable ASTM number.

1.04 DELIVERY AND STORAGE

- A. Coordinate delivery of items to be built into other construction to avoid delay.
- B. Promptly cover and protect steel items delivered to the Site.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Plates to be Bent or Cold-Formed: ASTM A 283, Grade C.
- B. Steel Bars and Bar-Size Shapes: ASTM A 675, Grade 70; or ASTM A 36.
- C. Cold-Finished Steel Bars: ASTM A 108, grade as selected by fabricator.
- D. Galvanized Steel Sheet: ASTM A 526, with G90 hot-dip process zinc coating complying with ASTM A653.
- E. Anchors: Except where shown or specified, select anchors of type, size, style, grade, and class required for secure installation of metal fabrications. For exterior use and where built into exterior walls, anchors shall be galvanized or of corrosive-resistant materials.

1. Wedge-Type Concrete Inserts: Galvanized box-type ferrous casting, designed to accept 3/4 inch diameter bolt having special wedge-shaped head; either malleable iron or cast steel.
 - a. Bolts: Carbon steel bolts having special wedge-shaped heads, nuts, washers and shims.
 2. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent test agency.
 - a. Carbon Steel: Zinc-Plated; ASTM B 633, Class Fe/Zn 5.
 - b. Stainless Steel: Bolts, Alloy Group 1 or 2; ASTM F593, Nuts; ASTM F 594.
- F. Shop Paint (General): Universal shop primer; fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- G. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.02 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Fabricate metal framing and supports to support related items required by the Work. Fabricate of welded construction unless otherwise indicated. Preassemble to largest extent possible.
- B. When required to be built into other Work, equip units with integral anchors spaced not more than 24 inches on center.
- C. Galvanize steel framing and supports.

2.03 MISCELLANEOUS STEEL TRIM

- A. Fabricate trim of shapes, sizes, and profiles shown, with continuously welded joints and smooth exposed edges, unless otherwise indicated or approved. Use concealed field splices wherever possible. Furnish necessary cutouts, fittings, and anchorages.
- B. Galvanize steel trim.

2.04 FABRICATION

- A. Use materials of size and thickness indicated. If not indicated, use material of required size and thickness to produce adequate strength and durability for the

intended use of the finished product. Furnish suitable, compatible anchors and fasteners to support assembly.

- B. Fabricate items to be exposed to view of material entirely free of surface blemish, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove surface blemishes by grinding or by welding and grinding prior to cleaning, treating, and finishing. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown.
- C. Joints: Fabricate accurately for close fit. Weld exposed joints continuously unless otherwise indicated or approved. Dress exposed welds flush and smooth.
- D. Connections: Form exposed connections with flush, smooth, hairline joints. Use concealed fasteners wherever possible. Use Phillips flathead (countersunk) bolts or screws for exposed fasteners, unless otherwise shown or specified.
 - 1. Furnish flat washer under connections requiring raised bolt heads.
 - 2. Furnish lock washer under nuts when through-bolting occurs.
- E. Punch, reinforce, drill, and tap metal Work as required to receive hardware and other appurtenant items.
- F. Galvanizing:
 - 1. In addition to specific items specified or noted to be galvanized, galvanize items attached to, embedded in, or supporting exterior masonry (including interior wythe of exterior masonry walls) and concrete Work.
 - 2. Unless otherwise specified or noted, items indicated to be galvanized shall receive a zinc coating by the hot-dip process, after fabrication, complying with the following:
 - a. ASTM A 123 for plain and fabricated material, and assembled products.
 - b. ASTM A 153 for iron and steel hardware.
- G. Shop Painting:
 - 1. Cleaning Steel: Thoroughly clean all steel surfaces. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning". Remove loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 "Hand Tool Cleaning", SSPC SP-3 "Power Tool Cleaning", or SSPC SP-7 "Brush-Off Blast Cleaning".
 - 2. Galvanized Items:
 - a. Galvanized items which are to be finish painted under Section 099101 shall be rinsed in hot alkali or in an acid solution and then in clear water.
 - b. Welded and abraded areas of galvanized surfaces shall be wire brushed and repaired with a coating of cold galvanizing compound.
 - 3. Apply one coat of shop paint to all steel surfaces except as follows:

- a. Do not shop paint steel surfaces to be field welded and steel to be encased in cast-in-place concrete.
 - b. Apply 2 coats of shop paint, before assembly, to steel surfaces inaccessible after assembly or erection, except surfaces in contact.
 - c. Do not paint galvanized items which are not to be finished painted under Section 099101.
4. Apply paint and compound on dry surfaces in accordance with the manufacturer's printed instructions, and to the following minimum thickness per coat:
 - a. Shop Paint (General): 4.0 mils wet film.
 - b. Shop Paint for Galvanized Steel: 3.0 mils wet film.
 - c. Cold Galvanizing Compound: 2.0 mils dry film.

PART 3 EXECUTION

3.01 PREPARATION

- A. Temporarily brace and secure items which are to be built into concrete, masonry, or similar construction.
- B. Isolate non-ferrous metal surfaces to be permanently fastened in contact with ferrous metal surfaces, concrete, or masonry by coating non-ferrous metal surface with bituminous mastic, prior to installation.

3.02 INSTALLATION

- A. Fit and set fabricated metal Work accurately in location, alignment, and elevation. Securely fasten in place. Cut off exposed threaded portion of bolts flush with nut.
- B. Set loose items on cleaned bearing surfaces, using wedges or other adjustments as required. Solidly pack open spaces with bedding mortar or grout.
- C. Attached Work: Fasten to concrete and solid masonry with expansion anchors and to hollow masonry with toggle bolts in cells, unless otherwise indicated. Drill holes for fasteners to exact required size using power tools.

END OF SECTION

SECTION 071613

CEMENTITIOUS WATERPROOFING

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and application instructions for each material specified.
- B. Samples:
 - 1. Cementitious Coating: One pound of dry powder mix.
 - 2. Acrylic Additive: One quart.
- C. Quality Control Submittals:
 - 1. Test Reports: If requested by the Client's Representative, furnish certified test data issued by an independent testing laboratory, demonstrating that the products submitted comply with the required physical properties.
 - 2. Installers Qualifications Data:
 - a. Submit the names and addresses of 5 previous cementitious waterproofing projects. Include the type and size of each project.
 - b. Submit a letter certifying that the supervisor or foreman and the workers applying the cementitious waterproofing materials have at least 2 years experience in the application of cementitious waterproofing materials.

1.02 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer's Qualifications: The manufacturer shall have qualified technical representatives with the technical expertise to advise the Contractor of application procedures required for coating materials under the particular job conditions.
 - 2. Applicator's Qualifications: The person supervising the Work of this Section and the workers applying the cementitious waterproofing shall have had 2 years of experience in the application of cementitious waterproofing coatings and in addition shall have worked on 5 cementitious waterproof coating projects of comparable scope and complexity to the work of this project.
- B. Field Examples:
 - 1. On actual surfaces designated by the Client's Representative's Representative, apply a sample application of the cementitious waterproof coating. Apply coating on at least 100 sq ft of surfaces.

2. Sample application accepted by the Client's Representative's Representative will be used as the standard of comparison for the Work.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection:
 1. Comply with the manufacturer's printed instructions for material storage requirements.

1.04 PROJECT CONDITIONS

- A. Environmental Requirements:
 1. Do not apply materials to surfaces that contain free water or frost.
 2. Do not apply materials when temperature is below 40 degrees F or will fall below 40 degrees within 24 hours.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cementitious Waterproof Plaster Coating: Factory blended and packaged dry powder mix; "Thorseal Plaster Mix" by Thoro/BASF Building System, "Blockade Finisher" by Merlex Stucco, or other material complying with Federal Specification TT-P-0035 and having the following physical properties:
 1. Compressive Strength (ASTM C 109): 4000 psi at 28 days.
 2. Tensile Strength (ASTM C 190): 310 psi at 28 days.
 3. Flexural Strength (ASTM C 348): 900 psi at 28 days.
 4. Absorption (ASTM C 67): 3.38 percent.
 5. Freeze/Thaw Resistance (ASTM C 666, Method B): No cracking or delamination after 300 cycles.
 6. Accelerated Weathering (FS TT-P-0035): No checking, cracking, or loss of adhesion after 5000 hours of weatherometer exposure.
 7. Salt Spray Resistance; 300 hour exposure: No deterioration or loss of adhesion.
- B. Acrylic Additive: "Acryl 60" by Thoro/BASF Building System, "Acrylic Additive" by Sonneborn/BASF Building System, or a comparable product recommended by the cementitious coating manufacturer.
- C. Cleaning Agents: Products recommended by the cementitious coating manufacturer for the particular conditions.

PART 3 EXECUTION

3.01 PREPARATION

- A. Protection: Protect adjacent surfaces not required to be coated.
- B. Surface Preparation:

1. Remove all debris, dirt, dust, and other substances that are detrimental to the application of the cementitious waterproofing.
2. Remove existing paints and coatings. Use cleaning agents and methods recommended by the cementitious coating manufacturer.
3. Remove laitance and efflorescence with a 10 percent solution of hydrochloric (muriatic) acid, followed by a thorough wash with clean water.

3.02 APPLICATION

- A. Plan the Work with enough workers and scaffolding so breaks in the cementitious coating application are at natural stopping points recommended by the coating manufacturer and approved by the Client's Representative's Representative.
- B. Mixing: Follow the cementitious coating manufacturer's recommendations unless otherwise specified.
 1. Use clean containers for mixing.
 2. Power mix materials with mechanical mixing equipment.
 3. Mix only the amount of material that can be applied within "open time". Do not re-work set or hardened material; remove such material from the site.
 4. Liquid solution shall consist of 3 parts of clean water and 1 part acrylic additive, unless otherwise recommended by the cementitious coating manufacturer for the particular conditions.
 5. Proportion and mix liquid solution and powder in accordance with the cementitious coating manufacturer's recommendations for the application indicated.
- C. Immediately before application, dampen dry surfaces with clean water.
- D. Apply cementitious coating in compliance with the coating manufacturer's recommendations unless otherwise specified.
- E. Cementitious Waterproof Coating:
 1. Brush on and evenly distribute a base coat of the mix at the minimum rate of 2 lbs per sq yd. Cure base coat for 24 hours or longer if required by environmental conditions. Apply a finish coat of the mix at the minimum rate of 1 lb per sq yd.
- F. Apply minimum total coating thickness indicated on the Drawings.
- H. Curing: If rapid drying occurs, spray the finished surface with a water mist as required to keep the surface damp. Water mist for the period of time recommended by the cementitious coating manufacturer.

3.03 CLEANING

City of Yonkers
Will Library Elevator Upgrade

- A. Clean adjacent surfaces that have been soiled or defaced by the execution of this Work.
- B. Remove protective covers.

END OF SECTION

**SECTION 078400
FIRESTOPPING**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide firestopping at all penetrations and juncture joints of fire-rated walls, floors and ceilings in accordance with the requirements of the NYC Building Code.
- B. Firestopping and Smoke Seals shall be provided, but not limited to the following specific locations:
 - 1. Penetrations for the passage of duct, cable, cable tray, conduit, piping and electrical busways and raceways through fire-rated vertical barriers (walls and partitions), and horizontal barriers (floor slabs and floor/ceiling assemblies).
 - 2. Openings between floor slabs and curtain walls and fire rated walls and curtain walls.
 - 3. Construction Joints between the top of walls and floor or roof slab and steel deck assemblies, or, concrete floor or roof slab.
 - 4. Openings and penetrations in fire-rated partitions or walls containing fire doors.
 - 5. Locations shown specifically on the Drawings.

1.02 REFERENCES

- A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
 - 1. American Society for Testing and Materials (ASTM)
 - 2. Underwriters Laboratories, Inc. (UL)

3. National Fire Protection Association (NFPA)
4. Warnock Hersey

1.03 DEFINITIONS

- A. Penetration: Any opening or foreign material passing through or into a fire-rated barrier.
- B. Fire-Rated: Have the ability to withstand the effects of a standard fire exposure for a specified time period, as determined by qualified testing.
- C. Fire-Rated Barrier: A floor, wall, partition or floor-ceiling assembly able to withstand a standard fire and hose stream test without failure.
- D. Fire resistance rating: The ability of a structure to act as a barrier to the spread of fire and to confine it to the area of origin. Ratings are expressed in hours and apply to beams, columns, floors, ceilings, roofs, walls and partitions.
- E. Firestopping: A means of sealing openings in fire-rated barriers to preserve or restore the fire resistance rating.
- F. Firestop System: A material, or combination of materials, installed to retain the integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke or gases through penetrations in fire-rated barriers.
- G. F Rating: The time period that the through-penetration firestop system limits the spread of fire through the penetration when tested in accordance with ASTM E814.
- H. T Rating: The time period that the penetration firestop system, including the penetrating item, limits the maximum temperature rise to 325°F (163°C) above its initial temperature through the penetration on the non-fire side when tested in accordance with ASTM E814.

1.04 DESIGN REQUIREMENTS

- A. Technical Requirements
 1. Firestopping materials shall be UL Classified as "Fill, Void or Cavity Material" for use in Through-Penetration Firestop Systems.
 2. Firestop Systems shall provide a fire resistance rating at least equal to the hourly resistance rating of the fire-rated barrier and resist passage of smoke and other gases.

B. General Considerations

1. Firestop Systems do not re-establish the structural integrity of load bearing partitions. The Contractor shall consult the Authority's Representative prior to penetrating any load bearing assembly.
2. Firestop systems are not intended to support live loads or traffic. Contractor shall consult the Authority's Representative if there is reason to believe these limitations may be violated.

1.05 SUBMITTALS

A. Product Data

Submit manufacturer's product information for each type of firestopping/smoke seal and assembly installed, including application instructions and specifications.

B. Shop Drawing

Submit shop drawings of each firestopping or smoke seal system/assembly to be installed in the project, showing all parts of the system, required clearances.

C. Quality Control Submittals

1. Certificates

- a. Furnish manufacturer's certification that materials meet or exceed specification requirements for each of the performance tests specified in Part 2. Provide testing certification.
- b. Furnish applicator's certification that material has been completed as specified to meet fire resistance ratings, thickness requirements, and application requirements of the applicable assembly.
- c. Furnish UL, BSA, MEA, or OTCR approval of material.
- d. Furnish certificate stating each material is 100% asbestos free.

2. Contractor Qualifications

Provide proof of Manufacturer and Applicator qualifications specified under "Quality Assurance".

D. Mock-up

Provide mock-up as indicated under Quality Assurance.

E. Guarantee

1. Contractor and installer's installation guarantee.

1.06 QUALITY ASSURANCE

A. Qualifications

1. Manufacturer: Company specializing in the manufacture of firestopping/smoke seal materials to be used in this Contract shall have a minimum of five years experience.
2. Installer: All firestopping Work shall be performed by a Subcontractor who will be acceptable to the firestopping manufacturer in the application of its products and systems and have a minimum of three years experience and shall have worked on at least two projects with similar quantities of materials used. .

B. Regulatory Requirements

1. Building Code: Material and application shall meet the requirements for firestopping materials in accordance with the NYC Building Code.
2. Material must have UL or NYC BSA, MEA or OTCR approval for each assembly utilized. Comply with the following for firestopping that is required to be in compliance with BC 712 of the 2008 NYC Building Code:
 - a. ASTM E84 - Surface Burning Characteristics of Building Materials.
 - b. ASTM E814 - Fire Tests of Through Penetration Firestops.
 - c. U.L. 1479 - Fire Tests of Through-penetration `Firestops.
 - d. U.L. - Fire Resistance Directory; Through-Penetration Firestop Systems (XHEZ), and Fill, Void or Cavity Materials (XHHW).
 - e. U.L. 723 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. Manufacturer's Certification

1. Manufacturer shall provide written certification stipulating that its products and systems used in this Project, if installed in accordance with the manufacturer's recommendations, shall provide the firestopping specified in this Section, as indicated by its UL rating for that specific installation.

2. The certification shall not include either or both of the following statements, or variations thereof:

"Owner or User shall determine suitability of the product or system for its intended use and assume all risks and liabilities connected therewith".

and,

"Owner or User shall test application of product or system for its specific use".

D. Mock-up

Install, on representative substrates (on site), one mock-up of each type of firestopping system to be used on Project, for each fire rating required and for each type of wall, floor, and ceiling. Acceptable mock-up installations may remain as part of the completed work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages bearing name of manufacturer, product identification, and the proper UL labels for fire hazard and fire-resistance classification.
- B. Reject damaged packages found unsuitable for use and remove from job site.
- C. Store materials off ground, under cover, and away from damp surfaces.
- D. Keep materials dry at all times. Wet material shall be discarded.
- E. Rotate stock material and use prior to expiration date.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain air and substrate temperature at a minimum temperature of 50°F for 24 hours before, during, and for 24 hours after application of the material or as required by the product literature, which ever is more stringent. Contractor shall provide enclosures with heat to maintain temperatures.

1.09 GUARANTEE

- A. Submit a guarantee, executed by the Contractor and co-signed by the installer, agreeing to repair/replace firestopping work performed under this Contract which has cracked, flaked, dusted excessively, peeled, or has separated or fallen from the substrate due to defective workmanship for a period of two (2) years from the date of substantial.

installation.

PART 2 PRODUCTS

2.01 FIRESTOPPING-GENERAL

- A. Through-Penetration Firestop Devices, Forming Materials, And Fill, Void or Cavity Materials: As listed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide, or the Omega Point Laboratories Listings Directory.
 - 1. For firestopping exposed to moisture, furnish products that do not deteriorate when exposed to this condition.
 - 2. For firestopping systems exposed to view, furnish products with flame-spread values of less than 25 and smoke developed values less than 50, as determined per ASTM E 84.
 - 3. For penetrations for piping services below ambient temperature, furnish moisture-resistant through-penetration firestop systems.
 - 4. For penetrations involving insulated piping, furnish through-penetration firestop systems not requiring removal of insulation.
- B. Accessories: Components required to install fill materials as recommended by the firestopping manufacturer for particular approved fire rated system.
- C. Identification Labels:
 - 1. Furnished by fire stopping manufacturer of suitable material for permanent field identification of through-penetration firestops.
 - 2. Identify the following:
 - a. "WARNING - FIRESTOP MATERIAL".
 - b. Company Name.
 - c. Product Catalog number.
 - d. F rating.
 - e. T rating, if available.
 - 3. Field fabricated labels are not acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine existing through-penetrations of floors, walls, partitions, ceilings and roofs in the Work areas.
- B. Examine existing junctures, control joints, and expansion joints in the Work areas.
- C. Where firestopping is missing or not intact, submit a written report to the Director's Representative describing the existing conditions.

3.02 PREPARATION

- A. Clean out openings immediately before installation of through-penetration firestopping. Comply with recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove foreign materials from surfaces of openings, and from penetrating items that could interfere with adhesion of firestopping.
 - 2. Clean opening and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form release agents from concrete.
- B. Clean out openings, and juncture, control, and expansion joints immediately before installation of firestopping. Comply with recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove foreign materials from surfaces of openings and joint substrates, and from penetrating items that could interfere with adhesion of firestopping.
 - 2. Clean opening joint substrates to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form release agents from concrete.
- C. Protection:
 - 1. Protect surfaces adjacent to through-penetration firestops with non-staining removable masking tape or other suitable covering to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or that would be caused by cleaning methods used to remove smears from firestopping materials.
- D. Substrate Priming:
 - 1. Prime substrates in accordance with the firestopping manufacturer's printed installation instructions using recommended products and methods.
 - 2. Do not allow primer to spill or migrate onto adjoining exposed surfaces.

3.03 INSTALLATION OF THROUGH PENETRATION FIRESTOPS

- A. Use through-penetration firestop devices, forming materials, and fill, void or cavity materials to form through-penetration firestops to prevent the passage of flame, and limit temperature rise of the unexposed surface as detailed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide, or the Omega Point Laboratories Listings Directory.
 - 1. Where applicable design is not detailed in the Directories, use forming materials and fill, void or cavity material to form through-penetration firestop in accordance with approved printed details and installation instructions from the company producing the forming materials and fill, void or cavity material.
 - 2. If the construction type(s) of the building cannot be determined, provide firestopping with fire resistance ratings as specified in the Building Code of New York State, Tables 720.1(1), 720.1(2), 720.1(3), and 302.3.2.

- B. Provide through-penetration firestop systems with F ratings that shall equal or exceed the fire resistance rating of the penetrated building construction.
- C. Provide through-penetration firestop systems with T ratings, in addition to F ratings, at floors where the following conditions exist:
 - 1. Where firestop systems protect penetrations located outside the wall cavities.
 - 2. Where firestop systems protect penetrations located outside fire resistive shaft enclosures.
 - 3. Through-penetration firestop systems protecting floor penetrations require a T-rating of at least 1 hour, but not less than the required floor fire-resistance rating.
- D. Firestop through-penetrations associated with the new Work.
- E. Firestop through-penetrations of floors, walls, partitions, ceilings, and roofs in accordance with the fire resistance rating assigned to the walls, partitions, floors, ceilings, and roofs on the Construction Work Drawings.
- F. Permanently affix label at each firestop. Use adhesive compatible with surface construction at firestop location.

3.04 INSTALLATION OF JUNCTION, CONTROL, AND EXPANSION JOINT FIRESTOPS

- A. Use joint treatment materials to form firestop to prevent the passage of flame and limit temperature rise of the unexposed surface, as detailed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide or the Omega Point Laboratories Listings Directory.
 - 1. Where applicable design is not detailed in the Directories, use forming materials and fill, void or cavity material to form firestop in accordance with approved printed details and installation instructions from the company producing the forming materials and fill, void or cavity material.
 - 2. If the construction type(s) of the building cannot be determined, provide firestopping with fire resistance ratings as specified in the Building Code of New York State, Tables 720.1(1), 720.1(2), 720.1(3), and 302.3.2.
- B. Firestop junctures, control joints, and expansion joints associated with smoke partitions and fire rated construction.
- C. Permanently affix labels every 10 feet along each firestop. Use adhesive compatible with surface construction at firestop location.

3.05 CLEANING

- A. Clean off excess fill materials and sealants adjacent to penetrations by methods and cleaning materials recommended by manufacturers of firestopping products and of products in which penetrations occur.

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- B. Remove masking tape as soon as practical so as not to disturb the firestopping's bond with substrate.
- C. Protect firestopping during and after curing period from contact with contaminating substances, or damage resulting from adjacent Work.
- D. Cut out and remove damaged or deteriorated firestopping immediately.

END OF SECTION

SECTION 079200

JOINT SEALERS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for each product specified except miscellaneous materials.

1.02 QUALITY ASSURANCE

- A. Container Labels: Include manufacturer's name, trade name of product, kind of material, federal specification number (if applicable), expiration date (if applicable), and packaging date or batch number.
- B. Test and validate sealants used for exterior weathersealing per the Sealant Waterproofing Restoration Institute (SWRI).
- C. Warranties:
 - 1. Silicone sealants: 20 years Weatherseal Warranty.
 - 2. Polyurethane or Silicone: 5 year Weatherseal Warranty.

1.03 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Temperature: Unless otherwise approved or recommended in writing by the sealant manufacturer, do not install sealants at temperatures below 40 degrees F or above 85 degrees F for non silicone sealants and below minus 20 degrees F or above 125 degrees F for silicone sealants.
 - 2. Humidity and Moisture: Do not install the Work of this section under conditions that are detrimental to the application, curing, and performance of the materials.
 - 3. Ventilation: Provide sufficient ventilation wherever sealants, primers, and other similar materials are installed in enclosed spaces. Follow manufacturer's recommendations.
- B. Protection:
 - 1. Protect all surfaces adjacent to sealants with non-staining removable tape or other approved covering to prevent soiling or staining.
 - 2. Protect all other surfaces in the Work area with tarps, plastic sheets, or other approved coverings to prevent defacement from droppings.

PART 2 PRODUCTS

2.01 SEALANTS

- A. Type 2 Sealant: One-part acrylic polymer sealant; Pecora AVW-920, PTI 738, or Tremco Mono.

2.02 JOINT FILLERS

- A. Expanded Polyethylene Joint Filler: Flexible, compressible, closed-cell polyethylene of not less than 10 psi compression deflection (25 percent).

2.03 MISCELLANEOUS MATERIALS

- A. Joint Primer/Sealer/Conditioner: As recommended by the sealant manufacturer for the particular joint surface materials and conditions.
- B. Backer Rod: Compressible rod stock of expanded, extruded polyethylene.
- C. Bond Breaker Tape: Polyethylene or other plastic tape as recommended by the sealant manufacturer; non-bonding to sealant; self adhesive where applicable.
- D. Cleaning Solvents: Oil free solvents as recommended by the sealant manufacturer. Do not use re-claimed solvents.
- E. Masking Tape: Removable paper or fiber tape, self-adhesive, non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine all joint surfaces for conditions that may be detrimental to the performance of the completed Work. Do not proceed until satisfactory corrections have been made.

3.02 PREPARATION

- A. Clean joint surfaces immediately before installation of sealant and other materials specified in this Section.
 - 1. Remove all loose materials, dirt, dust, rust, oils and other foreign matter that will impair the performance of materials installed under this Section.
 - 2. Remove lacquers, protective coatings and similar materials from joint faces with manufacturer's recommended solvents.
 - 3. Do not limit cleaning of joint surfaces to solvent wiping. Use methods such as grinding, acid etching or other approved and manufacturer's recommended means, if required, to clean the joint surfaces, assuring that the sealant materials will obtain positive and permanent adhesion.
- B. Set joint fillers at proper depth and position as required for installation of bond breakers, backer rods, and sealants. Do not leave voids or gaps between the ends of joint filler units.

- C. Priming Joint Surfaces:
 - 1. Prime joints if so recommended by the manufacturer's printed instructions.
 - 2. Do not allow the primer/sealer to spill or migrate onto adjoining surfaces.

3.03 JOINT BACKING INSTALLATION

- A. Install bond breaker tape in relaxed condition as it comes off the roll. Do not stretch the tape. Lap individual lengths.
- B. Install backer rod of sufficient size to fill the joint width at all points in a compressed state. Compress backer rod at the widest part of the joint by a minimum of 25 percent. Do not cut or puncture the surface skin of the rod.

3.04 SEALANT INSTALLATION

- A. Except as shown or specified otherwise, install sealants in accordance with the manufacturer's printed instructions.
- B. Install sealants with ratchet hand gun or other approved mechanical gun. Where gun application is impractical, install sealant by knife or by pouring as applicable.
- C. If low temperature makes application difficult, preheat sealants using manufacturer's recommended heating equipment.
- D. Finishing: Tool all vertical, non-sag sealants so as to compress the sealant, eliminating all air voids and providing a neat smoothly finished joint. Provide slightly concave joint surface, unless otherwise indicated or recommended by the manufacturer.
 - 1. Use tool wetting agents as recommended by the sealant manufacturer.

3.05 CLEANING

- A. Immediately remove misapplied sealant and droppings from metal surfaces with solvents and wiping cloths. On other materials, remove misapplied sealant and droppings by methods and materials recommended in writing by the manufacturer of the sealant material.
- B. After sealants are applied and before skin begins to form on sealant, remove all masking and other protection and clean up remaining defacement caused by the Work.

END OF SECTION

SECTION 081102

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Finish Hardware: Section 087100.

1.02 SUBMITTALS

- A. Shop Drawings: Show details of each frame type, elevation and construction for each door type, conditions at openings, location and installation requirements for finish hardware including cutouts and reinforcements, details of connections, and anchorage and accessory items.
 - 1. Include a schedule of doors and frames using the same reference numbers for details and openings as those shown on the Contract Drawings.
- B. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions.

1.03 QUALITY ASSURANCE

- A. Fire Rated Assemblies: Wherever a fire resistance classification is shown or scheduled for steel doors and frames; provide fire rated units that have been tested as fire door assemblies, and comply with National Fire Protection Association (NFPA) Standard No. 80 and these specifications. Identify each door and frame with a metal UL, FM, or WHI label. Indicate the applicable fire class on the door label. Rivet or weld labels on the hinge edge of door and jamb rabbet of frame. If continuous hinges are specified, rivet or weld labels on the header rabbet of frame and on top exposed edge of door. Locate labels as close to hinge edge as possible.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames in heavy paper cartons or other protective packaging.
- B. Store doors and frames on raised platforms in vertical position with blocking between units to allow air circulation.

PART 2 PRODUCTS

2.01 MATERIALS

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- A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
or
Cold-Rolled Steel Sheets: Commercial quality carbon steel complying with ASTM A 366 and ASTM A 568.
- B. Anchors and Supports: Fabricate of not less than 16 gage sheet steel unless otherwise indicated.
 - 1. Galvanized Units: Galvanize anchors and supports to be used with galvanized frames, complying with ASTM A 153, Class B.
- C. Anchorage Devices, Bolts, and Other Fasteners: Manufacturer's standard units unless otherwise indicated.
 - 1. Galvanized Units: Galvanize items to be used with galvanized frames complying with ASTM A 153, Class C or D as applicable.

2.02 DOORS

- A. General:
 - 1. Design and Thickness: Flush design doors, seamless, hollow construction, 1-3/4 inches thick.
 - 2. Sound Deadening (ASTM E 90): Minimum Sound Transmission Class (STC) of 25.
 - 3. Door Edges: Bevel lock stile edge of single acting hinged doors 1/8 inch in 2 inches.
- B. Interior Doors:
 - 1. Fabricate interior doors with 2 outer stretcher-leveled, steel sheets of 16 gage unless indicated otherwise on the Drawings. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces and stile edges, except around glass and louver panels. On mortise face of door, vertical joints shall be welded, filled and ground smooth. For all toilet room, locker room, mechanical room, food service area doors and other doors indicated on the door schedule, all outer sheets of the door shall be galvanized and welds shall be coated with zinc rich primer.
 - 2. Provide surface sheet reinforcement for surface sheet, edge, hardware, stops and other provisions, of size and gage as detailed on Drawings.
 - 3. Provide 16 GA top and bottom channels and closures as detailed on the Drawings.

2.03 FRAMES

- A. General:
 - 1. Furnish steel frames for doors, of size and profile as specified or shown.
 - 2. Construction: Full-welded unit construction, with corners mitered and continuously welded full depth and width of frame, unless otherwise specified or shown. Knock-down type frames will not be accepted.

- a. Fixed Stops: Integral 5/8 inch stop unless otherwise shown.
 - b. Prepare door frames for silencers as required.
- B. Interior Frames: Form interior frames of either hot-rolled or cold-rolled steel sheets, 14 gage for openings up to 4 feet wide.
- C. Mullions and Transom Bars:
 - 1. Furnish closed or tubular mullions and transom bars where shown. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.
 - 2. Furnish false head member to receive lower ceiling where frames extend to finish ceilings of different heights.
 - 3. Where installed in masonry, leave vertical mullions in frames open at the top so they can be filled with grout.
- D. Wall Anchors: Unless otherwise specified or shown, formed of not less than 16 gage steel, and galvanized when used with galvanized frames.
 - 1. Masonry Construction: Adjustable, corrugated or perforated T-shaped to suit frame size with leg not less than 2 inches wide by 10 inches long. Furnish at least 3 anchors per jamb up to 7'-6" jamb height.
 - 2. Anchors for Completed Openings: Anchorage devices designed to secure frame to in-place concrete or in-place masonry construction, as applicable. Furnish at least 5 anchors per jamb up to 7'-6" jamb height;
- E. Floor Anchors: Furnish floor anchor for each jamb and mullion which extends to floor, formed of not less than 16 gage steel, with 2 holes to receive fasteners, welded to bottom of jamb or mullion, and galvanized if used with galvanized frames.
- F. Head Anchors: Furnish 2 anchors at head of frames exceeding 42 inches wide for frames mounted in steel stud walls. Frame manufacturer's standard head anchor unless otherwise shown.
- G. Shipping Bars: Removable spreader bar across bottom of frames, tack welded to jambs and mullions.
- H. Mortar Guards: 26 gage steel mortar or plaster guards, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation.

2.04 FABRICATION

- A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from warp, buckle and other defects. Accurately form metal to required sizes and profiles. Weld exposed joints, and make smooth, flush and invisible by filling or grinding and dressing. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify items that cannot be permanently factory-assembled before shipment, to assure proper assembly at the project site.

- B. Exposed Fasteners: Countersunk, flat or oval Phillips head for exposed screws and bolts. Unless otherwise specified or shown, locate fasteners 2 inches from each end of members and not more than 12 inches apart.
- C. Finish Hardware Preparation:
 - 1. Prepare doors and frames to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping, in accordance with Finish Hardware Schedule and templates furnished by hardware manufacturer.
 - 2. Reinforce doors and frames to receive surface applied hardware. Drilling and tapping for this hardware shall be done at the project site.
 - 3. Locate finish hardware as specified elsewhere or as shown on the hardware manufacturer's templates.
 - 4. Weld 14 gage steel tongues, 1-1/2 inches high, inside lock mortise to keep lock body centered in door.
 - 5. Install 7 gage reinforcement for hinges and pivots, except hinge reinforcement in door edge may be a one-piece 12 gage channel full door height with extruded hinge screw holes having an average minimum thread pull-out strength of 1600 pounds per hole. Install 12 gage reinforcement for all other hardware.
 - 6. Reinforce doors not mortised for concealed door closers for surface door closer application, and all frames for closer arm application, whether or not closers are specified.
- D. Clearances: Fabricate doors for their respective frames within the following clearances:
 - 1. Jambs and Head: 3/32 to 1/8 inch.
 - 2. Meeting Edges of Pairs: 1/8 to 1/4 inch.
 - 3. Bottom (no threshold or carpet): 3/4 inch, maximum to finished surface.
 - 4. Fire Rated Doors: Comply with clearances specified in NFPA Standard No. 80.
- E. Shop Painting:
 - 1. Chemically wash, rinse, and dry exposed and concealed surfaces of fabricated units.
 - 2. Apply one coat of primer to all surfaces and oven-bake units.
 - 3. Units shall be capable of passing the following tests:
 - a. Salt Spray Test complying with ASTM B 117 for 120 continuous hours.
 - b. Water Fog Test complying with ASTM D 1735 for 240 continuous hours.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install steel doors, frames, and accessories in accordance with the manufacturer's printed instructions, except as otherwise specified or shown.

- B. Frame Installation: Place frames accurately in position; plumb, align, and brace securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreader bars, leaving surfaces smooth and undamaged.
 - 1. Floor anchors may be set with powder-actuated fasteners instead of anchorage devices and machine screws, if so approved on final shop drawings.
 - 2. Place fire rated frames in accordance with NFPA Standard No. 80.
 - 3. Make necessary field splices in frames as detailed on final shop drawings, welded and finished to match factory fabrication.
 - 4. Placing Frames For Completed Openings: Secure to in-place concrete and in-place masonry construction with anchorage devices. Set anchorage device opposite each anchor location in accordance with details on final shop drawings and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed, and free from dust and debris.
- C. Door Installation:
 - 1. Install doors accurately in their respective frames within the clearances specified in Part 2.
 - 2. Place fire rated doors with clearances as specified in NFPA Standard No. 80.
- D. Drill and tap doors and frames to receive surface applied hardware.

3.02 ADJUSTING

- A. Prime Coat Touch-up: Immediately after installation, sand smooth and clean rusted and damaged areas of shop prime coat and apply touch-up of compatible air-drying primer.
- B. Final Adjustments: Check and readjust operating finish hardware items just prior to final inspection. Leave Work in complete and proper operating condition.

3.03 CLEANING

- A. Clean doors, frames, and accessories free of dirt and other foreign materials after completion of installation.

END OF SECTION

SECTION 083113

ACCESS DOORS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Fire Rated Access Doors For Ceilings: Complete assemblies complying with Warnock Hersey (WHI) requirements for one-hour rating in wood-framed assemblies and three-hour rating in non-combustible assemblies. Identify each assembly with WHI label and NFPA requirement indicating "For Horizontal Installation".

PART 2 PRODUCTS

2.01 2-HOUR FIRE RATED ACCESS DOORS FOR CEILINGS

- A. Frames: Minimum 16 gage steel, with integral exposed flange not less than one inch wide around the perimeter.
 - 1. Anchorage: Predrilled holes in frame for anchoring with fasteners.
- B. Door Panel: Flush type, minimum 20 gage steel double wall construction with insulation, equipped with automatic closer and inside release mechanism.
 - 1. Hinge: Concealed pin hinge or continuous hinge set to open to approximately 100 degrees.
- C. Finish: Factory-applied baked enamel or primer over phosphate treated steel.
- D. Automatic Latches: Direct action knurled knob or turn ring operated; sufficient number to hold door panel in flush, smooth plane when closed. Equip each latch with inside release device.

2.03 FABRICATION

- A. Assemble access doors as integral units complete with all parts and ready for installation. Fabricate units of continuous welded steel construction unless otherwise indicated or specified. Grind welds smooth and flush with adjacent surfaces. Anchorage devices shall be of size and type required to secure access doors to types of supports indicated on the Drawings.

1. Allowable Size Variations: Manufacturer's standard size units which vary slightly from the sizes indicated may be acceptable, subject to the approval of the Owner.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the access doors in accordance with the manufacturer's printed installation instructions, except as shown or specified otherwise.
- B. Coordinate access door installation with installation of supporting construction.
- C. Set units accurately in position and securely attach to supports with face panel plumb or level in relation to adjoining finish surface.

3.02 ADJUSTING

- A. Adjust hardware and doors for proper operation.

END OF SECTION

SECTION 087100

FINISH HARDWARE

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Steel Doors and Frames: Section 081102.

1.02 REFERENCES

- A. Materials and Finishes Standard: ANSI/BHMA A156.18-2006, "American National Standard for Materials and Finishes".
- B. Conform to the requirements of the National Electric Code.

1.03 DEFINITIONS

- A. Company Field Advisor(s): Hardware manufacturers' representatives who are certified in writing by manufacturer to be technically qualified in design, installation, operation, inspection, and servicing of products.
- B. Installation Supervisor: Designated supervisor and/or installer who has a minimum of 5 years experience in finish hardware installation, and qualified to ensure approved finish hardware is installed, adjusted and operating correctly.

1.04 SUBMITTALS

- A. Submittal Packages:
 - 1. Submit the Quality Assurance Package prior to other submittal packages. After Quality Assurance Package is approved, submit the Samples if required, and finally the Packages listed below:
 - 2. Submit the Finish Hardware Schedule, and Product Data, specified below at the same time as a package. Partial submittal will not be approved.
- B. Finish Hardware Schedule: Use vertical format, horizontal format not acceptable. Include all Finish Hardware to complete the Work.
- C. Contract Close Out Submittals: Turn over to the Owner immediately following the Post Installation Inspection.
 - 1. Operation and Maintenance Manuals:
 - a. Furnish 2 copies.
 - b. Manufacturers' operation, installation, maintenance and repair instructions, and templates, for each type of hardware provided.
 - c. Parts List for each type of finish hardware provided.
 - d. Manufacturers' written warranties for each type of finish hardware.

2. Certification: Written certification from Company Field Advisor(s) or Installation Supervisor that the products are installed according to manufacturers' recommendations, are operating properly. Manufacturers' written warranty will be in effect upon physical completion of the Work.
3. Maintenance Materials.

1.05 QUALITY ASSURANCE

- A. Size Variations: Manufactures' products may vary slightly from sizes specified except where a minimum size or thickness is specified. Variations shall not prevent the product from performing the intended use.
- B. Installer's Qualifications: Employ experienced finish hardware installers who have been regularly employed by a Company installing finish hardware for a minimum of 3 years.
- C. Installation Supervisor: Employ a qualified installation supervisor who will be responsible to ensure approved finish hardware is installed, adjusted, and operating properly.
- D. Company Field Advisors: Secure the services of qualified Company Field Advisor(s) for locksets, exit devices, and door closers, as required for the following:
 1. Render advice regarding installation and final adjustment of the hardware.
 2. Answer any questions that might arise and resolve any installation or operational problems.
 3. Attend Post Installation Inspection, and then certify with an affidavit that the hardware is installed, adjusted, and operating properly.

1.06 DELIVERY AND STORAGE

- A. Coordinate delivery to avoid delay.
- B. Package hardware with fasteners, parts, instructions, and templates.
- C. Clearly label each item for identification and installation location according to approved Finish Hardware Schedule.
- D. Provide locked, dry storage for Finish Hardware at a location acceptable to Director's Representative.

1.07 MAINTENANCE

- A. Hand Tool Maintenance Kit: Lockable steel tool box containing one set of all hand tools necessary to perform preventative maintenance and repairs to the Hardware. Include:
 1. One complete Torx kit and driver.
 2. Six special Hex wrenches for door closer adjustment.

3. Provide manufacturer's recommended lubricants for hinges, locksets, exit devices, and closers etc. sufficient for 3 years of maintenance.
4. Turn Kit over to the Facility through the Director's Representative.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Butts
 1. Stanley
 2. McKinney
 3. Hager
- B. Locksets, Passage Sets (Lever Type) (Double cylinder is required for the intruder function.)
 1. Sargent 8200 Series mortise lock with LW1B trim in satin stainless steel finish (US32D). Model 49-8238 for classroom security intruder with visual indicator
- C. Door Closers
 1. LCN
 2. Sargent
 3. Yale
- D. Stop and Holder
 1. Glynn Johnson
 2. Architectural Builders Hardware
- E. Surface Bolts
 1. Ives
 2. Rockwood
 3. Securitech
- F. Flush Bolts
 1. Ives
 2. Rockwood
 3. Glynn Johnson
- G. Smoke seal
 1. Pemko

2.02 FASTENINGS

- A. Provide appropriate fasteners that harmonize with the material and finish.
- B. Provide machine screws for hardware secured to metal; self-tapping screws are not acceptable. Provide machine screws with metal expansion shields for attachment to masonry substrates.

- C. Provide undercut (shallow head) screws where necessary for proper seating, with manufacturer's standard Phillips heads, except where security head screws are specified.

2.03 ACCESSORIES, BRACKETS AND PLATES

- A. Strikes are to fit individual lockset function. Universal or generic strikes that fit a variety of lockset functions are not acceptable. Furnish curved lip strikes with wrought boxes.
- B. Provide compression rings and spacers as required, to achieve proper spacing relationship between cylinder and face of door.
- C. Provide brackets, plates, and special templates to mount door closers in combination with overhead stops and holders, on narrow top rails, transom mountings, and for special ceiling and jamb conditions.
- D. Provide filler plates at existing hinge and strike mortises as required.

2.04 FINISH HARDWARE

- A. Group 1:
 - 1. Butts: 1-1/2 Pair 4-1/2"x4-1/2" McKinney TB2714.
 - 2. Lockset: 1 Sargent 8204 LW1B.
 - 3. Surface Mounted Door Closer: 1 LCN 4014.
 - 4. Overhead Stop Without Holder: 1 Glynn Johnson 81 Series.
 - 5. Silencers: 3 Ives SR64.

2.05 KEY CONTROL SYSTEM

- A. Furnish a complete set up system with brass permanent file key tags, detachable fiber key tags, cross index cards, borrower's receipt forms, brass receipt holders, and parts and instruction manual. Keys to be stored on swinging panels within steel, wall hung, locked cabinet, or with in steel, standard metal cabinet with capacity for 150% of the number of commercial cylinders required for this Project.
 - 1. Provide a complete cross-index system set up by key control manufacturer. Place keys on markers and hooks in the cabinet as determined by the final keying schedule.

2.06 KEYING

- A. Furnish uncombined cylinders compatible with the existing system. Obtain keying information from the Facility through the Director's Representative.
- B. If locksets and cylinders are from different manufacturers, identify and furnish the correct cams required to install the cylinder.
- C. Furnish 7 keys for each change unless otherwise noted.
 - 1. Provide keys of nickel silver only.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install hardware in accordance with the manufacturer's printed instructions, and adjust for smooth operation.
 - 1. Installation Sequence: Use proper installation sequence e.g., install overhead stops and coordinators before surface mounted door closers.
 - 2. Template door closers for maximum door swing by wall placement and jamb conditions. Where overhead stop prevents door from swinging to wall, template closer to exceed degree of opening allowed by overhead stop.
- B. Use proper tools and methods to prevent scratches, burrs or other defacement.
- C. After installation, cover hardware with protective cloth or paper to prevent damage during remaining construction. Remove protection upon completion.
- D. Adjust existing related hardware as required for the proper operation of all the hardware.
 - 1. Where items of finished hardware will be surfaced mounted to existing steel frames, continuously weld to the frame a 1/8 inch thick steel plate of sufficient size to properly reinforce frame. Drill and tap plate to receive machine screws.

3.02 LOCATIONS

- A. Locate hardware as follows:
 - 1. Hinges: Top hinge 5 inches from jamb rabbet to top edge of barrel; bottom hinge 10 inches from bottom edge of barrel to finished floor; intermediate hinge centered between top and bottom hinges. Intermediate hinges for Dutch doors 5 inches from top of lower leaf and bottom of upper leaf to edge of respective hinge barrel.
 - 2. Knobs and Levers: Center line 3'-2" from finished floor. 4'-0" for doors with armor plate; 8 inches below top of lower leaf for Dutch doors.
 - 3. Manual Flush Bolts: Locate top bolt within 6'-6" from floor.
 - 4. Flush Bolts for Dutch Doors: Edge of upper leaf bolting into lower leaf.
 - 5. Door Closers: Template for maximum door swing allowed by wall placement and jamb conditions. Where overhead stop prevents door from swinging to wall, template closer to exceed degree of opening allowed by overhead stop.

3.03 FIELD QUALITY CONTROL

- A. Post Installation Inspection: After the hardware is adjusted for smooth operation a post installation inspection meeting will be held to assure that the hardware is installed and operating properly and to familiarize the Facility Representative with the hardware operation and maintenance. The Contractor, hardware installer, and Company Field Advisor shall attend the meeting. The Director's Representative and a Facility Representative will also attend the meeting.

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1. Notify the Director's Representative at least 3 working days prior to the inspection so arrangements can be made to have a Facility Representative participate in the inspection.
2. Secure the services of a Company Field Advisor(s) for door closers, mortise locks and latches, cylinder and bit key deadlocks, electric strikes, magnetic switches, magnetic locks, exit devices, overhead stops and holders, flush bolts, coordinators to inspect and certify in writing, that their products are installed and operating properly and that the manufacturer's warranty will be in effect upon physical completion of the Work.

END OF SECTION

SECTION 089100

STATIONARY METAL WALL LOUVERS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Show fabrication details and connections to adjacent Work.
- B. Product Data: Catalog cuts, specifications, and installation instructions for louver type specified.

1.02 QUALITY ASSURANCE

- A. Louvers shall be rated by AMCA (Air Movement and Control Assoc.).

PART 2 PRODUCTS

2.01 ALUMINUM LOUVERS

- A. Type: Stationary drainable blade extruded louvers, 4 inches deep, with extrusions not less than 0.081 inch thick, of aluminum alloy required for the indicated finish.
 - 1. Drainable blades formed with a drain gutter in each blade, positioned at approximately 37 degree angle and spaced approximately 4-1/2 inch centers.
 - 2. Frames formed with downspouts in each jamb and mullion.
 - 3. Maximum air velocity below point of zero water penetration velocity.
 - 4. Maximum pressure drops:
 - a. 0.13 inch w.c. exhaust louvers.
 - b. 0.09 inch w.c. intake louvers.
- A. Fabrication: Form frames with mitered or coped members, welded or riveted and soldered joints. Form ends of blades flat against frame jamb and weld, or rivet and solder blades to frame at each end to ensure watertight joints. Reinforce units with concealed plates, angles, tees or other shapes to form a rigid unit. Fabricate louvers with horizontal and vertical mullions where louver openings exceed 60 inches in any direction. Allow for expansion and contraction.
- C. Finishes: Comply with the Metal Finishes Manual of the National Assoc. of Architectural Metal Manufacturers except as otherwise indicated.
 - 1. Clear anodized (AA-C22A41).
 - 2. Protect exposed factory finished surfaces prior to shipping.
- D. Sills: Same material and finish as the louvers.

2.02 LOUVER SCREENS

- A. Fabricate removable screen frames of the same metal and finish as the louvers. Locate screens on the inside face of the louvers, unless otherwise indicated. Secure screens to louver frames with machine screws at each corner and spaced 12 inches oc.
- B. Insect Screens:
 - 1. Anodized aluminum wire, 18 x 14 mesh.

2.03 FASTENERS AND ANCHORS

- A. Bolts, Nuts, Lags, Washers, Screws and Anchors: Same material as items being installed unless otherwise indicated; types, gages and lengths to suit unit installation conditions; galvanized steel, aluminum or stainless steel for exterior locations or for items anchored to exterior walls.

2.04 MISCELLANEOUS

- A. Bituminous Paint: SSPC-PAINT 12 (Cold applied asphalt mastic).

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the Work of this Section in accordance with the manufacturer's printed instructions, except as shown otherwise on the Drawings.
- B. Install units plumb, level and in proper alignment with adjacent construction.
- C. Form tight joints with exposed connections accurately fit together.
- D. Use concealed anchorages wherever possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to form a weathertight connection.
- E. Where louvers are in contact with concrete, masonry or a dissimilar metal, coat the contacting surface with a heavy coat of bituminous paint.
- F. Clean louvers after installation. Remove dirt, dust, and grime.

END OF SECTION

SECTION 092116

GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.01 DEFINITIONS

- A. Sheet Steel Gages: US Standard.
- B. Gypsum Board Terminology: ASTM C 11 - Standard Terminology Relating to Gypsum and Related Building Materials and Systems.

1.02 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for each item specified.

1.03 QUALITY ASSURANCE

- A. Fire Resistance Rated Applications: Provide UL listed or ASTM E 119 tested materials, accessories, and application procedures to comply with the rating, UL Design Number, or Gypsum Association File Number indicated.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with gypsum board manufacturer's printed temperature and ventilation requirements during application and finishing. Ventilate installation areas to relieve excess moisture.

PART 2 PRODUCTS

2.01 FRAMING

- A. Studs, Tracks, and Furring: ASTM C 645; 25 gage (minimum base metal thickness 0.0179 inch) unless otherwise noted, galvanized steel with additional

framing members, reinforcing, accessories, and anchors necessary for the complete framing system.

1. Deep-Leg Deflection Track: ASTM C 645 top runner with 2 inch deep flanges.
2. Hat-Shaped, Rigid Furring Channels: ASTM C 645; 25 gage (minimum base metal thickness 0.0179 inch) galvanized steel.
3. Resilient Furring Channels: Steel furring members designed to reduce sound transmission.

2.02 GYPSUM BOARD

- A. Standard Gypsum Board: ASTM C 1396; long edges as follows:
 1. Long Edges: Tapered.
- B. Fire Resistant Gypsum Board: ASTM C 1396; Type X, UL listed and bearing listing marking; long edges as follows:
 1. Long Edges: Tapered.
- C. Elevator Machine Room Ceiling: Materials and components listed in manufacturer's published product literature for gypsum board shaft-wall assemblies required.
 1. Steel Framing: ASTM C 645, of profile, size and base metal thickness to produce assemblies complying with indicated or required fire rating and structural properties.
 2. Gypsum Liner Panels: Manufacturer's standard or recommended panels as required for the specific fire-resistant rated gypsum board shaft-wall assemblies indicated, with moisture resistant paper facings.
 3. Gypsum Board: ASTM C 1396, type as required by fire-resistant assembly indicated; long edges tapered.

2.03 FASTENERS

- A. Steel Drill Screws: ASTM C 1002; gypsum board manufacturer's recommended types and sizes for substrates involved.
- B. Laminating Adhesive: Gypsum board manufacturer's recommended type for substrates involved.
- C. Expansion Anchors: Anchor bodies AISI 1018 or 12L14, of dimensions indicated; with nuts, ASTM A 563; and flat washers. Expansion sleeves AISI 1010, of dimensions indicated; with bolts, SAE Grade 5; and flat washers.
- D. Toggle Bolts: Tumble wing type.
 1. Wing Body: AISI 1008-1010 or equivalent cold rolled steel.
 2. Trunnion Nut: 1/4 inch thru 3/8 inch AISI 1010 steel; 1/2 inch Zamac alloy.
 3. Screw: Carbon steel.

- E. Self Threading Masonry Screws: Zinc plated; Tapcon Fasteners by ITW Buildex 1349 West Bryn Mawr Ave. Itasca, IL 60143, (800) 284-5339.

2.04 TRIM

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized steel or extruded vinyl.
 - 2. Shapes:
 - a. Cornerbead: Use at outside corners.
 - b. Bullnose Bead: Use where indicated.
 - c. LC-Bead: J-Shaped, exposed long flange receives joint compound. Use at exposed panel edges.
 - d. L-Bead: L-shaped, exposed long leg receives joint compound with tear away bead. Use where gypsum board abuts or intersects dissimilar material.
 - e. U-Bead: J-shaped, exposed short flange does not receive joint compound. Use where indicated.
 - f. Expansion (Control) Joint: Use where indicated.

2.05 JOINT TREATMENT MATERIALS

- A. Joint Tapes: ASTM C 475; plain or perforated.
- B. Joint Compound: ASTM C 475; gypsum board manufacturer's recommended dry powder or ready-mixed, either of the following:
 - 1. One Compound Treatment: One compound for both bedding and finishing joints.
 - 2. Two Compound Treatment: Compatible joint compounds; one compound for bedding and the other compound for finishing joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates to which gypsum board system attaches or abuts, preset steel door frames, cast in anchors, and structural framing, with installer present for compliance with requirements for installation tolerances and other conditions affecting performance of gypsum board system construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 CONSTRUCTION TOLERANCES

- A. Do not exceed 1/8 inch in 8 feet variation from plumb or level in any exposed line or surface, except at joints between boards do not exceed 1/16 inch variation between planes or abutting edges or ends. Shim as required to comply with specified tolerances.

3.03 STEEL FRAMING INSTALLATION

- A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.
- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board system to support fixtures, equipment services, heavy trim, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations.
- C. Isolate partitions from structural elements with slip or cushion-type joints between steel framing and structure as recommended by steel framing manufacturer to prevent transfer of structural loads or movements to partitions.
- D. Partition Framing Installation:
 - 1. Align tracks accurately at floor and ceiling. Secure tracks as recommended by the framing manufacturer for the floor and ceiling construction involved, except do not exceed 24 inches oc spacing for powder-driven fasteners, or 16 inches oc for other types of attachment. Provide fasteners approximately 2 inches from corners and ends of tracks.
 - 2. Position studs vertically and engage both floor and ceiling tracks. Install studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edge of stud flanges first. Space studs 16 inches on center, unless otherwise indicated on the Drawings. Fasten studs to track flanges with screws or by crimping.
 - 3. Use full length studs between tracks wherever possible. If necessary, splice studs with a minimum 8 inch nested lap and fasten with two screws per stud flange.
 - 4. Install additional studs to support inside corners at partition intersections and corners, and to support outside corners, terminations of partitions, and both sides of control joints (if any).
 - 5. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
 - 6. Brace chase wall framing horizontally to opposite studs with 12 inch wide gypsum board gussets or metal framing braces, spaced vertically not more than 4 feet on center.
 - a. Attach gypsum board gussets with a minimum 3 screws per stud flange.
 - b. Attach metal framing braces with a minimum 2 screws per stud flange.
 - 7. Install rough framing at openings consisting of full-length studs adjacent to jambs and horizontal header and sill tracks. Cut horizontal tracks to length and split flanges and bend webs at ends for flange overlap and screw to jamb studs. Install intermediate studs between jamb studs at head and sill sections, at same spacing as full-length studs.

8. At door frames, install rough framing as specified above. Install jamb studs to comply with framing manufacturer's recommendations for the types of frames and weights of doors required. Fasten jamb studs to metal frames with anchor clips using 2 self tapping screws or bolts per clip. Where wood frames are shown, fasten jamb studs to rough framing with screws.

3.04 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in the most economical direction, of maximum lengths to minimize end butt joints. Where unavoidable, locate end butt joints as far from center of walls or ceilings as possible.
- B. Install gypsum board with face side out. Butt boards together at edges and ends over firm bearing with not more than 1/16 inch of open space between boards. Do not force into place.
- C. Fasteners: Fasten gypsum board to supports and furring with steel drill screws of required size and spacing as recommended by the gypsum board manufacturer.
 1. Multiple-layer Work:
 - a. Mechanically fasten both layers.
 - b. Stagger vertical joints in multiple layer Work. Offset joints not less than 10 inches.
- D. Provide additional framing and blocking required to support gypsum board at openings and cutouts.
- E. Reinforce joints formed by tapered edges, butt edges, and interior corners or angles with joint tape.

3.05 TRIM INSTALLATION

- A. Coordinate installation of trim progressively with gypsum board installation where trim is of type required to be installed prior to, or progressively with installation of gypsum board.
- B. Securely fasten trim pieces in accordance with manufacturer's printed instructions.
- C. Install cornerbeads at external corners. Install LC-Bead (J-Bead) beads at unprotected (exposed) edges and where gypsum board abuts dissimilar materials. Use single unjointed lengths unless otherwise approved by the Owner.
- D. Comply with joint compound manufacturer's recommended drying time for the relative humidity and temperature at time of application. Allow minimum of 24 hours drying time between applications of joint compound.

- E. Type X Gypsum Board: Install joint and corner reinforcing and trim, and one coat of joint compound over joints, fastener heads, and metal flanges above suspended ceiling lines.

3.08 LEVELS OF GYPSUM BOARD FINISH

- A. General: Finish panels to levels indicated below, in accordance with ASTM C 840, for locations indicated.
 - 1. Level 4 Finish: Joints and angles, provide tape embedded in joint compound and provide three separate coats of joint compound over all joints, angles, and fastener heads. Accessories to be covered with three separate coats of joint compound. Joint compounds to be smooth and free of tool marks and ridges. Cover the prepared surface with a drywall primer prior to the application of the final decoration.

END OF SECTION

SECTION 099101

CONSTRUCTION PAINTING

PART 1 GENERAL

1.01 DEFINITIONS

- A. The word “paint” in this Section refers to substrate cleaners, fillers, sealers, primers, undercoats, enamels and other first, intermediate, last or finish coatings.
- B. The word “primer” in this Section refers to substrate cleaners, fillers, sealers, undercoats, and other first or intermediate coats beneath the last or finish coating.
- C. The words “finish paint” in this Section refers to the last or final coat and previous coats of the same material or product directly beneath the last or final coat.
- D. Finish Paint Systems: Finish paint and primers applied over the same substrate shall be considered a paint system of products manufactured or recommended by the finish coat manufacturer.
 - 1. Finish paint products shall meet or exceed specified minimum physical properties.

1.02 SUBMITTALS

- A. Painting Schedule: Cross-referenced Painting Schedule listing all exterior and interior substrates to be painted and specified finish paint type designation; product name and manufacturer, recommended primers and product numbers, and finish paint color designation for each substrate to be painted.
 - 1. Designate exterior substrates by building name and number, substrate to be painted and surface location.
 - 2. Designate interior substrates by building name and number, floor, room name and number, and surface to be painted.
- B. Product Data Sheets: Manufacturer’s published product data sheets describing the following for each finish paint product to be applied:
 - 1. Percent solids by weight and volume, solvent, vehicle, weight per gallon, ASTM D 523 gloss/reflectance angle, recommended wet and dry film thickness, volatile organic compound (VOC) content in lbs/gallon, product use limitations and environmental restrictions, substrate surface preparation methods, directions and precautions for mixing and thinning, recommended application methods, square foot area coverage per gallon, storage instructions, and shelf-life expiration date.
 - 2. Manufacturer’s recommended primer for each finish paint product and substrate to be painted.

3. Manufacturer's complete range of available colors for each finish paint product to be applied.
- C. Finish Paint Type Samples: Two finish paint samples applied over recommended primers for each substrate to be painted.
1. Samples shall be in the designated color and specified ASTM D 523 reflectance.
 2. Label each sample with the following information:
 - a. Project number and Painting Schedule designation describing substrates and locations represented by the sample.
 - b. Finish paint and primer manufacturer, product names and numbers, finish paint color and reflectance.
 3. Leave a 1 inch wide exposed strip of unpainted substrate and each coat of primer and finish paint.
 4. Sample Sizes:
 - a. Wall, Ceiling, and Floor Substrates: 12 inch square panels.
 - b. Concrete and Concrete Masonry Unit Substrates: 4 inch square blocks.
 - c. Sheet Metals: 4 inch by 8 inch flat sheets.
 - d. Bar and Tubular Metals: 8 inch long bars or tubular stock.
- D. Quality Control Submittals:
1. Test Reports: Furnish certified test results from an independent testing laboratory, showing that products submitted comply with the specifications, when requested by the Owner
 2. Certificates: Furnish certificates of compliance required under QUALITY ASSURANCE Article.

1.03 QUALITY ASSURANCE

- A. Volatile Organic Compounds (VOCs) Regulatory Requirements: Chapter III of Title 6 of the official compilation of Codes, Rules and Regulations of the State of New York (Title 6 NYCRR), Part 205 Architectural Surface Coatings.
1. Certificate of Compliance: List of each paint product to be delivered and installed. List shall include written certification stating that each paint product listed complies with the VOC regulatory requirements in effect at the time of job site delivery and installation.
- B. Container Labels: Label each product container with paint manufacturer's name, product name and number, color name and number, thinning and application instructions, date of manufacture, shelf-life expiration date, required surface preparations, recommended coverage per gallon, wet and dry film thickness, drying time, and clean up procedures.
- C. Field Examples:
1. Prior to on-site painting, at locations designated by the Owner, apply field examples of each paint type to be applied.
 2. Field examples to be applied on actual substrates to be painted and shall duplicate earlier approved paint samples.

- a. Interior field examples to be applied in rooms and spaces to be painted with the same products.
 - b. Field Example Minimum Wet and Dry Film Thickness: As indicated on approved product data sheet.
 - c. Application: Apply each coat in a smooth uniform wet mil thickness without brush marks, laps, holidays, runs, stains, cloudiness, discolorations, nail holes and other surface imperfections.
 - 1) Leave a specified exposed width of each previous coat beneath each subsequent coat of finish paint and primer.
- D. Compatibility of Paint Materials: Primers and intermediate paints shall be products manufactured or recommended by the finish paint manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to the Site in original, unopened containers and cartons bearing manufacturer's printed labels. Do not deliver products which have exceeded their shelf life, are in open or damaged containers or cartons, or are not properly labeled as specified.
- B. Storage and Handling: Store products in a dry, well ventilated area in accordance with manufacturer's published product data sheets. Storage location shall have an ambient air temperature between 45 degrees F and 90 degrees F.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Ambient Air Temperature, Relative Humidity, Ventilation, and Surface Temperature: Comply with paint manufacturer's published product data sheet or other printed product instructions.
 - 2. If paint manufacturer does not provide environmental requirements, use the following:
 - a. Ambient Air Temperature: Between 45 degrees F and 75 degrees F.
 - b. Relative Humidity: Below 75 percent.
 - c. Ventilation: Maintain the painting environment free from fumes and odors throughout the Work of this Section.
 - d. Surface Temperature: At least 5 degrees F above the surface dewpoint temperature.
 - 3. Maintain environmental requirements throughout the drying period.
- B. The following items are not to be painted unless otherwise specified, noted or directed:
 - 1. Exposed stainless steel, chrome, copper, bronze, brass, and aluminum.
 - 2. Steel to be encased in cast-in-place concrete.
 - 3. Top flanges of structural beams and girders in composite concrete-steel construction.
 - 4. Factory prefinished items.

5. Exposed structural wood floor joists, subflooring, rafters, roof sheathing and other framing lumber.
6. Galvanized items not exposed in finished spaces.

1.06 EXTRA MATERIALS

- A. Provide extra finish paint materials, from the same production run as paints to be applied, in the following quantities for each color installed:
 1. Paint: One gallon, each type.

PART 2 PRODUCTS

2.01 PAINT MANUFACTURERS

- A. Where noted, the following finish paint manufacturers produce the paint types specified.
 1. Ameron Protective Coatings, 201 Berry St., Brea, CA 92621, (800) 926-3766.
 2. Benjamin Moore and Co., 51 Chestnut Ridge Rd., Montvale, NJ 07645, (201) 573-9600.
 3. ICI Dulux Paints, 4000 Dupont Cr., Louisville, KY 40207, (800) 984-5444.
 4. Inorganic Coatings, Inc., 500 Lapp Rd., Malvern, PA 19355 (800) 345-0531.
 5. PPG Architectural Finishes, One PPG Plaza, Pittsburgh, PA 15272, (800) 441-9695.
 6. Sherwin-Williams Co., Cleveland, OH 44101, (800) 321-8194.
 7. Valspar Corp., 1401 Severn St., Baltimore, MD 21230, (800) 638-7756.
 8. Wm. Zinsser & Co., 39 Belmont Dr., Somerset, NJ 08875-1285, (908) 469-8100.

2.02 MISCELLANEOUS PRODUCTS

- A. Bedding Compound: Water based pre-mixed gypsum wallboard joint compound.
- B. Cleaning Solvents: Low toxicity with flash point in excess of 100 degrees F.
- C. Color Pigments: Pure, nonfading, finely ground pigments with at least 99 percent passing a 325 mesh sieve.
 1. Use lime-proof color pigments on masonry, concrete and plaster.
 2. Use exterior pigments in exterior paints.
- D. Galvanizing Compound, Cold: Single component compound with 93 percent pure zinc in the dried film and meeting the requirements of DOD-P-21035A (NAVY).
- E. Glazing Compound: ASTM C 669.

- F. Masking Tape: Removable paper or fiber tape, self-adhesive and nonstaining.
- G. Metal Filler: Polyester resin base autobody filler.
- H. Mineral Spirits: Low odor type recommended by finish paint manufacturer.
- I. Paint Stripper: As recommended by finish paint manufacturer.
- J. Spackling Compound: Water based pre-mixed plaster and gypsum wallboard finishing compound.
- K. Turpentine: ASTM D 13.

2.03 FINISH PAINT TYPES

- A. Physical Properties:
 - 1. Specified percent solids by weight and volume, pigment by weight, wet and dry film thickness per coat, and weight per gallon are minimum physical properties of acceptable materials.
 - a. Opaque Pigmented Paints: Physical properties specified are for white titanium dioxide base before color pigments are added.
 - b. Specified minimum wet and dry film thickness per coat are for determining acceptable finish paint products. Minimum wet and dry film thickness per coat to be applied shall comply with approved finish paint manufacturer's product data sheets.
 - 2. Gloss or Reflectance: The following ASTM D 523 specified light levels and angles of reflectance:
 - a. Flat: Below 15 at 85 degrees.
 - b. Eggshell: Between 5 and 20 at 60 degrees.
 - c. Satin: Between 15 and 35 at 60 degrees.
 - d. Semigloss: Between 30 and 65 at 60 degrees.
 - e. Gloss: Over 65 at 60 degrees.
- B. Interior Finish Paint Types:
 - 1. Paint Type IAL-1: Interior Acrylic Latex, Flat.
 - a. Solids by Weight: 50.0 percent.
 - b. Solids by Volume: 32.0 percent.
 - c. Solvent: Water.
 - d. Vehicle: Vinyl acrylic resin.
 - e. Weight Per Gallon: 10.9 lbs.
 - f. Wet Film Thickness: 3.8 mils.
 - g. Dry Film Thickness: 1.3 mils.
 - h. Manufacturers: Benjamin Moore, ICI Dulux, Sherwin-Williams.
 - 2. Paint Type IAL-2: Interior Acrylic Latex, Eggshell.
 - a. Solids by Weight: 51.0 percent.
 - b. Solids by Volume: 35.0 percent.
 - c. Solvent: Water.

- d. Vehicle: Vinyl acrylic resin.
 - e. Weight Per Gallon: 11.0 lbs.
 - f. Wet Film Thickness: 3.8 mils.
 - g. Dry Film Thickness: 1.3 mils.
 - h. Manufacturers: Benjamin Moore, ICI Dulux, Sherwin-Williams.
 - 3. Paint Type IAL-3: Interior Acrylic Latex, Semigloss Enamel.
 - a. Solids by Weight: 49.0 percent.
 - b. Solids by Volume: 35.0 percent.
 - c. Solvent: Water.
 - d. Vehicle: Vinyl acrylic resin.
 - e. Weight Per Gallon: 10.0 lbs.
 - f. Wet Film Thickness: 3.8 mils.
 - g. Dry Film Thickness: 1.2 mils.
 - h. Manufacturers: Benjamin Moore, ICI Dulux, Sherwin-Williams.
 - 4. Paint Type IAL-4: Interior Acrylic Latex, Gloss Enamel.
 - a. Solids by Weight: 40.0 percent.
 - b. Solids by Volume: 32.0 percent.
 - c. Solvent: Water.
 - d. Vehicle: Vinyl acrylic resin.
 - e. Weight Per Gallon: 10.0 lbs.
 - f. Wet Film Thickness: 3.4 mils.
 - g. Dry Film Thickness: 1.2 mils.
 - h. Manufacturers: Benjamin Moore, PPG, Sherwin-Williams.
 - 5. Paint Type ISP: Interior Steel Primer, Flat.
 - a. Solids by Weight: 72.0 percent.
 - b. Solids by Volume: 52.0 percent.
 - c. Vehicle: Alkyd resin.
 - d. Weight Per Gallon: 11.4 lbs.
 - e. Wet Film Thickness: 3.0 mils.
 - f. Dry Film Thickness: 1.5 mils.
 - g. Manufacturers: PPG, Sherwin-Williams, Valspar.
- D. Colors: Provide paint colors either shown on contract drawings or to be selected by the Owner from finish paint manufacturers available color selections.
- 1. Approved finish paint manufacturers to match designated colors of other manufacturers where colors are shown on contract documents.
 - 2. Safety Colors: Industry Standard ANSI Safety Colors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to be prepared, primed, or painted for compliance with contract documents, required environmental conditions, manufacturer's product data sheets, product label instructions and other written requirements.
 - 1. Do not begin any phase of the work without first checking and verifying that surfaces and environmental conditions are acceptable for such work

and that any earlier phase deficiencies and discrepancies have been properly corrected.

- a. The commencement of new work shall be interpreted to mean acceptance of surfaces to be affected.

3.02 PREPARATION

- A. Protection: Cover and protect surfaces to be painted, adjacent surfaces not to be painted, and removed furnishings and equipment from existing paint removals, airborne sanding particles, cleaning fluids and paint spills using suitable drop cloths, barriers and other protective devices.
 1. Adjacent exterior surface protections include roofs, walls, landscaping, driveways and walkways. Interior protections include floors, walls, furniture, furnishings and electronic equipment.
 2. Remove and replace removable hardware, lighting fixtures, telephone equipment, other devices and cover plates over concealed openings in substrates to be painted.
 - a. Cover and neatly mask permanently installed hardware, lighting fixtures, cover plates and other devices which cannot be removed and are not scheduled for painting.
 3. Schedule and coordinate surface preparations so as not to interfere with work of other trades or allow airborne sanding dust particle to fall on freshly painted surfaces.
 4. Provide adequate natural or mechanical ventilation to allow surfaces to be prepared and painted in accordance with product manufacturer's instructions and applicable regulations.
 5. Provide and maintain "Wet Paint" signs, temporary barriers and other protective devices necessary to protect prepared and freshly painted surfaces from damages until Work has been accepted.
- B. Clean and prepare surfaces to be painted in accordance with specifications, paint manufacturer's approved product data sheets and printed label instructions. In the event of conflicting instructions or directions, the more stringent requirements shall apply.
 1. Cleaners: Use only approved products manufactured or recommended by finish paint manufacturer. Unless otherwise recommended by cleaner manufacturer, thoroughly rinse with clean water to remove surface contaminants and cleaner residue.
- C. Surfaces:
 1. Concrete:
 - a. Allow three months for poured concrete to dry before painting.
 - b. Remove form release agents, laitance, efflorescence, dirt, grease, oils, slurry, chalk deposits, and other surface contaminants using a high-pressure power wash. Use mildewcide solution if mildew is present.
 - c. Remove any remaining efflorescence by dampening surface with water and scrubbing with a 5 percent solution of muriatic acid.

- Rinse with clean water, neutralize with ammonia, rinse and allow to dry.
 - d. Vacuum surface clean before painting.
 - e. Sandblast to remove any existing deteriorated paint films, curing compounds, concrete sealers, and other substances that may prevent primer adhesion.
 - f. Chip and grind surface projections smooth to adjacent surfaces.
 - g. Open concealed voids and cracks, remove cement slurry by wire-brushing to expose clean aggregate substrate, and chip out surface honeycomb pockets to allow a neat cementitious patch with square corners and a uniform thickness.
 - h. Inspect surfaces to be painted for exposed or rusted steel reinforcement and contact Owner for a survey of damages to be repaired before substrate can be painted. Do not paint over exposed steel reinforcement without first repairing both deteriorated reinforcement and protective coating.
 - i. Use an electronic meter to determine moisture content compliance with finish paint manufacturer's recommendations.
2. Concrete Masonry Units:
- a. Allow two months for mortar joints to dry before painting.
 - b. Remove severe laitance, efflorescence, dirt, grease, slurry, chalk deposits and other surface contaminants using a low-pressure power wash. Use mildewcide solution if mildew is present.
 - c. Remove less severe surface contaminants and contaminant residues by dampening surface with water and scrubbing with a 10 percent solution of muriatic acid.
3. Existing Structural Steel, Metal Decks and Stairs:
- a. Prepare existing steel to be painted by cleaning in accordance with Structural Steel Painting Council (SSPC) standards:
 - 1) SSPC-SP2: Remove loose rust, mill scale, and paint to the degree specified by hand chipping, scraping, sanding, and wire-brushing.
 - b. Inspect for exposed or rusted steel reinforcement and contact Owner for an on-site survey of repairs to made before painting. Do not paint over exposed steel reinforcement without first repairing both deteriorated reinforcement and protective concrete covering.
4. Galvanized Metal:
- a. Allow new galvanized surfaces to weather as long as possible before cleaning. Remove surface contaminants using clean rags and petroleum spirits.
 - b. Remove "white rust" using appropriate solvent and, if necessary, wire brushing or sanding.
 - c. Use appropriate Structural Steel Painting Council Standard SSPC-SP1 to SSPC-SP6 to clean steel substrates where galvanized protection has been removed.
5. Steel Doors and Frames: Fill indentations and cracks with metal filler; sand smooth to match adjacent undamaged surfaces.
6. Plaster, Cement Plaster, and Gypsum Wallboard:

- a. Fill cracks, holes, and other indentations smooth to adjacent surfaces using specified bedding, spackling, and finishing compounds.
 - b. Gypsum Wallboard: Fill and sand smooth minor bedding and finishing compound defects.
 - c. Vacuum and wipe surfaces free of all sanding residue and dust
 7. Other Substrates: See finish paint manufacturer's recommendations.
- D. Painting Material Preparations:
1. Prepare painting materials in accordance with manufacturer's approved product data sheets and printed label instructions.
 - a. Stir materials before and during application for a consistent mixture of density. Remove container surface paint films before stirring and mixing.
 - b. Slightly tint first opaque finish coat where primer and finish coats are the same color.
 - c. Do not thin paints unless allowed and directed to do so in writing within limits stated on approved product data sheets.

3.03 APPLICATION

- A. Environmental Conditions:
1. Water-based Paints: Apply when surface temperatures will be 50 degrees Fahrenheit to 90 degrees Fahrenheit throughout the drying period.
 2. Other Paints: Apply when surface temperatures will be 45 degrees Fahrenheit to 95 degrees Fahrenheit throughout the drying period.
- B. Install approved paints where specified, or shown on the drawings, and to match approved field examples.
1. Paint Applicators: Brushes, rollers or spray equipment recommended by the paint manufacturer and appropriate for the location and surface area to be painted.
 - a. Approved minimum wet and dry film thicknesses shall be the same for different application methods and substrates.
- C. Paint Type Coats To Be Applied: Unless specified otherwise by finish paint manufacturer's product data sheet, the number of coats to be applied for each paint type are as follows:
1. Paint Types IAL:
 - a. New Unpainted Surfaces: Apply 1 coat of primer and 2 coats of finish paint.
 - b. Existing Painted Surfaces:
 - 1) Apply 2 coats of finish paint when existing paint has a lower gloss.
 - 2) Apply one coat of primer and 2 finish coats when existing paint has a higher gloss.

- c. Paint Types IAL: Provide mildewcide additive for bathrooms, kitchens, janitor closets, laundry rooms, restrooms and other wet or damp areas.
 - d. Pitted Concrete & Concrete Masonry Surfaces: Use block filler as primer /sealer where allowed by finish paint manufacturer.
 - e. Existing Structural Steel:
 - 1) Primed Steel: Apply 2 coats of finish paint.
 - 2) Unprimed Steel: Apply 1 coat of Paint Type ISP, depending upon exterior or interior location.
 - a) If top-coated, apply additional coat of finish paint manufacturer's galvanized primer and 2 coats of finish paint.
 - 2. Paint Types ISP: Apply 1 coat.
 - a. Do not prime or finish paint steel to be encased in concrete, masonry, or to receive sprayed on fireproofing.
 - b. Allow primer to dry one week and test adhesion. Remove and replace defective primer where adhesion failures occur.
- D. Surfaces: Unless otherwise specified or shown on the drawings, paint surfaces as follows:
- 1. Interior Surfaces:
 - a. Ceilings: Paint Type IAL-1 except as noted below:
 - 1) Janitor Closets and Other Wet Areas: Paint Type IAL-3.
 - b. Walls: Paint Type IAL-2 except as noted below:
 - 1) Janitor Closets and Other Wet Areas Paint Type IAL-4.
 - c. Doors, Windows, Frames and Trim: Paint Type IAL-3 except as noted below:
 - 1) Use Paint Type IAL-4 where walls are Paint Type IAL-3.
 - 3. Unless otherwise noted, paint both exterior and interior exposed wall and ceiling air supply and return grilles; plumbing pipes; electrical panel and fuse boxes, raceways and conduits; heating convector cabinets, radiators, radiator cabinets, unit heaters, and similar existing and installed devices and equipment by other trades.
 - a. Paint substrates to match adjacent wall or ceiling surfaces.
 - b. Paint exposed surfaces when any part of the surface is on or within 8 inches of ceiling or wall surface to be painted.
 - c. Paint visible interior surfaces behind grilles, guards and screens.
 - 4. Doors and Frames: Unless otherwise noted, paint doors and frames the same color in the next highest gloss as adjacent wall surfaces.
 - a. Where walls are not the same color on both sides of a door frame, change frame color at the inside corner of the frame stop.
 - b. Prime and finish paint door faces and edges before installation.
 - 1) Paint door edges the same paint type color as the exterior side of the door.
 - c. Do not paint door components which are clearly not intended to be painted such as non-ferrous hardware, frame mutes, and weather stripping.

- d. Do not allow doors and frames to touch until paint is thoroughly dry on both surfaces.
- 5. Ferrous Metal Door and Window Hardware: Unless otherwise noted, prime and paint to match adjacent doors, windows and frames.

3.04 ADJUSTING AND CLEANING

- A. Reinstall removed items after painting has been completed.
 - 1. Restore damaged items to a condition equal to or better than when removed. Replace damaged items that cannot be restored.
- B. Touch up and restore damaged finish paints. Touch up and restoration paint coats are in addition to the number of specified finish paint coats.
- C. Remove spilled, splashed, or spattered paint without marring, staining or damaging the surface. Restore damaged surfaces to the satisfaction of the Owner.
- D. Remove temporary barriers, masking tape, and other protective coverings upon completion of painting, cleaning and restoration work.

END OF SECTION

SECTION 14 24 23
REHABILITATION OF HYDRAULIC PASSENGER ELEVATOR

PART 1 – GENERAL

1.1 DESCRIPTION – GENERAL

Related Documents: The general provisions of the contract including Bidding Requirements, General and other Conditions and Specification Requirements apply to all work of this section.

1.2 WORK INCLUDED

The work of this section consists of furnishing all labor, material, equipment and appliances necessary and required by the contractor to rehabilitate the existing hydraulic passenger elevator. Work shall include but not be limited to the following:

A. REHABILITATE ONE EXISTING HYDRAULIC PASSENGER ELEVATOR

1. Remove existing elevator controller. Provide new microprocessor simplex, solid state, automatic, selective collective elevator controller featured with independent service, inspection service and Fire Fighters' service and load weighing device.
2. Provide battery powered emergency elevator lowering system.
3. Remove entire existing hydraulic pump unit. Provide new hydraulic pump unit system complete with electric motor, hydraulic pump, oil tank, control valve, and accessories.
4. Remove entire existing piston-cylinder assembly. Provide new cylinder-piston assembly and PVC protective liner.
5. Remove existing car guide shoes and provide new roller type guide shoes assemblies.
6. Remove the existing elevator cab enclosure and provide a new cab with doors, door operators, sub flooring, finish flooring, exhaust fan, car station, car lantern, car position indicator etc. Provide audible verbal announcements of floors and door operation as required.
7. Remove the existing car platform. Provide a new platform with nickel silver sill.
8. Reuse existing car guide rails, rail brackets, clips and hardware. Check all attachments and re-secure as necessary.
9. Recondition existing hoistway entrance frames. Remove existing hoistway door panels and associated accessories including rollers, tracks, interlocks, door closers and hangers. Provide new hoistway door panels with all accessories at each opening.
10. Remove existing car buffer and support steel. Provide new car buffer with

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footing steel.

11. Remove existing hydraulic line. Provide new hydraulic pipe with fittings and supports as necessary.
12. Remove and legally dispose existing hydraulic oil. Provide new biodegradable hydraulic oil.
13. Provide new rupture valve.
14. Provide scavenger pump system with plastic tubing connecting hydraulic jack oil ring to oil tank in machine room.
15. Remove existing traveling cable. Provide new traveling cable.
16. Remove existing corridor push button stations from each landing. Install cover plates over existing cutout in door entrance frames. Provide new flush mounted corridor push-button stations with digital position indicators (all landings) and Fire Fighters' key switch (Main Floor). All pushbuttons shall be installed at appropriate height conforming to ADAAG requirements and all other applicable codes. Provide all necessary cutouts and any patching and wall finishing required for installation of fixtures.
17. Provide new hands-free autodial telephone incorporated into the main car operating panel. Provide communications between the elevator machine room and the elevator car. Communications must also be provided between the car and a location in the building readily accessible to authorized and emergency personnel as per A17.1.
18. Provide new shielded communication wiring to all locations for the communications devices as described above.
19. Remove existing landing devices. Provide new metal tape with magnetic strip type floor selector and landing device.
20. Remove existing pit stop switch and hoistway limit switches. Provide new hoistway switches and elevator pit stop switch.
21. Provide a new steel pit ladder conforming to applicable Code.
22. Connect smoke detector system wiring to the elevator controller.
23. Remove existing elevator wiring. Provide new hoistway and machine room wiring, in conduit as per NEC code.

1.3 RELATED ITEMS PROVIDED IN OTHER SECTIONS

1. Install hoistway vent with smoke damper at the top of the hoistway to conform to code requirements (3 ft.² required).
2. Provide air conditioning to maintain temperature and humidity in machine room

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as per elevator equipment manufacturer's requirements.

3. Provide a fused disconnect switch for elevator power per the National Electrical Code with feeder or branch wiring to controller. Size to suit elevator power requirement. An auxiliary contact shall be provided in the disconnect switch to provide a signal to the battery powered emergency lowering device.
4. Provide a separate 120 volt, A.C. 15 amp, single phase power supply with fused disconnect switch for the elevator cab lighting, venting and alarm.
5. Provide electrical power for all elevator related accessories such including sump pump, motor room AC, motor room light, GFI receptacles, pit light and scavenger pump.
6. Provide an electrical outlet (GFI) and light fixture in pit with switch located adjacent to the access ladder per code.
7. Provide smoke sensing devices, located as required in elevator lobbies, pit and machine room with wiring from the sensing devices to elevator controller.
8. Provide dedicated telephone line service up to elevator motor room for elevator emergency cab communication system.
9. Provide elevator pit sump pump with power supply, oil separator, and accessories per MEP design.
10. Provide a sprinkler in the elevator pit (no more than 24" above the pit floor). Elevator electrical equipment located less than 48" above the pit floor shall be weatherproof (Type 4 as specified in NEMA 250). Elevator wiring, except traveling cables, shall be identified for use in wet locations in accordance with the requirements in NFPA 70.

1.4 REFERENCES

- A. National Electrical Manufacturer Association (NEMA).
- B. American Society for Testing and Materials (ASTM).
- C. American National Standards Institute (ANSI).
- D. Underwriters Laboratories, Inc. (UL).
- E. National Elevator Industry, Inc. (NEII).
- F. American Society of Mechanical Engineers (ASME).
- G. American National Standard Safety Code for Elevators and Escalators. ASME A17.1 2016 and A17.3.
- H. New York State Building Code.

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- I. NYS Uniform Fire Prevention and Building Code
- J. City of Yonkers Building Code.
- K. National Electrical Code (NEC).

1.5 DEFINITIONS

- A. Company Field Advisor:

An employee of the company which lists and markets the primary components of the elevator under their names who is certified by the company to be technically qualified in design, installation and servicing of the required products, or an employee of an organization certified by the foregoing company to be technically qualified in design, installation and servicing of the required products.

1.6 PROJECT DESIGN AND JOB SITE

- A. Review and study the project drawings including architecture, structural, mechanical, electrical, plumbing and other drawings related to elevator work and verify that the design is suitable for installation of the proposed elevator and related components. The contractor shall identify and report within two weeks from the date of the award of the contract for any design issue that may prevent or does not meet code requirements. No "waiver of responsibility" for incomplete inadequate or defective adjoining work will be considered unless notice has been filed by the Contractor and accepted to in writing by the owner before the Contractor begins any part of the work.
- B. The Contractor shall review and coordinate with all other trades so as no difficulties are encountered during installation of all equipments under this contract. Any unnoticed or missed situation/condition and resulting into necessary required modification in term of labor and material shall become responsibility of the contractor.

1.7 MANUFACTURE AND INSTALLATION OF EQUIPMENT

- A. All elevator equipment required under the contract shall be of the highest grade, smooth, and safe in operation, of individuals, firms and corporations, who have been engaged in business or manufacturing of the elevator equipment of the same kind, type, speed, capacity and design as herein specified, for at least a period of 5 years immediately prior to the date of award of the Contract. The successful bidder shall submit a list of projects on which he has performed the installation of elevator equipment of the same kind, type, speed, capacity and operation as that specified herein which have been in satisfactory operation for a period of at least three years.
- B. Furthermore, the organization performing the elevator work shall give satisfactory evidence that it has maintained and operated in the immediate vicinity, a servicing organization capable of promptly servicing, repairing and replacing equipment and materials of elevator installations of the same type and capacity. This servicing organization shall have been in continuous operation not less than 5 years prior to award of the contract. It shall carry at the above location a complete and ample stock of materials and parts for the equipment furnished that are subject to wear, breakage, etc.

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- C. The contractor shall provide evidence that the proposed elevator equipment designed for the same kind, type, speed and capacity specified herein has been in satisfactory operation in the area for a period of at least two years immediately prior to the date of the award of Contract. Has consistently operated in compliance with the performance requirements specified herein. No experimental or end of line equipment shall be permitted or used.
- D. Major elevator components required for this project may be the product of a manufacturer of such equipment provided they are specially built to operate satisfactorily under the severe conditions specifications herein stated.

1.8 FIELD MEASUREMENTS

- A. The Contractor shall verify dimensions and conditions at the job during construction so that all work will properly function and meet the required code.
- B. The Contractor, before commencing work shall examine all adjoining work area on which his work is in any way dependent for perfect workmanship according to the intent of the specifications.

1.9 SUBMITTALS

- A. Within 30 days after the award of the contract, the Contractor shall furnish to the owner the names and addresses of the manufacturers, together with catalog information or other identifying description for all items specified in the specification.
- B. The contractor shall submit drawings and other submittals e.g. catalog cuts, charts, graphs, computations, etc. within 30 days of award of the contract. The shop drawings shall show material type and gauge, general dimensions, methods of attachment, location and size of reinforcements and openings, and a general arrangement of components. Matter submitted for approval shall be accompanied by complete information concerning the material, articles and/or design proposed for use in sufficient detail to show compliance with the specification, and use in sufficient detail to show compliance with the specification, and shall be approved before incorporation into the work. Approval thereof will not be construed as relieving the Contractor of compliance with the specification, even if such approval is made in writing, unless the attention of the owner is called to the noncompliance features by letter accompanying the submitted matter. Approval of drawings, cuts and samples by the owner shall not be construed as a complete check or approval of the detailed dimensions, weights, gauges and similar details of the proposed articles. The conformance of such details with the contract requirements, together with the necessary coordination of dimensions and details between the various elements of the work, and between the various subcontractors and suppliers, shall be solely the responsibility of the contractor, approval of submitted matter notwithstanding. All submitted material shall be tendered complete, and at one time. **PARTIAL SUBMITTALS WILL NOT BE CONSIDERED.** No work shall be started before written approval is received. In general, the items to be submitted shall include but shall not be necessarily limited to the following:
 - 1. Complete and fully dimensioned hatch plan, machine room and sections of hatch plan (i.e. elevation) including pit depths, car run-by, equipment sizes, etc.

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2. Schedule of work showing commencement and completion dates. Approval shall be obtained from the owner.
 3. Work schedule breakdown of elevator to be installed, showing construction sequence and allotted time in calendar weeks.
 4. Written description of the mode and sequence of operation
 5. Complete information on elevator control system.
 6. Interior elevations and details of elevator car enclosures, details of car operating and signal fixtures including metal gauges, dimensions, hinge details, finishes, etc.
 7. Hoistway and car door panel drawing showing type and size with plan view and section view.
 8. Complete fixtures for cab and corridors.
 9. Detail of all elevator components including platform, car frame, pump unit, piston-cylinder assembly, landing device, hydraulic line with components, etc.
 10. Straight line diagrams of all control, operating, signal and other circuits with wire sizes and necessary cuts and other data on the several relays, switches and other devices.
 11. Conduit layouts showing sizes and runs of conduits with number and size of wires in each.
 12. Samples of all finishes.
 13. Samples of conduit, fittings, wires, devices and traveling cables.
 14. Complete information on all components required for the cab communication system including a description of the mode and operational features.
- C. Approval of drawings, schedules and other submitted matter will be general and shall not be construed as:
1. Permitting any departure from the contract requirements.
 2. Relieving the Contractor of the responsibility for any errors, including details, dimensions, materials, etc.
 3. Approving departures from details furnished by the owner.
- D. If drawings, schedules or other submitted matter shows variations from the contract requirements, the Contractor shall describe such variations in his letter of transmittal. If acceptable, the owner may approve in writing, any or all such variations. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the work in accordance with the contract, even though which drawings or

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schedules may have been approved.

- E. Submissions, which are disapproved, shall be resubmitted with two weeks with all revisions circled and annotated with the appropriate revision number.
- F. Samples: Where submissions are called for in the specifications, or when otherwise required by the owner, the Contractor shall submit duplicate samples of materials, appliances, finish or other items included in the work. Such samples shall be approved by the owner before the work is executed. Samples shall be submitted in ample time before work is installed, to permit sufficient time for owner's consideration. Samples shall be accompanied by a label, or shall be properly marked, indicating the type and brand of material, its place of origin, the name of the producer, the Contractor's name and the name of the project for which the material is intended.

1.10 MANUFACTURE AND INSTALLATION OF EQUIPMENT

- A. Quality: Unless otherwise specified or shown, materials and products shall be the best for each type or class. They shall be new, sound, uniform in quality, size, shape, texture and color, as each case may require, and free from cracks, warping and other defects which might impair their strength, appearance, performance, durability or service ability.
 - 1. Materials and products shall be of those manufacturers having established reputations for products, which are of high quality, are practical and durable, and require minimum of maintenance. Manufacturer shall have ample facilities for producing and delivering to meet construction schedules.
 - 2. The Contractor shall unload, haul, and pile material delivered for the project and shall assume all responsibility for insurance, coverage, care and protection of same after unloading.

1.11 REQUIREMENTS

- A. The completed elevator installation shall conform to ASME A17.1 and ASME A17.3, City of Yonkers Building Code, NYS Building Code and all other applicable codes. All material and equipment shall be new unless otherwise specified and indicated. Equipment shall be the product of a manufacturer regularly engaged in the manufacture and installation of this type of equipment. Design and construction of the equipment and parts subject to wear shall be such that similar machines and devices provided will be completely interchangeable. Working parts shall be accessible for inspection, servicing and repair. Adequate means shall be provided for lubrication of all wearing parts that require lubrication.
- B. In all cases where a device or part of the equipment is referred to herein in the singular, it is intended that such reference shall apply to as many devices as are required to complete the installation.
- C. All work called for in the specifications applicable to each separate section but not shown on the contract drawings in their present form, or vice versa, is required and shall be performed by the Contractor even though it were not specifically delineated or described.
- D. Work not particularly specified in the specifications nor detailed on the contract drawings

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but involved in carrying out their intents or in the complete and proper execution of the work, is required and shall be performed by the Contractor.

- E. Should the owner require that any portion of the conveying system or equipment be operated prior to final completion and acceptance of the work, such operation shall be under the Contractor's direct supervision, but such preliminary operation shall not be construed as an acceptance of any of the work.
- F. It is the intent of these specifications to replace all parts of the elevator and to place the equipment in like-new operating condition. In the event of omission of an item, detail and/or duty not specified within these specifications, it shall be deemed that such item, detail and/or duty will be noted in writing and included as part of the Contractor's bid.

1.12 DELIVERY, STORAGE & USE OF THE PREMISES

- A. Contractor's Use: The Contractor shall confine his equipment, the storage of materials and the operations of its workmen to the elevator machine room, hoistway and pit and any other staging area, which may be provided by the owner, and shall not unreasonably encumber the premises with his materials. The Contractor shall be solely responsible for safeguarding this equipment.
- B. Materials shall be delivered to the site ready for use, in the approved manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to approved samples.
- C. Materials shall be stored under cover in a dry and clean location, off the ground. Delivered materials which are damaged or otherwise not suitable for installation, shall be removed from the job site and replaced with acceptable materials.
- D. It will be the Contractor's responsibility to keep all materials stored within the boundaries of the area assigned to him and to store his material in a neat and safe manner.
- E. Contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.
- F. Any work that is not included in this contract but is disturbed by this work, shall be restored to "as is" condition by the Contractor and acceptable to the Owner.

1.13 SAFETY & ACCIDENT PREVENTION

- A. The Contractor shall comply with all the health and safety regulations of governing codes, laws and ordinances. Contractor shall take all reasonable steps and precautions to protect health and minimize danger from all hazards to life and property. The Contractor is responsible for conducting all work activity associated with this project in strict conformance with all applicable OSHA standards and/or local and state regulations. The Contractor is solely liable for enforcement of these safe practices in his operation.

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1.14 DAMAGE

- A. Should the building be damaged outside of the zone of operations of this Contract due to work of this Contract, the Contractor shall report the conditions and circumstances to the owner and shall make all necessary repairs and replacements to such damaged work at his own expense with new materials to identically match existing similar work in every respect as approved.

1.15 CUTTING, PATCHING AND DRILLING

- A. In addition to the requirements of the "General Conditions", the following conditions are binding on the Contract:
 - 1. No holes in the building structural member shall be made without the written permission of the Engineer. However, if the hole in the structural member is necessary, the contractor shall submit the request with all detail such as location, member affected, size of hole, method of making hole etc.
 - 2. Cutting of metal shall be performed per approval and in accordance with OSHA and NFPA requirements. Provide fire extinguishing equipment and proper ventilation as described below.

Provide ventilation and provisions for removing smoke, fumes, etc. directly to the outdoors for all work that involves cutting and burning of metals. Provide all equipment necessary for this service including fans, flexible ducts, etc. The Contractor shall not allow in any way smoke, fumes, etc. Provide fire watchman service if required by OSHA and other regulatory agencies. The entire procedure shall be in complete accordance with OSHA requirements.

1.16 SUPERVISION, COORDINATION AND RECORD KEEPING

- A. Supervision: Contractor shall personally supervise the work or shall have at all times a competent person on site with authority to act for Contractor. Contractor's Representative shall not be removed from the work without owner's consent. If contractor's Representative ceases to be acceptable to owner, he shall be removed from the work within 24 hours after receipt of owner's request, and be replaced immediately by one who is acceptable to the owner. When requested by owner, Contractor shall furnish experience record of Contractor's Representative.
- B. Coordination: Contractor shall be held responsible for the proper coordination of all phases of the work under this contract. He shall be held responsible for the resolution of all conflicts between the work of his subcontractors or the work of his subcontractors and his own work.
 - 1. Before proceeding with any work, carefully check and verify all pertinent dimensions and sizes, and assume full responsibility for fitting the equipment and materials to the structure. Where the apparatus and equipments have been indicated on the drawings, the dimensions have been taken from typical equipment of the type specified in this section. Carefully check the drawings to verify that the equipment that will be actually provided will fit into the spaces available. Should the additional sub-framing members required to accommodate

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the elevator shall be provided and paid for as part of the work of this section.

2. Contractor shall familiarize with the specifications, drawings, installation procedures and construction schedules for those phases of work performed by the subcontractors. If the Contractor's work or the work of any of the subcontractors depends upon the execution of the work of another subcontractor or upon his own work, he shall so coordinate all phases of work so as to avoid conflicts in installation procedures and construction schedules.
3. As work progresses, Contractor shall consult with the subcontractors, examine the work installed by them, and resolve all conflicts without expense to the owner.

1.17 MISCELLANEOUS

- A. Neat and smooth steel sleeves arranged for cement curbs shall be placed through all slabs of concrete or other material for openings.
- B. Metal guards shall be placed around exposed moving machinery, and tapes and belts in the elevator machine rooms where required and where directed by the owner

1.18 PAINTING

- A. All ironwork existing or installed by the Contractor and exposed in the hoistway or adjacent thereto, shall be cleaned and painted with one shop coat of an approved rust inhibitive paint. After erection in the field and final adjustments, bare spots on ironwork shall be touched up. Final field coat of paint shall be applied by the Contractor. Field coat shall be similar to shop coat.
- B. The power unit shall be given two field coats of an approved color and then varnished. All cast iron frames of the machine shall be filled, rubbed smooth before painting. All exposed surfaces of the machine room equipment, including controller cabinets, shall be given one coat of special machinery paint and in addition, a field coat of approved color and then varnished.
- C. Power units, controllers, and other panels shall be identified by means of approved templates.
- D. Floor number designations shall be neatly painted on the hoistway side of doors at each floor.

1.19 QUALITY ASSURANCE

- A. Installers Qualifications:

The persons installing the work and their supervisor shall be personally experienced in elevator Work, and shall have been regularly employed by a Company engaged in the installation of elevators similar to that specified for this project for a minimum of 3 years.

Furnish to the Owner the names and addresses of 5 similar projects, which the foregoing people, have worked on during the past 3 years.

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B. List of completed Installations

If products by Companies other than those specified are proposed for use, furnish the name, address and telephone number of at least 5 comparable installations, which can prove the proposed products, have operated satisfactorily for 3 years.

C. Company Field Advisor

Secure the services of a Company Field Advisor for the following:

1. Render advice regarding installation, adjustment and operation of equipment.
2. Witness tests and certify with an affidavit that the equipment installed is in accordance with contract documents and is operating properly.
3. Explain available service programs to facility supervisory personnel for consideration.

D. Regulatory Agencies:

City of Yonkers.

E. Comply with requirements of ASME A17.1.

1.20 CLEANING, ADJUSTMENT AND FINAL ACCEPTANCE

A. Cleaning: The Contractor shall at all times keep the premises, clean and free from excess accumulation of waste materials or rubbish caused by Contractor's operations.

B. Adjustments and Removals: After completion of work, and before the issuance of Certificate of Final Acceptance, work shall be thoroughly cleaned, and the elevator properly adjusted, so that the system is in proper operating condition. Contractor shall remove from site, all debris, and associated materials which are no longer required as a result of work performed under this Contract to be left as part of finished work, and shall remove all stains and defacements caused by this Contractor's work. The entire work shall be left in a clean condition, satisfactory to the owner.

C. Final Acceptance

Upon completion of work, the contractor shall arrange for building department inspection. The elevator work accepted by the owner in complete respect including the signed inspection certificate from the building department or authorized agency shall be considered final acceptance by the owner.

1.21 FIELD ADJUSTMENT AND TEST OF ELEVATOR

A. The elevator specified herein shall be adjusted to make comfortable, smooth, rapid and accurate landings, properly coordinated with the door operation and acceptable to the owner. All hoist doors shall be adjusted to operate smoothly, rapidly and without shock or slam and to the satisfaction of the owner. The control system shall provide a smooth acceleration and retardation as finally approved by the owner. The adjustments shall be

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properly maintained, and any required corrections shall be made by the installer during the maintenance period.

- B. The Contractor shall furnish all labor, materials, equipment and properly calibrated instruments for making all field tests.
- C. A full load test, as per ASME A17.1 and A17.2 shall be performed on the elevator prior to the acceptance of the work.
- D. The elevator shall be subjected to a test for a period of one-hour continuous run with full contract load in car. During the test run, the car shall be stopped at all floors in both directions of travel.
- E. FLOOR LEVELING TEST - Floor leveling device shall be tested for accuracy of landing at all floors with no load in car, in both directions of travel. Accuracy of floor landing shall be within 1/8" of landing both before and after full load run test.
- F. Tests shall be made during regular working hours.
- G. If tests show that the equipment is in any way defective, of poor workmanship, at variance with the requirements of the Contract Documents, or dangerous or objectionable in operation, the Contractor shall make all necessary changes and remedy all defects at his expense, to the satisfaction of the owner, and also pay for the expenses of all subsequent tests until all equipment is acceptable.
- H. Upon completion of satisfactory tests, secure and furnish to the owner, certificates from all departments having jurisdiction, that the elevator and related equipment have been inspected and approved.
- I. Approval and acceptance of equipment by the owner is contingent upon prior approval of the above referenced authorities, Consultant, and compliance by the Contractor with all requirements of such authorities and the Contract Documents.
- J. Notices of all tests shall be given to the owner and the owner's insurance carrier at least ten days in advance of the several tests.
- K. Any alignment, testing, static and/ or dynamic balancing, removal, or replacement of internal machine components must be verified by the owner.

1.22 INSPECTION OF THE WORK

- A. The owner and assigned representative shall at all times have access to the work wherever it is in preparation or in progress, and Contractor shall provide proper facilities for such access and inspection.
 - 1. The owner shall have the right to reject or require correction of materials and workmanship, which are defective. Rejected materials shall be removed from the premises and satisfactorily replaced with proper materials without additional cost.
 - 2. Should it be necessary by the owner at any time before final acceptance of the

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work, to make examination of work already completed by removing or tearing out work, Contractor shall, upon request, promptly furnish all necessary facilities, labor and materials required. If such work is found to be defective, Contractor shall defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of drawings and specifications, the Contractor shall be reimbursed for the removal and replacement of the work.

3. Failure by the owner during the progress of the work or rejected materials or work not in accordance with the drawings and specifications, shall not be deemed an acceptance thereof, or a waiver of defects therein, and no payment and partial occupancy of the premises shall be construed as an acceptance of the work or materials.

1.23 INSPECTION, PERMITS AND TESTS

- A. The Contractor shall obtain and pay for any necessary municipal and state inspections as required, and also make such tests as may be required by the regulations of such authorities and the owner. These tests shall be made in the presence of the authorized representative of such authorities and the owner or representative.

Contractor shall modify and make necessary adjustment and/or replacement of components, until all tests are approved by the owner. The owner shall be issued a letter of inspection report upon receiving for contractor's record and information.

1.24 RECORD DRAWING FOR ELEVATOR

- A. In addition to the drawings specified under the "General Conditions", the Contractor shall furnish to the owner, for record and operating purposes, the following record drawings for the elevator furnished under this Section:
 1. Elementary Diagrams for power and signal systems.
 2. Wiring Diagrams showing all external connections between equipment, devices and power and signal panels.
 3. The Record Drawings shall include the layouts and diagrams enumerated under the heading "WORKING DRAWINGS AND SAMPLES".
- B. Complete sets of all elementary wiring and drawing diagrams for elevator, showing the work as actually installed i.e., "as-built" drawings. The wiring diagram shall be printed on Glossy long life laminated paper. The wiring diagram shall be sequentially numbered (i. e. 1 of 5, 2 of 5, etc.) All wiring prints shall be in the hard binder and secured in the machine room at acceptable location.
- C. All record drawings shall be of the "as-built" type with floor markings indicating actual floor designations.
- D. The manual shall include the complete detail of components identified by part number.

1.25 INSTRUCTION AND TECHNICAL DATA

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- A. Furnish set of neatly bound instructions giving the method of control, diagnostics and sequence of operation and control, together with data on all switches, relays, and other devices for maintaining, trouble shooting, servicing and for ordering.
- B. Furnish set of bound instructions and recommendations for maintenance, with special reference to lubrication and lubricants.

1.26 MAINTENANCE

The elevator equipments specified herein shall be maintained for Two (2) years from the date of acceptance of the elevator by the owner.

- A. Bi-weekly systematic examination, adjustments, cleaning and lubrication of all machinery, machinery space, hoistway and pit. The Contractor shall maintain all parts of the elevator, consisting of, but not limited to motor, controller, pump unit, piston cylinder assembly, valve unit, contacts, coils, resistance for operating and motor circuit, leveling device, hoistway door, track and guide, door operating device and door motor, car light, push buttons, indicators, car lantern and all other elevator signal scheduling and accessory equipment complete.
- B. This service does not include repairs or renewals of hatchway enclosure, hoistway door and cab interior.
- C. All normal work, including regular examination and normal and scheduled repair in accordance with this contract, is to be made during the regular business hours of the Contractor.
- D. Emergency Callback Service: Provide emergency callback service which consists of promptly dispatching qualified employees in response to requests from the Owner by telephone or otherwise, for emergency callback service on any day of the week, at any hour, day or night. Emergency repair shall be made to restore the equipment to operating order. If repair cannot be made immediately, the mechanic shall notify the Owner or his designated representative as to the reason why. It is understood and agreed that this shall constitute twenty-four (24) hour callback service for the elevator. Response time for emergency callback service shall not exceed one half (1/2) hour when the Contractor is advised that a trapped passenger is involved, and one (1) hour when an elevator malfunction occurs which does not involve a trapped passenger.
- E. It is mutually agreed that the Contractor shall not be under any obligation hereunder to make any repair or replacement except those incidental to the normal operation of the machinery, and that the Contractor is not required under this contract to make repair or replacement necessitated by reason of malicious damage, fire, which are the result of causes beyond Contractor's control. Work, beyond the scope of the contract, performed and completed without authorization, shall be considered part of the Contractor's obligation under normal contract support.
- F. Lubrication: Lubricate bi-weekly (26 times per year at regularly scheduled intervals) all of those mechanical parts recommended to be lubricated by manufacturer of the equipment, or to otherwise lubricate as often as and in the manner specified by said manufacturer.

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- G. Lubricant and Cleaning: Lubricant shall consist of oil, grease and compound furnished by Contractor, and shall be of the highest quality, the consistencies of which shall be proper for the purposes employed and for the part to which applied. Contractor shall keep guide rails clean. When necessary, the Contractor shall renew guide shoe as required to ensure smooth and quiet operation. All oil reservoirs shall be kept properly sealed to prevent leakage. Approved metal containers shall be provided by the Contractor for the storage of wiping cloths.
- H. Cleaning Materials: Cleaning compounds, waste, cloths and other materials are to be supplied by Contractor, it being understood and agreed that cleaning agent employed shall not be flammable or noxious, and must always be stored in approved metal container provided by the Contractor.
- I. Testing: Examine quarterly all safety device including piston cylinder assembly, and conduct annual no load test, annual inspection in accordance with ASME A17.1 and A17.2.
- J. Wiring: Repairing and/or replacing all electrical wiring and conductor extending to the elevator from main line switch in the machine room and outlet in the hoistway. The fuses of the main line switch shall be maintained and replaced.
- K. Keeping the exterior of the machinery and any other part of the equipment subject to rust, properly painted, identified and presentable at all times. Motor winding and controller coil are to be periodically treated with proper insulating compound.
- L. Hydraulic system of pump unit, valve unit, and piston cylinder assembly: Examine and repair as required to maintain in smooth operating condition without any oil leak.
- M. Repair, Renewal and Replacement: Repair, renewal and replacement shall be made by Contractor within a reasonable time. "Reasonable time" meaning that positive corrective action be taken within twenty-four (24) hours from Contractor's awareness, it being understood and agreed that repair, renewal and replacement shall be new and genuine part supplied by the manufacturer of the original elevator equipment or its successor, and shall apply to the repair, renewal or replacement of all mechanical, electronic and electrical part, including but not limited to the following:
 - 1. Cab door operator and car door control, door protective device, car frame, platform, platform flooring, elevator car guide shoes, etc.
 - 2. Guide rollers.
 - 3. Motor, motor winding, bearings and rotating element.
 - 4. Pump unit, pump drive system, valve unit, muffler and hydraulic pipes.
 - 5. Cylinder piston assembly, oil tank, and associates discharge line.
 - 6. Controller including all relays, components, circuit boards, resistors, condensers, transformers, contacts, leads, timing devices, insulators, solenoids, resistance grids and mechanical and electrical driving equipment.

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7. Car guide rails.
 8. Hoistway door interlocks, track, roller, drive block, door gib etc.
 9. All car and hoistway operating fixtures including Main Lobby fixtures, main car operating panels, safety edge, and starter's panels.
 10. Top and bottom hoistway limit switches.
- N. A complete permanent record of inspections, maintenance, lubrication and callback service for the elevator under service shall be maintained by the contractor in a location determined by the owner. These records are to be available to owner at all times. The records shall indicate the reason the mechanic was in the building, arrival and departure time, the work performed, etc. In addition, a chronological record of all work performed shall be kept in each machine room. Signed work tickets shall also be provided.
- O. Contractor shall, at all times during the term of this Agreement, maintain locally an adequate supply of replacement parts in order to perform his obligations pursuant to the terms of this Agreement without any delay whatsoever.
- P. Contractor shall maintain a complete set of updated electrical wiring diagrams and drawings for the elevator on file with owner and these to become the property of the owner.
- Q. Contractor must maintain the elevator in accordance with the manufacturer's performance specifications (including floor-to-floor times, door timings, rated speed, etc.).
- R. Contractor shall be responsible to re-lamp all lighting fixtures in the pit, machine room and hoistway as required.
- S. Cleaning: Contractor shall, during the course of weekly examinations, remove and discard immediately, all accumulated dirt and debris from the pit areas. Prior to each anniversary date of this contract, the Contractor shall thoroughly clean down the entire hoistway of all accumulated dirt, grease, dust and debris.
- T. Report by Contractor: Contractor shall at any time during the term of this contract, upon written request of the owner, render a report of inspections, repairs or replacements made by the Contractor at the premises herein, itemized as to parts installed or other services performed, and supply samples of lubricants, compounds or other materials employed.
- U. Sole Responsibility: The maintenance work shall be performed by only the elevator men directly employed and supervised by the Contractor, who are experienced and skilled in maintaining and shall not be assigned or transferred to any agent or subcontractor.

1.27 WARRANTY

- A. Provide project warranty effective for two (2) years from the final acceptance of the elevator, which shall be signed by Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of elevator during warranty period. "Defective" is hereby defined to include, but not by way of limitation, operation

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or control system failures, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions.

- B. The Contractor shall warrant to the owner that all work furnished under this contract shall be:
 - 1. Free from defects in design, material, and workmanship.
 - 2. Adequate and suitable for any use and purpose specified or referred to in this contract.
 - 3. Suitable for any other use or purpose as represented in writing by the Contractor.
 - 4. In conformance with the drawings, specifications and design criteria supplied to the Contractor by the Engineer.

1.28 TRAINING OF OWNER'S PERSONNEL

- A. The Contractor shall train the owner's personnel for emergency condition.
- B. Training period shall be not less than four (4) hours.
- C. Training shall be given by qualified personnel in the care and operation of the elevator system.
- D. Training shall be given during normal working hours of normal working days.
 - 1. Five copies of a procedure manual for operation of the elevator during emergency conditions shall be prepared by the Contractor and shall be utilized by Contractor for instruction purposes.
 - 2. After completion of all instructions, the five copies of the complete manual shall be turned over to the owner.
 - 3. The time and place of the instructions shall be coordinated with the owner.
- E. Training shall also include but not be limited to the following:
 - 1. Operation of elevator under emergency condition.
 - 2. Operation of the elevator Fire Fighters' system.
 - 3. Operation of elevator communication.

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PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Elevator equipment (less signal controls):
 - 1. CEMCO Lift Elevator Systems.
 - 2. Canton Elevator, Inc.
 - 3. Leistriz Elevator Corp.
 - 4. MEI

- C. Cabs:
 - 1. Velis Associates, Inc.
 - 2. National Cab and Door Company.
 - 3. CEC Cab Company.
 - 4. Tyler Cab Company.
 - 5. H&B Cab Company.

- D. Car and landing signal:
 - 1. Monitor Controls.
 - 2. EPCO.
 - 3. G.A.L. Corporation.
 - 4. Innovation Industries.

- E. Elevator controls:
 - 1. Motion Control Engineering (MCE) Inc.
 - 2. G.A.L. Corporation.
 - 3. Elevator Control Corporation.
 - 4. Computerized Elevator Control Corporation.
 - 5. Elevator Systems, Inc.

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F. Car door safety edge:

1. G.A.L. - Scanguard 8000.
2. Janus - Panaforty Plus.
3. Adams - I.C.U. / Plus.
5. Tri-Tronics Company, Inc.

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2.02 ELEVATOR SCHEDULE

All items mentioned shall be new and as approved. It is not the intent of this schedule to itemize each component necessary to complete the work specified herein as the Contractor will be required to provide all components necessary to complete the work as specified herein whether or not included in the schedule.

A. HYDRAULIC ELEVATOR

- | | |
|---------------------------------|--|
| 1. General: | The work described herein shall apply to rehabilitate one existing hydraulic elevator. |
| 2. Quantity & Type: | One (1) Hydraulic passenger elevator. |
| 3. Classification: | Passenger |
| 4. Capacity & Speed: | 2,500 pounds; 50 feet per minute. |
| 5. Elevator Motor Power Supply: | 208 Volt- 3 Ph. – 60 Hz. elevator power.
120 Volt – 1 Ph. – 60 Hz lighting power |
| 6. Control: | Non-Proprietary, microprocessor solid state, automatic, simplex elevator controller system. Provide auto, independent service and signal control service operation. <u>Note: Short Floor Operation Required</u> |
| 7. Wiring & Conduit: | New machine room and hoistway wiring complete for control equipment. Wiring shall be provided in rigid, intermediate metal galvanized duct. Provide coded traveling cables complete with 10% spare conductors and shielded wires for cab communication system. |
| 8. Stops & Openings: | 3 Front at Lower Lobby, Main Lobby, Mezz.
3 Rear at Lower Stack, Upper Stack, Circ. Desk |
| 9. Travel of elevator: | 27'-1" |
| 10. Pump Power Unit: | New hydraulic pump unit with oil tank, muffler and control valve unit. |
| 11. Cylinder & Piston: | Provide new cylinder and piston assembly complete with head seal assembly in casing and protective covering. |
| 12. Guide Rails: | Recondition existing car guide rails, bracket and required stiffeners. |
| 13. Car Frame and Buffers: | Existing car frame. Provide new car guides and |

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buffers with footing channel & buffer blocking.

14. Platform: New car platform steel structure. Provide cab sub floor and finish flooring. New nickel silver door sills.
15. Pipe & Fitting: Provide hydraulic pipe, fitting and supports for oil line from pump unit to cylinder.
16. Car Enclosures: Provide cab complete with cab wall, ceiling, cab door, top emergency exit, handrail, exhaust fan, light, cab flooring, etc.
17. Car Door Operator: Provide complete automatic motorized door operators, full length infrared for reopening device with nudging feature. Provide car door hanger, track, gibs, clutch, interlock and associated door hardware
18. Hoistway Entrance: Reuse existing entrance frames, door panels and sills after reconditioning. Provide interlocks, drive block, hanger, roller assembly for door panel, hanger cover, door gibs and associated hardware.
19. Signals: Provide corridor call operating fixtures and car position indicator. Corridor call and car call buttons shall be metal encased with a Halo, which shall illuminate when a call is registered. Provide tamper-proof spanner-head screws to match faceplate. Install car operating panel and corridor call button at location and height shown on drawing to comply with handicap requirements.
20. Fixtures: All fixture faceplate shall be a minimum of 1/8-inch thick stainless steel.
21. Cab Communication System: Provide auto-dial cab communication system in the car station of the elevator. Provide wiring for cab communication from cab to machine room. Provide communications between the elevator machine room and the elevator car. Communications must also be provided between the car and a location in the building readily accessible to authorized and emergency personnel as per section 2.27.1.1.1 of A17.1.
22. Firefighters' Emergency Service: Provide elevator primary and alternate floor recall (Phase I) and in-car (Phase II) Fire Fighters' Service operation for the elevator in accordance with code and connect to Building Fire System.

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23. Miscellaneous: Provide hoistway limit switches, top emergency exit contacts, emergency car lighting, inspection and maintenance car top operating station, emergency stop switches, guards, and inspection testing in compliance with code and contract requirements.
24. Leveling Device: Provide metal tape with magnetic strip type floor Landing selector and landing device.

2.03 OPERATION AND CONTROL OF ELEVATOR

A. Operation:

1. The operation of the elevator shall be arranged for automatic operation as defined by the ASME A17.1 Code and per City of Yonkers Code requirements.
2. Highest and lowest call reversal circuits shall be provided and so arranged that when certain conditions exist, as hereinafter described, a car shall not invariably travel to the topmost or lowest landing but shall be reversed automatically at the landing corresponding to the highest or lowest car call or down landing call, as the case may be.
3. Short Floor Operation shall be provided.
4. The car operating panels being provided shall contain a series of car call buttons of the call register type arranged to illuminate when activated, Emergency Call Bell Button, Fire Service Key-switch and Light, a "Door Open" button and a "Door Close" button, "Stop" key switch. Include a grille in the faceplate for the cab-communication system and a lamp, which will illuminate red when the cab communication system is in use. Spring loaded key switches shall be provided for floor lockouts of landings as specified by the Owner. During Fire Fighters' operation, the key switch shall override and button shall become activated without key. The fixture faceplates shall be arranged so that the buttons are at a height required by handicapped Code.
5. The service panel located in the main car-operating panel shall be provided with a recessed compartment equipped with key locked doors. The compartment shall contain switches required for a two-speed car fan, cab light, inspection service operation, independent service, emergency light test button and an electrical receptacle. All key switches that are behind the locked cabinet shall be Barrel type.
6. The car buttons shall be metal encased with a "halo" and a center jewel indicator which shall illuminate in green when a call is registered. In addition, faceplate shall be provided with handicapped symbols integral with the hall and car operating panel faceplate.
7. Elevator shall operate from a riser of hall buttons provided. The fixtures shall contain buttons of the "up" and "down" type at the intermediate floors and single button unit at the terminal floors. Illumination of a button shall occur upon

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registration of a call at that landing illuminating green for "UP", red for "DOWN" and shall cancel the light when a car responds to that call. The hall push-button fixtures shall be installed at handicapped height.

8. If a landing button is operated while the doors at that landing are closing, a call shall be registered for the car. A call so registered shall be cancelled if the closing doors are reopened.
9. Car call shall be registered by passengers within the car by pressing the button corresponding to the floor to which they wish to go. Corridor calls shall be registered by pressing, the desired travel of "UP" or "DOWN" from the floor, buttons in the corridor push-button fixture. A car shall be dispatched in response to the call. The call shall be immediately cancelled when its corresponding landing is served.
10. The doors shall open automatically as the car reaches the landing and after a predetermined, field programmable time shall close and the car shall then proceed to answer any remaining car or assigned corridor calls. A protective device shall be provided on the car door which when activated shall prevent closing of the doors. The car shall become available for assignment at whatever floor the last car demand has been satisfied to either a hall or car call and park at its last call or in predetermined zone as determined by the controller system.
11. Door open time shall be field programmable so that open time for a car call is shorter than for landing call and for second passengers. If a longer time is needed for passenger entry, doors can be prevented from closing or reversing by the light ray door control, the protective leading edge on the car door, or by pressing the "door open" button in the car. Door operating time shall be in accordance to the contract requirements as listed in the specification.
12. No double door operation shall be permitted. If an "Up" traveling car has a passenger for an intermediate floor and a "Down" call is registered at that floor with no calls above car, it shall travel to floor, open door and let passenger out, then light "Down" direction arrow in the corridor position indicator, and accept waiting passenger who registered the "Down" call. Doors shall not close and reopen.
13. A two (2) position Independent Service shall be located in the main car station. When the key switch is turn to 'ON' position, the Independent service shall be in operation as follow by removing the elevator from automatic operation feature.
 - a. The elevator shall respond to car call only.
 - b. The elevator control shall not allocate hall calls to the elevator during Independent Service mode.
 - c. The car shall respond to the car call only after the cab door is closed by pressing 'Door Close' button unit it is fully closed.
 - d. The car shall respond to the car call as it approaches the floor and not in sequence, the calls were placed.

2.04 ELECTRIC SERVICE

- A. The power supply is 208 Volts, 3 phase, and 60 hertz, AC. The lighting supply is 120 volts, single phase, and 60 hertz, AC.
- B. The system voltages stated on drawings are the rated voltages at the main switchboard and are subject to the ordinary fluctuations with demand, etc. The elevator shall operate successfully with any load up to contract load at any voltage at the starter panel terminals not more than 10 percent above or below the rated system voltage, but not necessarily in accordance with the high standards of performance established herein. These standards of performance shall, however, be met when the voltage at the terminals of the controllers does not vary more than 5 percent above or below the rated system voltage.
- C. Before proceeding with the manufacture of any of the electrical equipment, the Contractor shall verify the voltage and other characteristics of electric service.

2.05 GENERAL DESIGN AND CONSTRUCTION REQUIREMENTS

- A. All elevator equipment and materials shall be new unless otherwise noted.
- B. All of the elevator equipment shall be designed, constructed, installed and adjusted to provide the best results with respect to smooth, quiet, convenient and efficient operation, durability, economy of maintenance and operation, and the highest standards of safety. The car speed between acceleration and retardation periods under all conditions and loads from no load to full load up or down shall not vary more than 5 percent from the scheduled contract speed.
- C. All elevator equipment shall conform to the best commercial standards with respect to design, construction, operating results, efficiency, etc.

2.06 MECHANICAL DESIGN REQUIREMENTS

- A. The following typical requirements shall apply to all parts of the work and are supplementary to other requirements noted under the respective headings.
- B. All bearings shall be liberally sized in accordance with the best commercial elevator usages which have proved entirely satisfactory on heavy-duty installations.
- C. All bolts used to connect moving parts, bolts, carrying hoisting stresses and all other bolts, except guide rail bolts, subject to vibration or shock shall be fitted with adequate means to prevent loosening of the nuts and bolts. Bolts transmitting important shearing stresses between machine parts shall have tight body fit in drilled holes. All bolts shall be of proper grade and hardness.
- D. All bearing and sliding surfaces of shafts, pins, bearings, bushings, guides, etc., shall be smoothly and accurately finished. The shaft shall be assembled and installed in accurate alignment and with working clearance most suitable for the load, speed, lubrication and other conditions of use. During the maintenance period, all bearings shall be regularly checked for any tendency to run hot and defects corrected in an approved manner.

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- E. Protection from moving parts: Belts, pulleys, couplings, projecting set screws, keys, and other rotating parts located so that any person can come in close proximity thereto, shall be fully enclosed or properly guarded.

2.07 ELECTRICAL DESIGN REQUIREMENTS

- A. The following typical requirements shall apply to all parts of the work and are supplementary to other requirements noted under the respective headings.
- B. The design and construction of the motors shall conform to the requirements of these specifications and to the Standards for Rotating Electrical Machinery C50 with revisions. The elevator motor specified herein and transformer shall be capable of meeting the I.E.E.E. and NEMA standard tests for maximum temperature rise of 50 degrees C. at full rated capacity for the duty specified. The motor and relay shall be reasonable free from magnetic hum, brush noise, winding noise and vibrations.
- C. Nameplates shall be provided giving the information required by the N.E.C. Characters shall be easily legible.
- D. Hall signal circuits shall not exceed 48 volts.
- E. In the machine room, hoistway, etc., the equipment shall be laid out and installed so as to allow as adequate and convenient access for maintenance as space conditions and Code will permit.

2.08 ELECTRIC WIRING METHOD

- A. All stationary wiring, except that on the backs of the control and other panels, shall be installed in galvanized conduit. Outlet boxes and fittings shall be galvanized. Split fittings shall not be used.
- B. The electrical system shall meet weatherproof requirement design for area exposed to possible water and comply with NEMA 4 and 12.
- C. Conduits shall be brought and connected to suitable approved connection boxes at all outlets, apparatus and panels. Conduits shall be neatly and systematically run. All exposed conduit and boxes shall be supported by approved and substantial straps, hangers or clamps to the structural steel, reinforced concrete or other approved supports. Riser conduits to hoistway shall be supported at each floor level. The conduits shall be of such size that the wires or cables be readily installed and replaced, if necessary. Approved strain boxes shall be installed for all vertical runs in accordance with N.E.C.

In no instance shall power wiring be in the same conduit, cable trough, etc. as control or signal wiring.

- D. Wiring shall be installed and connected in a thoroughly secure and workmanlike manner and in full accordance with governing codes. Connections of all wires larger than No. 8 shall be made with approved connectors. Metal eyelets pressed around the strands, or equivalent devices, shall be used for all connections of smaller stranded conductors. All splices shall be soldered and taped.

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- E. All terminals shall be tagged or identified in a permanent legible manner.
- F. All wiring troughs, wireways, gutters and ducts integral with equipment or separate shall be completely accessible at all points along the run.
- G. Wiring to the hoistway, door interlocks from the hoistway riser shall be Type SF-2 or equivalent as required by the code and National Electric Code.
- H. Provide ten percent spare wires between each controller, selector, hatchway junction box and starters panel; all spares to be properly tagged or otherwise identified with clear and indelible markings.

2.09 HYDRAULIC POWER UNIT

- A. The dry type power unit (oil pumping and control mechanism) shall include an oil hydraulic pump, electric motor, belt driven for pump unit, oil tank, pressure relief valve, manual lowering valve, oil control unit with flood control, oil pressure gauge assembly, muffler, pressure relief valve, drain valve, and oil tank with venting, oil level stick. Submersible type pump unit is not acceptable.
- B. The pump shall be especially designed and manufactured for oil hydraulic elevator service and shall be of the positive displacement screw type, inherently designed for steady discharge with minimum pulsations.
- C. The motor starter shall be electronic type to limit inrush of starting current of the pump unit.
- D. The pump shall be driven by a three-phase squirrel cage, induction motor designed for oil hydraulic elevator service. The motor shall have a horsepower rating that is compatible with the elevator speed and load specified.
- E. The hydraulic control system shall be designed to operate at the specified pressure plus any shock that may be encountered in any normal and emergency situation. The oil tank and cover shall be constructed of steel. The pump unit shall render the elevator inoperative if the oil level falls below a permissible minimum. The oil tank shall be equipped with removable type thermostatically controlled heater. The oil tank shall have a filter screen mounted over the suction inlet that can be readily cleaned and shall have oil a drain valve. The oil tank shall have a reserve capacity of not less than 10 gallons. Initial supply oil sufficient for proper operation of elevator shall be provided. Means for checking liquid level shall be accessible and visible without removal of cover. Provide protective vent opening. The oil storage tank shall be provided with a containment system with sufficient capacity to contain 25 percent of the total volume of the stored oil.

2.10 HYDRAULIC CONTROL SYSTEM AND OPERATING DEVICE

- A. The control system shall be compact in design and shall be capable of sustaining pressure to lift full load elevator to highest landing. The control valve shall be magnetically operated such as the oil flows through graduated opening in valve. The operation of valve control shall be positive so that the oil supply is gradually and completely closed-off when elevator is stopped.

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- B. The control unit shall consist of manifold with up-down and check valve section; a control section including solenoid valves to control up and down starting, transition from full speed to leveling speed and up and down, stops, high pressure relief valve, manual lowering valve, pressure valve and tank shut-off valve. A self-leveling system shall bring the car to stop within 1/8" inch of landing regardless of load and direction of travel. All valves shall be easily adjustable and labeled with instruction to adjust on the unit.
- C. The elevator shall be provided with an automatic leveling device. All controls shall be accessible and adjustable for maximum smoothness without requiring removal.
- D. The manual lowering valve shall be clearly labeled to indicate its function and shall permit lowering the elevator at slow speed.
- E. The pressure valve shall be located to between cylinder and hydraulic control valve unit. The loss of pressure at top of the cylinder shall activate the pressure switch to prevent operation of the lowering valve and the circuit for operation of safety condition per elevator code.
- F. The anti-creep leveling device shall be provided to maintain the car within 1" of the landing irrespective of the position of the hoist door. The system shall work as per ASME A17.1 code.
- G. An elevator controller unit with heavy-duty starting device, phase loss indicator, and hardware required to accomplish the specific operation shall be provided. All components required for the performance of the elevator shall be neatly mounted and wired in elevator controller cabinet.
- H. A protective circuit shall stop the motor and pump and return to its lowest landing in the event that the car, while traveling up does not reach the upper landing within a predetermine time interval. This circuit shall permit a normal exit from the car but prevent further operation of the elevator until the trouble has been corrected. In the event of a power and system failure, the elevator shall automatically descend to the lowest and door shall open. The equipment necessary to accomplish this requirement shall function independently of manual lowering valve specified above.
- I. A normal and an emergency terminal stopping device shall be installed and the controller switches and circuitry arranged in accordance with the requirements of the code.
- J. A stop switch shall be located in it pit and elevator cab.
- K. Means shall be provided to operate the elevator from the top of the car during adjustments, inspection, maintenance and repair. The device shall be operative when the Inspection switch is "ON" position and "up" or "down" direction button and safety button is held simultaneously with constant pressure. A stop switch and Fire Fighter's indicator with buzzer shall be provided.
- L. The controller shall be provided with reverse phase relays to prevent operation of the elevator in the event of phase reversal and phase loss relays to prevent operation of the elevator in the event of phase failure.
- M. The operating device shall include low oil protection to render the elevator inoperative if

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for any reason the oil level in the tank falls below permissible minimum. The low oil detection device shall include direct sensing of oil level, pump run-timer and other method.

2.11 HYDRAULIC PLUNGER - CYLINDER ASSEMBLY

A. Cylinder And Plunger:

1. Provide all necessary components as applicable for in-ground type hydraulic elevator. The piston and cylinder shall be designed and constructed in accordance with the applicable requirements of the ANSI/ASME A17.1 code. The cylinder unit shall be designed, of sufficient size for the total load and travel of the elevator, such as the working pressure shall not exceed 500 PSI. The cylinder made of heavy gauge seamless steel tube accurately turned and polished. The top of the cylinder incorporates a heavy steel plate fillet welded into cylinder wall. The flange designed with drip-ring around the cylinder shall be drilled and machined to accept the head flange section with babbitt bearing with double seals and packing. The cylinder head made of from 60-40 ductile iron shall be machined and drilled to match the flange of the cylinder. The head shall house the primary and secondary seal, wiper seal and method of returning weep-oil.
2. For multi-section cylinder, a thick steel sleeve with locking pin device shall be mounted in the field and then circumferential fillet welded around. The cylinder outer surface shall be provided with rust preventive coating.

The bracket shall be welded to the cylinder for supporting the elevator on pit channels. The cylinder shall be equipped with pipe connection and air bleeder. The cylinder shall be provided with bulkhead safety as per ANSI/ASME A17.1 code.

3. Plunger made of heavy seamless tubing shall be turned true and polished. The bottom of plunger shall be incorporated with a steel stop-ring welded to the plunger to prevent the plunger from leaving the cylinder. The multi piece plungers shall be joined to form a single piece by using threaded male and female coupling to assure ultimate concentricity and angular alignment.

B. Cylinder Casing:

1. The debris and any water and oil form the existing cylinder casing shall be removed in an approved manner. All removal shall be removed from the site in an approved manner. The top of the casing shall be sealed with quick setting type cement or approved material per industry standard. Provide PVC liner between cylinder and casing liner. The water light flange shall be mounted to existing casing. The flange shall be sealed all around to provide water tight condition. The contractor shall submit the detail for approval.

2.12 HYDRAULIC OIL

- A. The hydraulic oil shall be biodegradable and of the grade recommended by the manufacture of hydraulic system. The oil shall be suitable to all components including seals & gasket of valve unit, pump unit, and cylinder piston assembly.

A tag of recommended type oil for the system shall be mounted on the oil tank.

Oil tank and hydraulic system shall be provided with hydraulic oil of suitable quantity to lift the elevator at top floor and with extra minimum 10 gallons of spare hydraulic oil in the oil tank. The tank shall be calibrated for minimum and maximum oil level for the elevator.

2.13 HYDRAULIC PIPES AND PIPE FITTINGS

- A. Provide all necessary piping connection between the hydraulic cylinder and hydraulic pump unit. The hydraulic line shall be sized to accommodate required oil flow and system operating pressure as required meeting performance requirements. The oil lines shall be supported by approved brackets at spacing not more than seismic requirements of the elevator code and at least two means of supports between fittings. Pipeline stands and support shall be securely fastened to the building structure. The oil line shall be routed so as to minimize the number of bends, offsets, and elbows.
- B. When piping passes through wall, sleeve shall be provided of the size with minimum 1 inch clearance between pipe and sleeve. The sleeve shall be fitted with fiberglass packing and seal both ends with fire proof, no-hardening mastic of ¼ inches minimum thickness.
- C. All piping shall be seamless steel not less than schedule 40 and complying ASTM 53 grade B. All piping shall be threaded.
- D. A quick acting gate type shut-off valve shall be provided in the machine room near pump unit.

2.14 OVERSPEED VALVE (RUPTURE VALVE)

- A. Operation:

The valve designed to stop the elevator in the event of an over-speed condition caused by a broken supply line or an abnormally high rate of flow between over-speed valve and power unit. The rupture valve shall be installed and adjusted per manufacturer instruction, the copy of which shall be submitted to the owner and consultant. The rupture valve shall be tested in presence of the consultant.
- B. Location:

The valve shall be located next to cylinder inlet.

2.15 SCAVENGER PUMP

- A. Provide a positive displacement, rotary vane type oil return scavenger pump for the elevator. The pump shall be capable of pumping against a discharge pressure of 200 psi and shall have a capacity of 90 gallons per hour.

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- B. The pump shall be self-priming and self-lubricating. The pump shall be equipped with a check valve and a 200 microns mesh screen strainer. The pump housing shall be constructed of brass with stainless steel internal parts. The scavenger pump tank shall be furnished with a clear Lexan lid. It shall be provided with a float to prevent operation of the pump if the pit is flooded.
- C. Mount scavenger pump off the pit floor and connect it to the jack unit and the oil tank with plastic tubing. The plastic tubing shall be attached to the hydraulic piping for support.

2.16 CONTROLLER – (NON- PROPRIETARY)

- A. Provide the elevator installation with microprocessor, solid-state controller. The elevator control panel shall be made of heavy gauge steel metal painted with primer and two coat of final paint. The control panel shall be provided with center opening two hinged door panels and locking device. The controller shall be provided with ample ventilation to remove heat from the controller. The heat producing electrical components can be in one section of the controller or outside the controller with proper cover, so as the other circuit and electrical components are not affected by undue high temperature. The controller shall be located such as pump unit can be seen and meet the clear space in front and back of controller as per electrical code.
- B. All connections of wires to terminals from external circuits shall be made with soldered lugs, or metal eyelet compression type lugs, all in accordance with NEMA Standards. All contacts on relays and switches for all motor control circuits shall be electronic type non-arcing device. All components shall be mounted on the panel as required by this Contract, giving a neat appearance and designed for maximum efficiency in maintenance. All wiring on panels shall be neatly formed, cleared in place, equivalent to high grade back-of-board wiring in switchboard practice.
- C. The elevator controller contains a Computer Board, an I/O Board, and a Relay Interface Board in addition to the Power Supply, Control Transformer, and Starter.

The control board shall be equipped with plainly marked indicators including call registration and burn-out lamps, car position and direction, computer driver outputs and I/O, elevator status and mode of operation display, relay indicators, etc. A liquid crystal display (LCD) displays elevator status, mode of operation, relay indicators, etc. in plain English.

All available options or parameters shall be field programmable, without need for any external device or knowledge of any programming languages. Programmable options and parameters shall be stored in nonvolatile memory. As a minimum, there shall be a 32-character alphanumeric display used for programming and diagnostics. Programmable parameters and options shall include, but are not limited to, the following.

- 1. Number of Stops/Openings Served.
- 2. Single Automatic Push Button.
- 3. Simplex Selective Collective.
- 4. Programmable Fire Code Options.
- 5. Fire Floors (Main, Alternates).

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6. Floor Encoding (Absolute PI).
7. Digital PIs.
8. Programmable Door Times.
9. Programmable Motor Limit Timer.
10. Nudging.
11. External Car Shutdown Input (e.g., Rescuvator).
12. External Low Oil Sensor Input.
13. External Viscosity Control Input.
14. Parking Floor.
15. Hall or Car Gong Selection.
16. Independent Service Feature

The dispatching algorithm for assigning hall calls shall be real time based on estimated time of arrival (ETA). In calculating the estimated time of arrival for the elevator, the dispatcher shall consider, but not be limited to, the location of the elevator, the direction of travel, the existing hall call and car call demands, the door time, flight time, lobby removal time penalty and coincidence calls.

A motor limit timer function shall be provided which, in the event the pump motor is energized longer than a predetermined time, shall cause the car to descend to the lowest landing, park, open the doors automatically, and then close them. Car calls shall be canceled and the car taken out of service automatically. Operation may be restored by cycling the main line disconnect switch or putting the car on access or inspection operation. Door reopening devices shall remain operative.

A valve limit timer shall be provided which shall automatically cut off current to the down valve solenoids if they have been energized longer than a predetermined time. The car calls shall then be canceled and the car taken out of service automatically. Operation may be restored by cycling the main line disconnect switch or putting the car on access or inspection operation. Door reopening devices shall remain operative.

Hydraulic Controllers shall be provided with a battery lowering device pre-wired, pre-tested and integrated into the standard enclosure.

Viscosity control (valve design must allow the use of this option) shall cause the car to accomplish the following operation. If a temperature sensor determines the oil is too cold, and if there are no calls registered, the car shall go to the bottom landing and, as long as the doors are closed, the pump motor shall run without the valve coils energized to circulate and heat the oil to the desired temperature. In the event that the temperature sensor fails, a timer shall prevent continuous running of the pump motor.

- B. Cartridge fuse, five (5) amperes or less, installed for the protection of the direct current side for rectifier shall be "midget" type. These fuses shall be non-renewable, rated at 250V A.C., and in sizes of 1 or 3A. They shall meet requirements of "UL 198 - Miscellaneous Cartridge Fuses".

2.17 EMERGENCY FIRE FIGHTERS' SYSTEM

- A. The controller system shall be wired in such a manner to affect the operation as herein after described in compliance with New York State and local codes.

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- B. Furnish and install three (3) position keyed switch and illuminating fire emblems in corridor at main level. The cover plate of the key switch shall be clearly identified in red lettering as "RESET", "OFF", and "ON" with "OFF" position as center position (or as required by the City of Yonkers). The key shall be removable from any position.
- C. Emergency Fire Fighters' Phase II key switch shall be provided in the elevator car operating station.
- D. Once emergency terminal return has been initiated by activation by placing the Fire Fighters' key switch, located in Main Lobby, to "ON" position, the following operation shall go into effect. The feature described herein below is guide line, but not limited to meet the ASME A17.1 code.
 - 1. If traveling away from the Fire Recall floor, shall stop at the next landing floor without opening its doors, reverse direction and proceeds non-stop to the Fire Recall floor lobby. If traveling toward the Fire Recall floor, shall continue non-stop to the Fire Recall floor.
 - 2. Door reopening devices for power-operated doors, which may be affected by smoke or heat so as to prevent door closure, shall be rendered inoperative.
 - 3. Upon return to the Recall Floor lobby, the car and hoistway doors shall open and remain open. The Fire Fighters' indicating lights in elevator shall remain on.
 - 4. Emergency stop switch shall be rendered inoperative as the elevator start moving from landing. The inoperative emergency stop switch during fire recall shall remain inoperative during phase I operation.
 - 5. All car and corridor call buttons and all door opening and closing buttons shall be rendered inoperative, and all call register and directional lantern shall be cancelled and remain inoperative. Position indicator shall remain in service.
 - 6. The car shall be provided with visual and audible signal system that shall be activated to alert the passenger that car is returning nonstop to the designated floor. The signal shall remain active until the car has return to the designated floor.
- E. Furnish and install, in the elevator cab, a three-position keyed switch marked "OFF", "HOLD" and "ON" (in this order) with the "HOLD" position as center position and labeled "FIRE OPERATION". This key switch shall become effective only when at the designated level phase I is in the "ON" position has been activated and the car has returned to the designated floor by phase I of the Fire Fighters' Service.

The key shall be removable in "HOLD" or "OFF" position. The "OFF", "HOLD" and "ON" positions shall not change the operating until the car is at the Main landing with door open.

The elevator at the Fire Recall level during phase I of Fire Fighters' activation shall be available for phase II of Fire Fighters' by turning the Fire key switch in the cab to "ON" position and overriding all keyed switches and programming. During phase II of Fire Fighters System, the elevator shall operate as follows.

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1. Car and hoistway door operation shall subject to momentary pressure of the "DOOR OPEN" button. However, if the "DOOR OPEN" button has been released before the doors are completely open, they shall automatically re-close.
 2. Provision shall be made to all operative that, after having made a floor selection change such selection if so desires, by pressing a "CANCEL" button. When activated, all registered calls shall be cancelled and traveling car shall stop at or before the next available landing.
 3. The opened car and hoist doors shall be closed by momentary pressure on the "DOOR CLOSE" button.
 4. All corridor call buttons and directional lantern shall remain inoperative.
 5. The elevator shall only be removed from in car Fire Fighters' Service operation by moving the Emergency Fire key switch in the car to "OFF" position and the elevator is at the Main Recall floor.
- E. Provide a visual signal the elevator that will indicate when Emergency Fire Fighters' recall is in effect.
- F. Provide a fire recall audible signal which will sound in the cab when Emergency Fire Fighters' recall is in effect. Audible signal shall stop sounding when the elevator returns to the Main Lobby and the doors open.
- G. The key switches and instructions shall be identified with appropriate designations in "Red" lettering.
- H. All cover plates for such switches & buttons shall bear the lettering "FIRE RECALL" and the operating instruction as per ASME A17.1.
- I. The Fire Fighters' Service key switch shall be operable by city Fire Department standard keys only.
- J. "CALL CANCEL" button and vandal resistant visual Fire signal shall be adjacent to the Fire key switch in the elevator cab.
- K. When the phase II of Fire Fighters' switch, located in elevator cab, is in the "HOLD" position, the elevator shall be on Fire Fighters' phase II operation. The car shall remain at the landing with its doors open. The door close buttons shall be inoperative.
- L. Fire Fighters' key switch shall be in a car-operating station.
- M. All wiring shall be high temperature fireproof type. Wiring shall run in hoistway duct and steel pipe in the approved manner to meet the electrical code.
- N. Demonstrate the Fire Fighters' system test in presence of the owner or authorized representative.
- O. The Fire Service Key shall be #2642.

2.18 TRAVELING CABLES

- A. Provide traveling conductor cables which shall be an approved assembly of maximum flexibility. The construction of the cables shall have been successfully used in comparable heavy duty installations, without developing any defects requiring or indicating abnormal maintenance. The complete cable shall be sufficiently flexible to readily adapt itself to all changes in the position of the car and hang straight and without twist. The cable shall not be of the type requiring pre-hanging. The cables shall bend 360 degrees with an inside radius of one foot without any permanent set and cracking of the outer covering. The open loop shall not twist upon itself. All traveling cables shall be provided with steel or Kevlar strands and be free of all jute interstice fillers. Provide separate four (4) twisted pairs of shielded wires of polyester Mylar wrap with 100% coverage and a drain wire for telephone communication system for the car. Car lighting, receptacles and fans shall be provided on an individual circuit. Provide separate coaxial, specially designed for video system, cable for CCTV.
- B. Traveling conductor cables shall terminate in terminal boxes securely supported at the halfway in the hoistway and on the bottom of the car platform. These boxes shall have approved connection strips for making all conductor connections and approved strain devices or installation blocks for connecting the steel or Kevlar supporting strands and relieving the conductors of all strain. These boxes shall have screwed on or bolted covers of material and thickness as specified for the boxes. The terminals shall be marked in a legible permanent manner. Boxes shall be not less than No. 10 USSG steel or galvanized cast iron boxes as approved. Provide additional cab wiring and conduit as required.
- C. The swing of the traveling conductor cables shall be checked when the elevator is running, and all shields, screens and pads necessary to prevent chafing of traveling cable insulation shall be installed. The natural loop in the traveling cables shall not be less than 15 inches unless otherwise specially approved by the Owner. The cable shall be of a type that is torque free thereby eliminating pre-hanging, twisting and cross over. Install beam pads as necessary to prevent chafing of trail cable insulation.
- D. The traveling conductor cables and the corresponding groups of conductors connecting these cables to the control and signal panels and to the car operating panel shall each contain spare conductors equal in number to not less than 20 percent of the number of working conductors of the same size and type. Not less than two spare conductors shall be provided in each cable and corresponding group of wires containing less than five working conductors. Separate cables shall be provided for lighting, signaling, control, and safety switches. Include four (4) pairs of shielded wire for each car for communications. Car lighting, receptacles and fans shall be provided on an individual circuit.
- E. Multiple traveling conductor cables may be installed in single installation blocks provided 3" to 4" separation between cables at bottom of loops are used.

2.19 CAR GUIDES RAILS AND BRACKET

- A. The existing guide rails, rail bracket, rail clips and rail hardware shall be rained and reconditioned after cleaning, removing rust and painting. The rail shall be plumbed and

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joint shall be filed smooth. All bolts shall be torqued as per manufacturer's standard. Provide any required section of the guide rail and hardware.

- B. Steel guide rails, rail bracket, rail clips and bracket as per ASME A17.1 code. The rail shall be plumbed and joint shall be filed smooth. All bolts shall be torqued as per manufacturer's standard.
- C. Provide additional rail reinforcement, rail stiffeners, brackets and clips as required.
- D. The guide rail and bracket shall meet seismic criteria.

2.20 SELECTOR AND LEVELING

- A. Provide a magnetically operated selector and leveling system shall be located on top of the car. The operation of the selector shall be to govern function such as direction of travel, automatic stopping, and leveling at landings. The selector shall have a correction feature at least once in each direction of travel and at landings.
- B. The selector tape shall run from top to bottom of the hoistway with spring tension compensation. The tape shall be metallic type with weather resistant coating. The magnet sensor shall be firmly attached to the tape.
- C. The reader head located on top of the car shall be provided with low friction sliding gibs at both ends.

2.21 NORMAL STOPPING DEVICES

- A. The upper and lower terminal stopping devices shall be provided in the hoistway to automatically stop the car from any speed attained in normal operation within the top and bottom over-travels, independent of the operating devices, final terminal stopping devices and buffers.
- B. All normal and slowdown limits shall be individually rail mounted and independently adjustable. Mounting of switches on trough shall not be permitted. The limit switches shall be adjusted and shall be through bolted to rail at final location. The enclosure of the terminal switches shall meet NEMA 4.

2.22 FINAL LIMIT SWITCHES

- A. The terminal stopping devices for the elevator shall be provided to automatically stop the car within the top clearance and bottom over-travel independently of the operation of the normal terminal stopping devices. The final terminal devices, when operated, shall prevent further normal operation.
- B. Final limit switches shall be through-bolted after the conclusion of the final acceptance tests.
- C. All final limits shall be individually rail mounted and independently adjustable. The enclosure of the terminal switches shall meet NEMA 4.

2.23 BUFFER AND FOOTING STEEL

- A. Provide car buffers with footing steel of wide surface area on the floor for load distribution.
- B. The elevator shall be provided with spring buffer per ASME A17.1.
- C. The buffers shall have successfully passed engineering tests, and shall be certified to by Bureau of Standards, or an approved testing laboratory. Such certification shall cover range of speed and load requirements for this installation. All metal plate marked with name of manufacturer, type, stroke in inches and range of speed and load certified, shall be provided to all buffers.
- D. The footing steel shall be applied with primer and two (2) coat of rust inhibitive paint.

2.24 ELECTRICAL INTERLOCKS AND DOOR CONTACTS

- A. The door at each operable hoistway landing shall be provided with approved type hoistway door interlocks of the hoistway unit system type, arranged for and equipped with service and emergency keys as required by Code.
- B. The door of the elevator car shall be equipped with approved electric contacts conforming to the requirements of the Code.
- C. If two independent electrical circuits are used in the same door interlock box, the circuits shall be so arranged that, in case of a short between the two circuits, the operating fuses on the control board shall blow immediately.

2.25 CAR DOOR OPERATOR

- A. The elevator shall be equipped with an approved variable frequency belt-driven unit to open and close the car and hoistway doors simultaneously when the car is at the landing. The door operator control shall be equipped with a current sensing circuit in both the open and close directions which will provides feedback to the speed control circuit. Passenger car door and hoistway door of the elevator at the landing shall be opened simultaneously. When on automatic operation, door-closing speed shall be adjustable, and shall not exceed 25 pounds torque. Doors shall be cushioned or checked at both limits of travel and shall operate without slamming. Reversal of the doors while the elevator is being operated on automatic operation shall be accomplished by pressing the "Door Open" button.
 - 1. The operator shall be so arranged that in case of interruption or failure of electric power for any cause, it will readily permit manual emergency opening of both the car and hoistway doors in the landing zone only. After the doors have been opened manually, it shall be possible to continue manual operation. The hoistway doors shall continue to lock automatically when closed manually.
 - 2. The door operating mechanism, including motor, switch and worm gearing, shall be of rugged and ample design and construction to operate the size and type of the door shown and specified. They shall be of size, make and type which have been successfully used for comparable installations, and have proved entirely

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adequate and to operate with a minimum of maintenance expense. Provide switch on operator to disconnect power from the operator to allow adjustments to be made.

3. All levers and cams operating the door shall be constructed with heavy malleable castings and steel members, and all their pivot points and bearings shall be of ample size.
 4. Provide separate adjustable timers to establish passenger transfer time for car stop and hall stop.
- B. The infrared electric door control devices consisting of multi light rays shall be provided and the unit shall be securely and rigidly mounted on the car between the car and hoistway doors. The set of multi infrared shall cover the minimum six (6) feet of the opening height. The device shall be such that certain set of ray disability among more than 40 sets of ray unit, the device gives indication on unit for repair/replacement. The unit shall be vandal resistance and securely mounted to cab door such as the safety-edge unit shall not interfere with the operation. As passengers enter or leave the car, the light beams shall be interrupted.
1. These infrared rays door control units are to be provided with the necessary additional circuitry to provide regulation in the following manner:
 - a. Upon the initial opening of the doors, they will remain open for a predetermined adjustable (3 to 8 seconds) time, which shall be sufficient to allow a waiting passenger in the hall to enter the car, or passenger in the rear of the car, when crowded, to make his exit.
 - b. Upon the interruption of the light beam by the first person entering or leaving the car, the door re-closing timer will be transferred automatically to a much shorter predetermined adjustable time of between 1 to 4 seconds time interval. By this means, the doors shall close immediately after the last person passes through the doors.
 - c. If the doors are re-closing after first activation of reopening device and any of the light beams should be interrupted, the doors shall automatically stop, re-open and shall start re-closing of the doors after the short predetermined time interval.
 - d. Bypass protective timing circuitry and buzzer to be automatically activated in the event of infrared unit total failure or interruption of infrared light beam, by smoke or other means.
 - e. All timing functions shall be programmable.
 - f. Car Door Nudging shall be initiated when the car has a direction to run, but the doors are held open for a predetermined time by the constant interruption of the infrared light beam. At the end of the predetermined time, a distinctive buzzer shall sound, the infrared door control shall become inoperative and the doors start to close at a reduced speed. The door open button shall remain operative. If the door open button is

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pressed, the doors will reopen but will close again, when the button is released. When the doors get completely closed, the buzzer goes off and infrared ray door control shall be restored. Once entrance is cleared, doors resume normal closing speed.

2.26 ELEVATOR FIXTURES

- A. All hall and car fixture faceplate shall be 1/8 inch thick.
- B. The hall and cab fixtures shall be #4 finish stainless steel. Borders and Handicap symbols shall be provided.
- C. Fastenings for all exposed fixtures shall be secured with tamperproof Spanner head screws in the same material and finish as the fixture it is securing.
- D. All hall and car call buttons shall be one inch (1") in diameter with a jewel type illuminative indicator in center and made of the same finish as faceplate. The button shall be surrounded by a translucent halo (1-3/8 inch diameter) and shall illuminate in with L.E.D. lamps evenly spaced behind the halo. The button shall be vandal resistant type with restrictive movement of button. All hall and car call buttons being provided shall be of the call register type having a low D.C. voltage power supply not to exceed 24 volts. Pressure on a button shall illuminate the button (Car Buttons to illuminate green and Hall Buttons to illuminated red for "down" and green for "up") to indicate that a call in the desired direction has been registered.
- E. The contractor shall provide opening size and location to install all corridor fixtures.
- F. Contractor to provide back boxes, grouting etc., for all fixtures.

2.27 CORRIDOR PUSH-BUTTON

- A. Provide corridor hall button fixtures with "UP" and "DOWN" buttons, at the intermediate landings, and single buttons at the terminal landings. All buttons shall be of the same finish as faceplate, as hereinbefore specified.
- B. Provide hall button fixtures at location to meet handicapped code and as per drawings. The Lobby Floor fixture shall include Fire Service key switch and light jewel. Fixture faceplates shall be 1/8 inch thick with material and finish as hereinbefore specified.

2.28 CORRIDOR POSITION INDICATOR

Provide corridor position indicator in each button station.

- A. The position indicator shall of the L.E.D. type with characters of minimum 1" high with corresponding floor characters and car directional travel indicators. The up travel indicator shall illuminate 'green' while the down direction travel indicator shall illuminate 'red'.

2.29 PIT STOP SWITCH

- A. Provide pit switch for the elevator in the elevator pit to prevent operation of the elevator

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when the switch is in "OFF" position. The pit switch shall be located 1"-6" above the bottom landing near the pit ladder and next to light switch.

- B. The pit stop switch shall weather proof and provided with a protection guard to prevent accidental operation of the switch.

2.30 COMMUNICATION SYSTEM

- A. The Contractor shall furnish and install an auto-dial telephone communication system with speakerphone and complete wiring. The system is described in the following and is referred to as "Cab-communication System". The device located in the elevator cab shall communicate with a programmed phone number assigned by the owner, a location in the lobby and the elevator machine room.

The Contractor shall provide wiring from cab communication with junction box in the machine room and shall make final connection to the communication system.

- B. A speakerphone installed behind the cab operating station shall be auto dial type emergency telephone. The cab-communication system shall have "Push" button to activate the telephone and a led indicator. Provide sign of telephone and engraved letter "EMERGENCY PHONE" and "PUSH TO TALK" under the push button.
- C. The system shall be capable of programming two phone numbers. When cab-communication is established by pressing "Push" button in cab, the phone dials the primary program number which has been programmed into memory M1. If there is a busy signal or if the call is not answered in six rings, the phone hangs up, goes off hook, and dials the secondary program number which has been programmed into memory M2. The speakerphone can differentiate between ringing, a busy signal, and an answered call. The speakerphone toggles between the two program numbers until the call is answered. The speakerphone disconnects automatically when the called number hangs up phone.
- D. The system shall be equipped with Back-up power supply to provide full operation of phone for four hours in the event A/C power failure.
- E. Red LED is lighted when the phone is activated and flashes when the call has been answered. LED goes out when the call is disconnected.
- F. The cab-communication system shall be Rath Microtech, Janus or equivalent.
- G. Provide additional communications between the fire command station, motor room and elevator cab.
- H. Provide line monitoring with an audible and visual signal located at the main floor hall button station.

2.31 HANDICAPPED PROVISION

- A. Car operating panels shall be mounted so that the dimension from the floor to the centerline of the highest button does not exceed 48 inches, and the dimension from the floor to the centerline of the emergency buttons does not exceed 35 inches.

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- B. The cab door shall be provided with non-touch type device to reopen the door if passenger is entering or leaving the cab while the door is closing.
- C. Provide floor designations with Braille and symbol per code, on both side jambs of the hoistway entrances, for the elevator visible from within the car and the elevator lobby at a height of 60 inches above the floor. Designations shall be a minimum of 2-1/2 inches high and shall be as approved by the owner.
- D. The cab shall be provided with emergency cab communication system suitable for handicap person.
- E. The travel directional gong shall sound once for the Up direction and twice for the Down direction.
- F. Provide an audible signal in the elevator cab and which shall sound to identify the passing a floor during elevator travel.
- G. Provide floor markings with Braille as required by handicap code adjacent to elevator car control button. The floor marking shall be integral with the faceplates and applied plates will be unacceptable.
- H. The centerline of hall buttons shall be located 3'-6", above the finished floor.

2.32 TOP OF CAR OPERATING STATION

- A. Provide the elevator with an operating device, mounted to the crosshead which will permit slow speed car operation for purposes of adjustment, maintenance and repair. This control shall consist of five buttons listed "UP", "DOWN", "RUN", "EMERGENCY STOP SWITCH" (red in color), an "INSPECTION SWITCH" and a light fixture with bulb protection enclosure and switch. The inspection station shall be provided with fire fighters' buzzer and indicator light.

2.33 DOOR HANGER, TRACK, GIBS AND CLOSER

- A. Hoistway Door Hanger, Track, Gibs and closer.

The elevator hoistway sliding door panel shall be equipped with 2-point suspension sheave, hanger and track complete.
- B. Sheave shall be of hardened steel or composition approximately 2-1/4 inches in diameter medium speed operator. The sheave shall have ball bearing properly sealed to retain grease lubrication, and shall be mounted in housing attached to the door panel by two cap screws. Each sheave shall be equipped with adjustable ball bearing or approved sleeve bearing to take the up-thrust of the door. Sheave shall be quiet running.
- C. Track shall be cold drawn high carbon steel of heavy section, with surface shaped to conform to the tread of sheave and roller. Drill and tap the entrance frame to secure the track with flat head machine screw to be mounted from hoistway side. Provide strut angle from floor to floor securely mounted to the building structure. The track shall be bolted to the strut angle.

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- D. Suitable means shall be provided to lubricate the tracks of the sheave.
- E. A lever arm mechanism or approved equal arrangement shall be used to transmit motion from one door panel to the other.
- F. Provide floor mounted door spring closers at each entrance.
- G. Provide two (2) removable nylon or Teflon gibs with fire tabs on the underside of each hoistway door panel.
- H. Provide a # 14 gauge minimum of 8" long zinc plated vandal resistant "Z" bracket at bottom of each hoist door located between door gibs. The bottom leg of "Z" bracket shall run in the sill groove. The "Z" bracket shall be mounted with minimum six counter shrunk screw on the back side of the hoist door.

2.34 HOISTWAY ENTRANCE

- A. The existing hoistway entrance frames and door panels shall be reused and reconditioned by removing existing paint to bare metal and provide primer and final two coat of approved paint. The color of the entrance frame shall be as selected and approved by the owner.

The floor marking plate with Braille and contrast raised board of black color shall be attached to on both sides of frame with epoxy and rivets at all four corners. The floor-marking letter shall be of raised surface and minimum 4" size painted in contrast black color. The floor plate shall be located on both sides of the entrance frame at 60 inches above finish floor.

- B. Bottom of door shall be provided with removable laminated phenolic guide and 6" long 14 gauge galvanized steel "Z" bracket which run on the sill slot. Guide shall be designed to replace without removing door panel. The door shall be reinforced and provided with keyway as required for operating mechanism.

Panel shall reinforced and be provided with hanger, track, gib, sill mounted closer, hanger housing, adapter, hanger housing, cover, strike piece, fascia and strut at each floor and miscellaneous hardware as required for power operation.

The door panel shall be provided with non-removable type minimum 4" size floor character on upper part of the hoistway side of the door.

- C. The following general requirements shall be required for the elevator hoistway entrance:
 - 1. All parts and appurtenances of the elevator hoistway entrances shall conform in every way to the requirements to the Safety Code for Elevators (ASME A17.1) including all other codes and provisions of authorities having jurisdiction.
 - 2. The elevator hoistway entrance doors and frames shall be of the heights and widths as existing and indicated on the contract drawings.
 - 3. Welding, except where tack or other type welding is required by the contract drawings, shall be continuous along the entire line of contact. Welds on exposed finished surfaces shall be ground smooth and shall be finished flush with adjacent

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surfaces.

4. All joint, seam and intersection of ornamental covering work and of sheet metal work shall be welded in an approved manner, and shall be ground smooth and finished flush with adjacent surface so as to provide invisible joint, seam, and intersection on face side. All welding work shall be completed prior to applying the required finishes.
- D. Door and related work shall be constructed and installed in such a manner as to properly receive the Work as may be required to be furnished and installed into the Work, including the door operation, hanger and interlock, and other accessory item.
- E. Sight guard shall be No. 16 USSG carbon steel painted with same as door and shall be provided to the hoist door. Sight guard shall be installed as to reduce to a minimum the clearance between hoistway and car door so as to conceal the hoistway and car beyond the opening.
- F. Structural steel angles of adequate size shall be furnished to support the hanger housing and the door closer. The angles shall be continuous, one piece and securely bolted to the sill and building structure above.
- G. Hanger support and adapter shall be 3/16 inch thick steel formed sections securely bolted to the strut angle and closer support angle.
- H. Hanger cover-plate shall be made of baked No. 14 USSG steel and shall extend the full travel of the door. Cover shall be made in sections for convenient access when servicing the hanger. The section above the door openings shall be removable from within the elevator car.
- I. Fascia plate shall be No. 14 USSG steel, reinforced as necessary to insure a flat even surface throughout, and shall be securely fastened to hanger housing and sill above. They shall extend 6 inches beyond door opening on each side.
- J. Toe guard shall be of No. 14 USSG steel and shall be installed at the lowest landing, one foot wider than the door opening and gradually beveled to the wall. Straight portion of the guard shall equal the distance from the bottom landing to the top of the buffer when fully compressed.
- K. Dust cover shall be of No. 14 USSG steel, shall be fastened to the top most header and gradually beveled to the wall. Dust cover shall extend the full travel of the door.
- L. Rubber bumper mounted on bracket shall be provided at the limit of travel of the door, located as required for the operator mechanism.
- M. The fascia plate, dust cover and toe plate, and any other ferrous metal parts shall be thoroughly cleaned off oil, grease and other foreign substances in preparation for finishing. After fabrication, all items shall be cleaned, given a mineral filler coat and primed with a dip coat of rust resisting metal primer, each coat baked on and rubbed smooth on exposed surface. As an alternate, all steel shall be hot dip galvanized and provide coat of rust preventive paint.

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- N. Work damaged in transit shall not be set but shall be replaced with undamaged material without additional compensation beyond the contract amount.

2.35 ELEVATOR IDENTIFICATION PLATES

- A. Provide #12 gauge steel plates permanently secured to buffer, controller, machine room and disconnect switch etc., which shall identify the city elevator identification number, manufacturer's data, model and all other related information with 1 inch high engraved numbers filled with black paint.

2.36 CAR PLATFORM

- A. The new platform shall be constructed of a structural steel frame filled with two layers of marine plywood. The underside of the platform shall be covered with baked enamel painted, galvanized sheet steel to meet the fire rating as per code.
- B. All exposed metal shall be factory painted with a minimum of one primer coat and two coats of rust inhibiting paint.

2.37 CAR GUIDE ASSEMBLY

- A. The elevator car shall be provided with roller type guide assemblies. The car roller shall be of an approved type consisting of three wheels tire with a durable resilient material, each rotating on ball bearings having sealed-in lubrication, all assemblies on a substantial steel metal base, and so mounted as to provide continuous contact of all wheels with the corresponding rail surfaces under all conditions of loading and operation. The steels shall run on three finished rail surfaces.
- B. The roller guides shall be properly secured at top and bottom on the car sling. The roller guides shall run on dry guide rails. Sheet metal guards shall be provided to protect wheels on top of car. Roller wheels for the car shall be not less than six (6) inches in diameter.

2.38 ELEVATOR CAR ENCLOSURE

- A. The elevator shall be provided with door contact, clutch, hanger, sheave not less than 3-1/8 inch riding surface diameter, with adjustable up-thrust roller of metal design, running on a polished steel track; sheave roller to be of composition type with no flat spot. Metal stiffeners shall be installed to eliminate excessive movement in the door and hanger assembly.

The door panel shall be not less than 1" thick hollow construction and made of not less than 16 USSG stainless steel with # 4 finish and shall be reinforced by formed stainless steel sections running vertical for full height of door panel, spaced not more than 8" apart, designed to hold front and rear sheet metal of the door together. Top and bottom of door closed with formed 'U' channel, not less than 16 USSG stainless steel #4 finish and welded to door panel. The door panel shall be reinforced as required for door operator linkage, interlocks, etc. The door panel shall be filled with fiber-glass insulation. The door panel shall be provided with door gib to run in the sill groove with minimum clearance. The guide mounting shall permit each replacement without removing the door from the hanger.

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- B. Provide removable nylon or Teflon gib with fire tab on the underside of the car door panel.
- C. The car platform shall be provided with nickel-silver sills.
- D. The elevator Contractor shall be responsible to hold to the dimension as indicated on the approved shop drawing detail. The car enclosure shall be constructed to fit the sling, platform and crosshead. The cab shall be in accordance with the contract drawing and as specified herein. The cab is to be manufactured in a first class workmanship manner, and shall be so constructed as to be free of squeak and noise.

- E. Provide a car enclosure complete, in accordance with following.

- 1. The side and rear cab enclosure walls shall be made of constructed $\frac{3}{4}$ inches thick flake wood panel applied with thick plastic lamination on the cab side surface and painted with fire retarded paint on the hoistway side of the enclosure. The plastic lamination shall be applied by a special lamination machine in controlled environmental condition and with manufacturer's recommended adhesive suitable for wood surface. The cab panel shall be provided with edging all sides of the panel. The edging and insert for cab panel shall be # 4 finish stainless steel. Laminate to be selected by owner.

The entrance column, door edge, front reveal panel and astragal shall be constructed of # 4 finish 14 USSG stainless steel.

Provide concealed cab vent in the base panel. Provide necessary cutouts for the required fixtures. Provide with minimum $\frac{3}{8}$ inches diameter platform bolts for fastening all panels and entrance columns to the car platform. The Contractor shall submit color chart, sample of cab wall, and other as required by the owner and Architect.

- 2. Ceiling: The ceiling shall be constructed of carbon steel of minimum 12 USSG and capable of sustaining a 300 lbs load on 4 square feet area. The cab side surface of the ceiling shall be provided with flake wood secured to metal ceiling panel. The plastic lamination shall be applied by the special lamination machine in controlled environmental condition and with manufacturer's recommended adhesive suitable for wood surface. The ceiling shall be provided with a hinged emergency exit of ample size. The ceiling shall be securely anchored to the enclosure structure. There shall be an emergency exit switch.
- 3. Cab Lighting: Provide recessed type fluorescent light fixture as shown on the contract cab drawing. Provide minimum two fluorescent light fixtures in the cab. The light fixture shall be with two bulbs and provided with quick start balustrade.
- 4. Handrail: Provide 1 $\frac{1}{2}$ inch diameter round bar of # 4 finish stainless steel. The handrail shall have bend ends towards cab wall and mounted on the rear and side walls. The handrail mounting block shall be replaceable through bolted to cab panel.
- 5. Rubber Bumpers: Provide bumper on the car door hanger tracks instead of on

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the car door strike post. After their final adjustment, they shall be permanently pinned in place.

6. Top Emergency exit shall be provided in the ceiling and opening upward clear of crosshead, other structure, and car door operator. Emergency exit cover in the ceiling shall be hinged and held in place by non-removable fastening device, and shall be opened from top of car only. Provide a mechanical switch designed to stop the elevator when the door is opened. Provide top exit guard..
7. Ventilation for the car enclosures shall be provided with a two-speed type exhaust ventilating blower unit mounted in the car ceiling. The ventilation blower shall be suitably isolated from cab ceiling, and shall distribute not less than 600 cubic feet per minute (free delivery) at top speed. The switch for the operation of the exhaust unit shall be provided in the car station service cabinet.
8. The elevator car enclosure shall be provided with an emergency lighting system. Emergency light shall automatically turn on instantaneously as normal lighting power fails. The emergency backup power shall be capable of maintaining emergency light for four hours, operate alarm bell and run exhaust fan for minimum of one hour.

F. Cab Flooring:

Provide cab flooring to the platform:

- A. Provide the elevator with sub flooring to consist of a minimum of two layers of marine plywood of tongue and groove hardwood.
- B. The cab shall be provided with finish floor of thick one vinyl sheet and securely installed per manufacturer's guidelines.

The flooring shall be as selected by the owner.

G. Pad Buttons & Protection Pads:

Pad buttons and vinyl quilted vinyl pads shall be provided. Pads shall be of a size for complete protection of the sides, rear and front return panels. Provide stainless steel pad buttons. Provide with one (1) set of vandal proof nylon reinforced, quilted pads of a size to afford complete protection of all sides for the aforesaid cab. The outer skin of the pad on both sides shall be 3 ply poly scrim material not less than 12 oz. per square foot. Furnish heavy duty No. 6 spur grommets. Submit sample for approval.

2.39 CAR OPERATING DEVICE

- A. Car operating device for the elevator shall consist of a car operating panel shall include a series of push buttons numbered to correspond to the floor served, alarm button, a set of "Door Open" and "Door Close" buttons, Fire Service key switch, fire activation signal, call cancel button for Fire Fighters' service, stop switch, independent operation "UP", "DOWN" & "NON STOP" buttons, service panel, cab communication grill with speaker, emergency light, activation indication, engraving as per detail on the drawing. All switches that are behind the locked cover must be Barrel type keys. Firefighter's key

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switch and associated buttons shall be provided in a separate cabinet as per code requirements.

The service panel shall include the key switches for cab lighting, cab exhaust fan, independent service, inspection service, emergency test button, and electrical receptacle. The service panel shall be hinged lockable door suitable for certificate frame with lexan lens.

- B. The cover of the car operating panel shall stainless steel with # 4 finishes. The cover of the car station shall be provided with three telescopic chromium plated hinges and key switch lock plus screws at all four corners.

2.40 CAR POSITION INDICATOR

- A. The position indicator shall be located in the car operating panel and shall be an L.E.D. of a minimum 2" high with corresponding floor characters and car travel indicators. The up travel indicator shall illuminate 'green' while the down direction travel indicator shall illuminate 'red'. The widow of the indicator shall be provided with cover of high impact resistant material such as poly carbon or lexan.

The car position indicator shall be provided with floor passing gong of different tone than the travel gong. The intensity of the gong shall comply with ASME code.

- B. The cover plate shall be same as faceplate detailed above.

2.41 CAR LANTERN

- A. Car lantern shall be vandal resistance and shall be provided in the jamb of each cab opening. The car lantern shall be provided with illuminated type directional arrow show the travel of the elevator. The 'UP' indicator shall be with green and the "DOWN" indicator shall be with red. Car lantern shall remain illuminated until car leaves the landing.
- B. One of the car lanterns shall be provided with an audible travel directional signal to sound one gong for upward travel with 'UP' indicator and two gong for downward travel with "DOWN" indicator.
- C. The indicator shall be flush with inside of door jamb.

2.42 INDEPENDENT SERVICE

Provide Independent Service feature to run the elevator by attendant. This feature can be activated by turning the key switch located in service panel to "on" position.

- A. The activation of the Independent service shall remove the elevator from selective-collective operation and run as an elevator controlled by car button operation only.
- B. All assigned corridor calls to the elevator shall be cancelled upon activation of this service.
- C. The doors shall be closed by constant pressure to 'Door Close' button or car call button.

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- D. The elevator shall proceed to the car calls and stop at the floor in sequence as it approaches.
- E. The elevator door shall open to the landing and shall remain open until doors are closed.
- F. In case of Emergency Fire Fighters' Service activation and during independent operation, the attendant shall be notified by audio-visual signal of fire warning.

2.43 INSPECTION KEY SWITCH

- A. Provide an inspection key switch in the service cabinet of the car operating panel. The inspection key shall be different than other keys.

2.44 HOISTWAY ACCESS SWITCHES

- A. Provide hoistway access switches in new wall cutouts located at the top and bottom landing, to permit access to the top of car, and the pit. The exposed portion of each access switch or its faceplate shall have legible indelible legends to indicate its "UP", "DOWN" and "OFF" positions. Each access switch shall be a cylinder-type lock with key removable only when switch is in the off position. Lock shall not be operable by any other key which will operate any other lock or device used for any other purpose in the building. The hoistway switch shall be arranged to initiate and maintain movement of the car. When the car is being moved at the top terminal landing, the zone of travel shall be limited to the distance allowed by Code for down travel and a return to the top terminal.
- B. Provide new wall cutouts, conduit, wiring, and patch and paint walls as required.

2.45 CAB LIGHT AND FAN KEY SWITCH

- A. Provide cab light and exhaust fan "HIGH", "LOW" and "OFF" key switches in the service cabinet of the car-operating panel.

2.46 ELEVATOR WIRING

- A. Raceways, Fittings and Accessories
 - 1. Ferrous Metal Conduit: Steel, galvanized on the outside and enameled on the inside or hot dipped galvanized on the outside and inside, UL categorized as Ferrous Metal Conduit (identified on UL Listing Mark as Metal Conduit - Steel or Ferrous Steel Conduit).
 - 2. Flexible Metal Conduit: Galvanized steel strip shaped into interlocking convolutions, UL categorized as Flexible Metal Conduit (identified on UL Listing Mark as Flexible Steel Conduit or Flexible Steel conduit Type RW).
 - 3. Liquid-tight Flexible Metal Conduit: Galvanized steel liquid-tight conduit, UL categorized as Liquid-tight Metal Conduit.
 - 4. Wireways, Fittings and Accessories: 14 gauge minimum, no knockouts, screw cover.

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5. Connectors and Couplings:

- a. Couplings (For Metal Conduit): Standard couplings as furnished by conduit manufacturer.
- b. Flexible Metal Conduit Connectors: Standard connector as furnished by conduit manufacturer.
- c. Liquidtight Connectors (for Liquidtight Flexible Metal Conduit): Standard connector as furnished by conduit manufacturer.

B. Conductors (600 Volts and Under) and Accessories:

- 1. Conductors: Annealed uncoated copper or annealed coated copper in conformance with the applicable standards for the type of insulation to be applied on the conductor.
- 2. Insulation:
 - a. Types for General Application:
 - 1. Type XHHW: Moisture and heat resistant cross-linked polyethylene insulation rated 600V conforming to U.L. requirements for type XHHW insulation (75° C Wet and 90° C dry).
 - 2. Type THWN: Polyvinyl chloride insulation rated 600V with nylon jacket conforming to U.L. requirements for type THWN insulation (75°C).
 - 3. Type THHN: Polyvinyl chloride insulation rated 600V with nylon jacket conforming to U.L. requirements for type THHN insulation (90°C).
 - 4. Types for Specific Application: As required by Article 620 of the National Electrical Code.
- 5. Traveling Cables:
 - I Type: Elevator cables as listed in Article 400, Table 400-4 of the National Electrical Code.
 - II Insulation thickness: Suitable for the voltage to which the cables are subjected.
 - III Minimum Size:
 - d. Lighting Circuits: No. 14 AWG.
 - e. Operating, Control, Signaling and Communication Circuits: No. 20AWG.

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- f. Shielded Twisted Pairs: Number and type to suit operating, control, signaling and communication circuit requirements.
 - g. Spare Conductors: Not less than 10 percent.
 - h. Provide a video coaxial cable Type RG59U in one traveling cable for each car.
 - 4. Splice Connectors:
 - a. Spring Type: Standard spring connector as furnished by conduit manufacturer.
 - b. Indent type with Insulating Jacket: Standard indent type insulation jacket as furnished by the manufacture.
 - 5. Terminals: Standard Nylon insulated pressure terminal connectors per manufacturer.
 - 6. Lugs:
 - a. Single Cable (Compression Type Lugs): Copper, one or two hole style to suit conditions.
 - 7. Insulation Tapes:
 - a. Plastic and Rubber Tape: Standard per manufacturer.
- C. Outlet, Junction and Pull Boxes
 - 1. Galvanized Steel boxes for Concealed Work: Standard type galvanized steel boxes and device covers as per approved manufacturer.
 - 2. Galvanized steel Junction and Pull Boxes for Exposed Work: Code gauge, galvanized steel screw cover boxes as per approved manufacturer.
 - 3. Specific Purpose Outlet Boxes: As fabricated by equipment manufacturers for mounting their equipment.

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2.47 BACK-UP POWER SUPPLY

Provide a battery powered emergency back-up power supply which shall automatically lower the elevator to the main egress landing and open the doors upon loss of normal power.

2.48 SPECIAL PROVISIONS

- A. Provide a data plate that indicates the Code and edition in effect at the time of installation and attached to the main line disconnect switch or on the controller.
- B. Provide dry contacts in controller for fire service recall through building's smoke detector system.
- C. Repair as required, all hallway walls subsequent to installation of new hall pushbutton stations.

2.49 MISCELLANEOUS

Any devices and features not specifically noted, but required by the City of Yonkers and any other applicable Code shall be provided as part of these specifications.

PART 3 - EXECUTION

3.01 GUIDE RAIL

- A. Verify that the guide rails are without any gaps at joints.
- B. Verify that the rail bracket shall comply with seismic requirement of the zone.
- C. Verify guide rail is securely mounted on structural steel or iron bracket, or anchored to hoistway framing at each floor.
- D. Check that the guide rail extend from pit floor to underside of the under-side of hoistway or provide extension as may require.
- E. Correct guide rail plumb and parallel, shim as required. Verify that the bolt shall be torqued as per manufacturer's recommended value.
- F. Verify that the splice plate is not interfering with supporting clamp and bracket.

3.02 INSTALLATION OF HYDRAULIC EQUIPMENT

- A. General

Install hydraulic pump unit, oil tank, valve and related pipes in the machine room.
- B. Install piston-cylinder assembly on the pit floor with proper footing steel.

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1. The piston-cylinder assembly shall be plumb.
2. The cylinder shall be properly supported.
3. Inspect rupture valve and test according to manufacturer recommendation.
4. Inspect the piston-cylinder assembly for any leak.
5. Inspect the function of air bleed valve.
6. Inspect piston packing and seal for any leak.
7. Inspect that piston is without any scratch.
8. Inspect all piping for proper installation and leak.
9. Inspect installation of pump unit operation, pressure gauge, relief valve, hydraulic valve unit.
10. Test pressure relief valve and working pressure at full load.
11. Check hydraulic valve operation and leak.
12. Check oil level indicators, tags, breathing device of oil tank.
13. Check oil level when car is at bottom and top floor.

3.03 FIELD QUALITY CONTROL

A. Inspection:

1. Power Off:
 - a. Inspect the motor fastening bolt for tightness and to ascertain it is in place.
 - b. Examine motor winding, to assure that it is free of dust and lint.
2. Power On:
 - a. With pump unit running, check for excessive play in bearing and excessive noise.
 - b. Check the pump and motor for any noise and vibration.
 - c. Check any oil leak.

3.04 INSTALLATION OF CONTROLLER

- A. Install elevator controller in the elevator machine room. The controller shall comply with ASME 17.5 code.
- B. Install components and integrate with controller for required operation of elevator.
- C. Field Quality Control
 - 1. Inspection:
 - a. Power Off: Inspect control equipment for dirt, dust, grease or other foreign material that would prevent proper operation.
 - 2. Power On:
 - a. Run elevator up and down shaft, stopping at each floor. Check for accurate landing and smooth stop and start under all load conditions.
 - b. With elevator running, inspect control equipment for excessive arcing, heating of coil, misalignment of relay, contactor or switch.
 - 3. Test:
 - a. Individually test each component for compliance with its specified function and operation.
 - b. Demonstrate that elevator perform in accordance with required type of operation.
 - c. Test elevator step by step as specified under function, and operation, in Part 2.

3.05 INSTALLATION OF CAR

- A. Car Sling and Platform:
 - 1. Verify car platform and sling between main guide rail are at equal distance on both side.
 - 2. Align car and sling in hoistway, adjust guide in perfect alignment.
 - 3. Clearance between car platform and hoistway door or entrance sill nose shall not exceed 1-1/4".
 - 4. Check mounting of the guides shoes to car sling.
- B. Car Enclosure:
 - 1. Assembly of car enclosure and securely fastened to car platform.

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2. Fasten door support structure for cab door.
- C. Field Quality Control:
1. Examine car enclosure for structural soundness. Determine if car enclosure is securely fastened to car platform.
 2. Verify that top exit panel is in place.
 3. Examine lighting fixture to determine if it is securely fastened, have required protection, and provide sufficient illumination.

3.06 INSTALLATION OF HOISTWAY ENTRANCE

- A. Install door panel with guide roller, interlock, hanger, track, drive block, strut angle, etc.
- B. Verify entrance frame and sill properly plumbed and accurately to ensure proper clearance.
- C. Install floor designation both sides of the frame.
- D. Proper grouting of the entrance frame and sill for solidness and to meet fire rating.
- E. Lubricate all working parts.
- F. Proper wiring to hoistway door, inter-lock, etc.
- G. Suspend hoist door panel properly plumbed to avoid any interference and free movement of door panel.
- H. Smooth operation of hoist door.
- I. Field quality Control:
 1. Inspect component for proper operation ascertaining that the operator and component are neatly and securely installed and aligned.
 2. Test: Demonstrate that the door operation perform in accordance with required operation.

3.07 INSTALLATION OF CAB DOOR OPERATOR

- A. Verify the installation of cab door operator including electric motor, belt drive, linkage, door control, wiring, safety edge, infrared protective device, etc.
- B. Lubricate all working parts.
- C. Proper wiring to door interlock etc.
- D. Verify installation of safety edge to cab door system.

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E. Field Quality Control

1. Inspect component for proper operation ascertaining that the operator and component are neatly and securely installed and aligned.
2. Test: Demonstrate that door operators perform in accordance with required operation. Check speed and force of the door not exceeding 25 lb/ft.
3. Test: Safety edge operation including nudging.

3.08 LANDING SIGNAL EQUIPMENT

- A. General: Install elevator landing signal equipment and integrate with elevator control equipment for required operation.
- B. Power Supply for Signal Equipment: Install in elevator or machine room.
- C. Landing Fixtures: Installation of the riser for landing fixture.

3.09 INSTALLATION OF FIREFIGHTERS' AND EMERGENCY SERVICE EQUIPMENT

- A. Two-Way Voice Telephone Type Cab-Communication System:
 1. Install the system in accordance with the Company's printed instructions.
 2. Locate central equipment cabinet and battery in elevator machine room or in the car station.
- B. Test battery capacity and recharge time. Operate system for required number of hours and load conditions.
- C. Firefighters' Emergency Service Operation:

Integrate components with elevator controller system for required operation.
- D. Cab Emergency Light and Alarm System:
 1. Locate the emergency cab light fixture in cab. Reinforce cutout in car panel for mounting of fixture.
 2. Install wiring, relay, battery charger unit, contact as required to connect car emergency light unit to 120 volt power source on car, and to inter-connect the 6" alarm bell on emergency light unit with emergency call button and emergency stop button in car operating panel.
 3. Test battery capacity and recharge time. Operate one unit for required number of hours and load conditions.
- E. Floor Number:

Paint minimum 4" high white gloss enamel numerals on back of each hoistway door and

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on elevator shaft walls between each floor.

3.10 WIRING INSTALLATION

A. Raceway Installation:

1. Raceway Type and Location:

- a. Install ferrous metal conduit in all locations unless otherwise specified.
- b. Flexible Metal Conduit:
 - 1. Use for short runs to equipment such as interlock, limit switch or other item requiring adjustment (dry location).
 - 2. Use one to two feet of flexible metal conduit for final connection to equipment subject to vibration (dry location).
- c. Liquid-tight Flexible Metal Conduit:
 - 1. Use for short run to equipment such as interlock, limit switch or other item requiring adjustment (damp and wet location).
 - 2. Use for one to two foot of Liquid-tight flexible metal conduit for final conduit connection to equipment subject to vibration (damp and wet location).

B. Wire-way:

- 1. Conductor Installation:
- 2. Wiring can be installed in raceway for:
 - a. Traveling cable connecting the car and hoistway wiring.
 - b. As permitted otherwise by the exception to National Electric Code Article 620-21.
 - c. Elevator control wiring in the machine room.
- 3. Traveling Cable: Terminate end of traveling cable in NEMA 1" junction box equipped with labeled terminal strip and strain relief device at each connection.
- 4. Outlet, Junction and Pull-box Installation:
 - a. Boxes for Concealed Conduit System:
 - b. Install box of depth to suit job condition and also comply with Article 370 of the National Electrical Code.
 - c. Use galvanized steel box with flush cover for junction and pull box.

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5. Box For Exposed Conduit System:
 - a. Use box for the Work with conduit size $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1".
 - b. Use box for the Work with conduit size over 1" in wet location.
 - c. Use galvanized steel junction and pull box for Work with conduit size over 1" in dry location and damp location.
6. Specific Purpose Outlet Box: Use specific purpose outlet box to mount equipment when available and suitable for job condition.
 - a. Supporting Device Installation:
7. Attachment of Conduit System:
 - a. Masonry construction: Attach conduit to masonry construction by means of pipe strap or pipe clamp and masonry anchorage device.

END OF SECTION

SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

1.01 SCOPE AND INTERPRETATION

- A. These Specifications and accompanying Drawings provide for the furnishing and the installation of the fire protection systems, including all accessories such as sprinkler heads, flow switches, etc.
- B. The specifications and Drawings require the Fire Protection Contractor, to provide all labor, materials, equipment and appurtenances to perform of all Work pertaining or incidental thereto, which is needed to complete the Work shown on the Drawings and called for in the Specifications.
- C. The complete fire protection system and the Work shall be so installed as to give proper and continuous service under all conditions, and shall be in accordance with the requirements of all public authorities having jurisdiction and to the complete satisfaction of the Owner. Any Work shown on the Drawings and not particularly described in the specifications, or vice versa or any Work which may be deemed necessary to complete the Contract shall be provided by the Contractor as part of its Contract.
- D. For purposes of clearness and legibility, fire protection Drawings are essentially diagrammatic and size and location of equipment are drawn to scale wherever possible. The Drawings indicate size, connection points and routes of pipe. It is not intended, however, that all offsets, rises and drops are shown. Provide piping as required to fit structure, avoid obstruction, and retain clearances, headroom openings and passageways.
- E. Sprinklers shown and described on the Drawings shall be connected to water supply piping in accordance with the requirements of NFPA 13, Standard for the Installation of Sprinkler Systems, despite any possible omission of indication of such piping on the plans. Any question involving the installation of such piping shall be referred to the Commissioner for resolution.
- F. Fire protection systems shall be tested in accordance with the New York State Building Code and the New York State Fire Code.
- G. Installation of sprinkler is subject to the special inspection requirements of the New York State Building Code and NFPA -13.
- H. Scope of Work: The fire protection work of this contract shall include but shall not be limited to the following systems, equipment and services:
 - 1. Provide a complete sprinkler system consisting of risers and riser control valves, sprinkler heads, floor control valve assembly and all associated appurtenances and connection to alarm devices.
 - 2. Piping: Installation of complete sprinkler systems piping from the point of connection at lunch room. Piping includes among other things: O.S & Y valves, control valves, flow switches, sprinkler heads etc.

3. Equipment and devices furnished under other Sections of this Contract that are integrated with the fire protection system, including electrical devices for system monitoring and alarms, shall be piped by this Contractor.
 4. All valves controlling the water supply for automatic sprinkler systems and water-flow switches on all sprinkler systems shall be electrically supervised by the fire alarm system.
 5. Testing of the sprinkler system shall be as per the provisions of Section 211313.
 6. Piping, Equipment Supports, and seismic bracing: To comprise all restraints, hangers, pipe guides, rods, beam clamps, brackets, pipe anchors, other attachments, floor flanges, masonry anchors, bolts, nuts, washers, and other items as required to fully support all piping and equipments installed under this contract. Provide spring hangers, seismic restraints, and vibration mounts where recommended by equipment manufacturers, where required to meet noise abatement regulations and as necessary to prevent piping and equipment vibrations being transmitted to structure.
 7. Miscellaneous Work: Included shall be all items of materials, piping, controls, wiring and other miscellaneous items not specifically shown on Contract Drawings or called for herein but which are normally furnished and required for a complete installation of this type.
 8. Sealing of Openings: Openings left in walls, floors, ceilings or partitions shall be sealed. Finish shall match existing adjoining finish in all respects.
 11. Coordination Drawings: The Fire Protection Systems contractor shall cooperate with the Electrical contractors in the development of the coordination drawings. The specified order in which the various trade contractors impose their work on the coordination drawings is not intended to grant priority to any one trade contractor in the allocation of space. At the completion of this phase, hold a coordination meeting to eliminate any interference among the trades that the drawings indicate and to avoid any conflicts in installing the Work.
- I. The contractor shall make provision to provide a dedicated fire watch during planned shut downs of building fire protection / alarm systems in accordance with all applicable requirements of New York State Fire Code. Occupied floors where new work is being performed shall be monitored continuously for fire / smoke condition. All interior corridors that are directly part of the path of egress shall remain free from obstructions. If egress path cannot be maintained, all occupied areas affected by the performance of work shall be temporarily evacuated until normal fire safety operation is restored.

1.02 CODES AND STANDARDS

- A. It shall be unlawful for any person to perform the work referred to under this Fire Protection Specifications and/or shown on the Fire Protection Contract Drawings unless such person is a licensed master fire suppression piping contractor, as permitted by the New York State Building Code and unless such work is performed under the direct and continuing supervision of a licensed master fire suppression piping contractor.

- B. Where requirements for products, materials, systems, equipment, methods and other portion of the work specified herein exceed minimum requirements of regulatory agencies having jurisdiction over the construction work, contractor shall comply with such requirements specified herein, unless specifically approved otherwise by the Engineer of Record.

1.03 TORCH BURNING OPERATION

- A. The storing and use of oxygen and combustible gases in conjunction with torch burning apparatus is subject to the Rules and Regulations of the New York State Fire Code. Fire watches shall be provided during all operations using torches for burning, cutting or welding.
- B. Contractor shall apply for and obtain permits for the use and storage of such equipment on premises. The operator of such equipment shall have a certificate of fitness issued by the Fire Department.
- C. The cost of permits, certificates, fire watches, apparatus and other items required in the torch burning operation shall be borne by the Contractor at no additional cost to the Owner.

1.04 PROTECTION OF MATERIALS AND WORK

- A. Existing Building
 - 1. Open ends of piping shall be temporarily closed by a proper fitting, until piping is approved and ready for service.
 - 2. Motors and appurtenances shall be covered and protected during the progress of the Work.

1.05 GUARANTEES AND WARRANTIES

- A. Contractor's Guarantees: The Contractor guarantees that all Work of this Contract is free from all defects, and is as specified, and that should any defects, which cannot be proven to have been caused by improper use, develop within the space of one year from the date of substantial completion of the Work, such defects shall be made good by the Contractor, free of cost to the Owner.

1.06 OPENINGS AND CHASES

- A. Openings through exterior foundation walls shall be made watertight by the Contractor after pipes, conduits and other items passing through the wall have been installed. This building is planned and detailed, and is the intent of these specifications to provide a structure that will prevent the penetration by rodents and vermin of any vacant space where they might find a harborage. The Contractor will be held responsible for securing this condition by the closing of all points of access to such spaces, including the passage of piping and conduits, through all walls, partitions, ceilings and furred out spaces, the closing of access to voids in hollow tile or cinder blocks. There shall be a special inspection of the building with regard to this matter before final acceptance.

1.07 INSTRUCTION OF PERSONNEL

- A. After the fire protection system has been tested, and all other items adjusted and operating properly to the satisfaction of the Commissioner, Contractor shall furnish a competent person to instruct the staff in the operation and maintenance of the systems. Contractor shall video record all the training sessions for various equipment and systems as specified in individual sections of these Specifications. Determination of the date and time of such instruction shall be under the direction of the Commissioner.

1.08 SUBMITTALS

- A. Formal submissions are required for materials and appurtenances (ex. pipes, etc.) as defined in the specification. Submittals are always required to verify capacity. Schedules, installation instructions, startup manuals, operation and maintenance manuals, and shop drawings are always required to be submitted.

1.09 CLEANING AND REPAIR

- A. At the completion of the Work and before the final inspection is made the Contractor shall thoroughly flush the system and leave it free from all marks, scratches, stains, and other damage. All equipment shall be cleaned and left in condition to operate, and the work, as a whole, left in perfect working order. Remove all tools, debris and excess materials from the premises.
- B. Contractor shall not leave sharp exposed metal edges (bottom of threaded rods, equipment supports, etc.) that could otherwise present safety hazards to the building's occupants/work staff.

END OF SECTION

SECTION 210529

PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Companion high density filler pieces for installation over the top 180 degree surface of pipe or tubing, at points of support where a combination clevis hanger, insulation shield and high density insulating saddle are installed.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Sprinkler Piping: Section 211300.
- B. Sprinkler Systems: Section 211313

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.
- B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with the applicable requirements of the ASME B31 Piping Codes.
 - 2. Unless otherwise shown or specified, comply with the requirements of the Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) Standards SP-58, and SP-69.
 - 3. Materials for use in Sprinkler Systems shall comply with the requirements of NFPA 13 as applicable.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.
 - 1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of

the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
Up to 2-1/2	4	16	6	10

- B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18

- C. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut.
1. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches in size and larger.
 2. Swivel ring type hangers will be allowed for sprinkler piping up to a maximum of 2 inches in size.
- D. Adjustable Floor Rests and Base Flanges: Steel.
- E. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.
- F. Riser Clamps: Malleable iron or steel.

2.02 ANCHORS AND ATTACHMENTS

- A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN, HN, or FS Series.
- B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS Series.
- C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips S Series.
- D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI Series, or Red Head/Phillips J Series.
- E. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS Series.

- F. Beam Clamps: Forged steel beam clamp, with weldless eye nut (right hand thread), steel tie rod, nuts, and washers, Grinnell's Fig No. 292 (size for load, beam flange width, and rod size required).
- G. Metal Deck Ceiling Bolts: B-Line Systems' Fig. B3019.
- H. Continuous Slotted Type Concrete Insert, Galvanized:
 - 1. Load Rating 800 lbs/ft: Kindorf's D-986.
 - 2. Load Rating 1500 lbs/ft: Kindorf's D-980.
 - 3. Load Rating 3000 lbs/ft: Hohmann & Barnard's Inc. Type CS-H.
 - 4. Load Rating 4500 lbs/ft: Hohmann & Barnard's Inc. Type CS-HD.
- I. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded to receive 3/4 inch diameter machine bolts.
- J. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept 3/4 inch diameter bolts having special wedge shaped heads.

2.03 FASTENERS

- A. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

2.05 SHOP PAINTING AND PLATING

- A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium plated, cadmium plated or galvanized shall be shop coated with metal primer paint.

PART 3 EXECUTION

3.01 PREPARATORY WORK

- A. Place inserts into construction form work expeditiously, so as not to delay the Work.

3.02 INSTALLATION

- A. Do not hang or support one pipe from another or from ductwork.
 - 1. Do not bend threaded rod.
- B. Support all insulated horizontal piping conveying fluids below ambient temperature, by means of hangers or supports with insulation shields installed outside of the insulation.
- C. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.
 - 1. For Steel Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10
2-1/2 and up	12

No pipe length shall be left unsupported between any two coupling joints.

3. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.
4. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.
5. For Branch Piping Runs and Runouts Over 5 feet In Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.
6. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.

- D. Minimum Hanger Rod Size: Increase hanger rod size as required to meet requirements of seismic restraint system.

PIPE OR TUBING SIZE (Inches)	SINGLE ROD HANGER SIZE (Inches)		DOUBLE ROD HANGER SIZE (Inches)	
	PIPE	TUBING	PIPE	TUBING
1/2 to 2	3/8	1/4	3/8	1/4
2-1/2 and 3	1/2	3/8	3/8	1/4

1. Size hanger rods, for piping over 12 inches in size and multiple line supports, based on a safety factor of five for the ultimate strength of the materials being used.
2. Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger attachment. A total of four nuts are required for each rod, two at upper hanger attachment and two at hanger.

- E. Vertical Piping:
 - 1. Support vertical risers of piping systems, by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 25 feet, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.
 - 2. Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps.
- F. Floor Supports: Install adjustable yoke rests with base flanges, for the support of piping, unless otherwise indicated on the Drawings. Install supports in a manner, which will not be detrimental to the building structure.

3.03 UPPER HANGER ATTACHMENTS

- A. General:
 - 1. Secure upper hanger attachments to overhead structural steel, steel bar joists, or other suitable structural members.
 - 2. Do not attach hangers to steel decks that are not to receive concrete fill.
 - 3. Do not attach hangers to precast concrete plank decks less than 2-3/4 inches thick.
 - 4. Do not use flat bars or bent rods as upper hanger attachments.
- B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.
 - 1. Do not use drive-on beam clamps.
 - 2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.
 - 3. Do not drill holes in main structural steel members.
 - 4. Beam clamps, with tie rods as specified, may be used as upper hanger attachments for the support of piping, subject to clamp manufacturer's recommended limits.
- C. Attachment to Existing Cast-In-Place Concrete:
 - 1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.
 - 2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.

3.05 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

- A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for cold service. Furnish companion high density vapor

barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.06 PIPE INSULATION SHIELDS

- A. Unless otherwise specified, install a pipe insulation shield, at all points of support. Center shields on all hangers and supports outside of high density insulation insert, and install in such a manner so as not to cut, or puncture jacket.

END OF SECTION

SECTION 211300

SPRINKLER PIPING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Through Penetration Firestops: Section 078400.
- B. Sealants: Section 079200.

1.02 REFERENCES

- A. NFPA 13 - Standard for the Installation of Sprinkler Systems.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Catalog sheets and specifications indicating manufacturer name, type, applicable reference standard, schedule, or class for specified pipe and fittings.
 - 2. Material Schedule: Itemize pipe and fitting materials for each specified application in Pipe and Fittings Schedule in Part 3 of this Section. Where optional materials are specified indicate option selected.

PART 2 PRODUCTS

2.01 STEEL PIPE AND FITTINGS

- A. Steel Pipe for Threading: Standard weight, Schedule 40, black or galvanized; ASTM A 53 or ASTM A 135.
- B. Cast Iron Fittings:
 - 1. Drainage Pattern, Threaded: ASME B16.12.
 - 2. Steam Pattern, Threaded: ASME B16.4.
 - a. Standard Weight: Class 125.
 - b. Extra Heavy Weight: Class 250.
 - 3. Flanged Fittings and Threaded Flanges: ASME B16.1.
 - a. Standard Weight: Class 125.
 - b. Extra Heavy: Class 250.
- D. Unions: Malleable iron, 250 lb class, brass to iron or brass to brass seats.

- E. Couplings: Same material and pressure rating as adjoining pipe, conforming to standards for fittings in such pipe. Use taper tapped threaded type in screwed pipe systems operating in excess of 15 psig.
- F. Nipples: Same material and strength as adjoining pipe, except nipples having a length of less than one inch between threads shall be extra heavy.

2.02 DUCTILE IRON PIPE AND FITTINGS

N/A

2.03 COUPLINGS AND FITTINGS FOR GROOVED END PIPE

N/A

2.04 BOLTED MECHANICAL BRANCH CONNECTION

N/A

2.05 JOINING AND SEALANT MATERIALS

- A. Thread Sealant:
 - 1. LA-CO Industries' Slic-Tite Paste with Teflon.
 - 2. Loctite Corp.'s No. 565 Thread Sealant.
 - 3. Thread sealants for potable water shall be NSF approved.
- B. Joint Packing:
 - 1. Oiled Oakum: Manufactured by Nupak of New Orleans, Inc., 931 Daniel St., Kenner, LA 70062, (504) 466-1484.
- C. Flange Gasket Material:
 - 1. For Use With Cold Water: 1/16 inch thick rubber.
- E. Anti-Seize Lubricant: Bostik Inc.'s Never Seez or Dow Corning Corp.'s Molykote 1000.

2.06 DIELECTRIC CONNECTORS

- A. Dielectric Fitting: Bronze ball valve with end connections and pressure rating to match associated piping.
 - 1. Nipples with inert non-corrosive thermoplastic linings are not acceptable.
- B. Flange Electrical Insulation Kit: Consisting of dielectric sleeves and washers, and dielectric gasket.
 - 1. Rated 150 psi at 250 degrees F: ANSI Class 150, full faced neoprene gasket with bolt holes, double phenolic washers, and mylar sleeves; Model 150 by APS, Lafayette, LA 70596, (337) 233-6116.

2.07 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

- A. Oiled Oakum: Manufactured by Nupak of New Orleans, Inc., 931 Daniel St., Kenner, LA 70062, (504)466-1484.
- B. Mechanical Modular Seals: Thunderline Corp.'s Link Seal wall and floor seals designed for the service of piping system in which installed.

2.08 PIPE SLEEVES

- A. Type A: Schedule 40 steel pipe.
- B. Type B: No. 16 gage galvanized sheet steel.
- C. Type C: Schedule 40 steel pipe with 1/4 inch steel collar continuously welded to pipe sleeve. Size steel collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.
- D. Type D: No. 16 gage galvanized sheet steel with 16 gage sheet steel metal collar rigidly secured to sleeve. Size metal collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.

2.09 FLOOR, WALL AND CEILING PLATES

- A. Cast Brass: Solid type with polished chrome plated finish, and set screw.
 - 1. Series Z89 by Zurn, 929 Riverside Drive, Grosvonordale, CT 06255, (800) 243-1830.
 - 2. Model 127XXXX by Maguire Mfg., Cheshire CT 06410, (203) 699-1801.
- B. Stamped Steel: Split type, polished chrome plated finish, with set screw.
 - a. Figures 2 and 13 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.
- C. Cast Iron or Malleable Iron : Solid type, galvanized finish, with set screw:
 - 1. Model 395 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.
 - 2. Model 900-016XX by Landsdale International, Westville, NJ 08093, (800) 908-0523.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install piping at approximate locations indicated, and at maximum height.
- B. Install piping clear of door swings, and above sash heads.
- C. Make allowances for expansion and contraction.

- D. Allow for a minimum of one inch free air space around pipe or pipe covering, unless otherwise specified.
- E. Install horizontal piping with a constant pitch, and without sags or humps.
- F. Install vertical piping plumb.
- G. Use fittings for offsets and direction changes.
- H. Cut pipe and tubing ends square; ream before joining.
- I. Threading: Use American Standard Taper Pipe Thread Dies.

3.02 FIRE SPRINKLER PIPING SYSTEM

- A. Install piping to be completely drainable.

3.03 PIPE JOINT MAKE-UP

- A. Threaded Joint: Make up joint with a pipe thread compound applied in accordance with manufacturer's printed application instructions for the intended service.
- B. Flanged Pipe Joint:
 - 1. Install threaded companion flanges on steel pipe; flanges on galvanized pipe are not required to be galvanized.
 - 2. Provide a gasket for each joint.
 - 3. Coat bolt threads and nuts with anti-seize lubricant before making up joint.
- C. Rubber Ring Push-on Joint: Clean hub, bevel spigot, and make up joint with lubricated gasket in conformance with the manufacturer's printed installation instructions.
- D. Grooved Pipe Joint: Roll groove pipe ends, make up joint with grooved end fittings and couplings, in conformance with the manufacturer's printed installation instructions.
 - 1. Cut grooved end piping is not acceptable.
- E. Mechanical Joint: Make up joint in conformance with the manufacturer's printed installation instructions, with particular reference to tightening of bolts.
- F. Dissimilar Pipe Joint:
 - 1. Joining Bell and Spigot and Threaded Pipe: Install a half coupling on the pipe or tube end to form a spigot, and calk into the cast iron bell.
 - 2. Joining Dissimilar Threaded Piping: Make up connection with a threaded coupling or with companion flanges.
 - 3. Joining Dissimilar Non-Threaded Piping: Make up connection with adapters recommended by the manufacturers of the piping to be joined.

4. Joining Galvanized Steel Pipe and Copper Tubing: Make up connection with a dielectric connector.

3.04 PIPING PENETRATIONS

- A. Sleeve Schedule: Unless otherwise shown, comply with the following schedule for the type of sleeve to be used where piping penetrates wall or floor construction:

CONSTRUCTION	SLEEVE TYPE
1. Frame construction.	None Required
2. Foundation walls.	A*
3. Non-waterproof interior walls.	B*
4. Non-waterproof interior floors on metal decks.	D*
5. Non-waterproof interior floors not on metal decks.	B*
6. Floors not on grade having a floor drain.	A
7. Floors over mechanical equipment, steam service, machine, and boiler rooms.	A
8. Floors finished or to be finished with latex composition or terrazzo, and on metal decks.	D*
9. Floors finished or to be finished with latex composition or terrazzo, and not on metal decks.	A
10. Earth supported concrete floors.	None Required
11. Exterior concrete slabs on grade.	A
12. Fixtures with floor outlet waste piping.	None Required
13. Metal roof decks.	C
14. Non-metal roof decks.	A
15. Waterproof floors on metal decks.	D
16. Waterproof floors not on metal decks.	A
17. Waterproof walls.	A

*Core drilling is permissible in lieu of sleeves where marked with asterisks.

- B. Diameter of Sleeves and Core Drilled Holes:
1. Unless otherwise specified, size holes thru floors and walls in accordance with the through penetration fire stopping system being used.
 2. Size holes thru exterior walls or waterproofed walls above inside earth or finished floors, and exterior concrete slabs in accordance with the following:
 - a. Uninsulated (Bare) Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of pipe, unless otherwise specified.

- b. Insulated Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of insulation, unless otherwise specified.
 - c. Mechanical Modular Seals: Size holes in accordance with the manufacturer's recommendations.
 - 3. Size holes for sprinkler and fire standpipe piping in accordance with NFPA 13.
- C. Length of Sleeves (except as shown otherwise on Drawings):
 - 1. Walls and Partitions: Equal in length to total finished thickness of wall or partition.
 - 2. Floors, Finished: Equal in length to total finished thickness of floor and extending 1/2 inch above the finished floor level, except as follows:
 - a. In furred spaces at exterior walls, extend sleeve one inch above the finished floor level.
 - 3. Exterior Concrete Slabs: Equal in length to total thickness of slab and extending 1/2 inch above the concrete slab.
 - 4. Roofs: Equal in length to the total thickness of roof construction, including insulation and roofing materials, and extending one inch above the finished roof level.
- D. Packing of Sleeves and Core Drilled Holes:
 - 1. Unless otherwise specified, pack sleeves or cored drilled holes in accordance with Section 078400 - FIRESTOPPING.
 - 2. Pack sleeves in exterior walls or waterproofed walls above inside earth or finished floors with oakum to within 1/2 inch of each wall face, and finish both sides with Type 1C (one part) sealant. See Section 079200.
 - a. Mechanical modular seals may be used in lieu of packing and sealant for sleeves and core drilled holes.
 - 3. Pack sleeves in exterior concrete slabs with oakum to full depth, and within 1/2 inch of top of sleeve and finish the remainder with sealant. See Section 079200.
 - a. Sealant Types:
 - 1) Piping Conveying Materials up to 140 degrees F other than Motor Fuel Dispensing System Piping: Type 1C (one part).
 - b. Mechanical modular seals may be used in lieu of packing and sealant for sleeves and core drilled holes.
- E. Weld metal collars of Type C and D sleeves to the upper surface of the metal deck. Seal voids under the metal collar as recommended by the manufacturer of the metal deck.

3.05 FLOOR, WALL AND CEILING PLATES

- A. Install plates for exposed uninsulated piping passing thru floors, walls, ceilings, and exterior concrete slabs as follows:
 - 1. Piping 2 Inch Size and Smaller In Finished Spaces:

- a. Solid Type: Chrome plated cast brass construction with set screw.
 - b. Split Type: Chrome plated stamped steel construction with set screw.
2. Piping over 2 inch size In Finished Spaces, and Piping in Unfinished Spaces:
 - a. Solid Type: Galvanized cast iron construction with set screw.
 - b. Split Type: Chrome plated stamped steel construction with set screw.
3. Piping in Unfinished Spaces (Including Exterior Concrete Slabs): Solid type, galvanized, cast iron or malleable iron construction.
4. Fasten plates with set screws.
5. Plates are not required in pipe shafts or furred spaces.

3.06 PIPE AND FITTING SCHEDULE

- A. Where options are given, choose only one option for each piping service. No deviations from the selected option will be allowed.
- B. Sprinkler:
 1. 2" & smaller: Schedule 40 black steel pipe, with standard weight cast iron fittings, and threaded joints.
 2. 2-1/2" & larger: Schedule 10 black steel pipe, with roll grooved ends, grooved pipe fittings, and couplings.
- D. Sprinkler (Below Ground): Coated ductile iron water pipe and fittings, with mechanical or push-on joints.

END OF SECTION

SECTION 211313

SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Painting: Section 099103.
- B. Hangers and Supports: Section 210529.
- C. Sprinkler Piping: Section 211300.

1.02 REFERENCES

- A. NFPA 13 - National Fire Protection Association Standard for the Installation of Sprinkler Systems.

1.03 SYSTEM DESCRIPTION

- A. Type of System:
 - 1. Wet System – Hydraulically calculated.
-Library Elevator machine room and shaft
- B. Occupancy Classification:
 - 1. Ordinary Hazard Occupancy.
- Library Elevator machine room and shaft

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Complete sprinkler system layout indicating the locations of sprinkler heads, devices, and accessories. Include separate details of special or not easily visualized piping arrangements and inspector's test valves and connections.
 - 2. Hydraulic calculations shall be complete and cross referenced to the appropriate drawing sheets.
 - 3. Layout of any proposed deviation from the Contract Drawings. A complete system layout is not required.
- B. Product Data: Catalog sheets, specifications, and installation instructions. Indicate UL or FM approval for each product. Include the following additional information:

1. Electrical Devices: Complete description of intended use, wiring diagrams, data plate information and, in the case of switching devices, whether normally on, or normally off. Include motor test data.
 2. Mechanical Devices: Complete description of intended use, including normal operating capacities and working pressures.
 3. Enclosures: Dimensions, materials, gages of metals; type of door hinges and locks, and methods of securing the enclosure members to the building construction.
 4. Hose Threads: Verify that hose threads on fire department connections match threads on equipment used by the local or servicing fire department.
- C. Quality Control Submittals:
1. Design Data: The portions of the sprinkler system not sized on the Contract Drawings shall be sized in accordance with NFPA requirements for Hydraulically Designed Systems. Submit drawings and hydraulic calculations for approval.
 2. Certificates: As required under Quality Assurance Article.
 3. Installers Qualification Data:
 - a. Name of each person who will be performing the Work.
 - b. Upon request, furnish names and addresses of the required number of similar projects that each person has worked on which meet the experience criteria.
- D. Contract Closeout Submittals:
1. Operation and Maintenance Data. Deliver 2 copies to the Director's Representative:
 - a. Instruction manual describing the operation and maintenance of the system.
 - b. Parts list for each mechanical and electrical device.
 - c. Publication NFPA 25, Inspection, Testing, and Maintenance of Water Based Fire Protection Systems.

1.05 QUALITY ASSURANCE

- A. Qualifications: The persons employed to perform the Work of this Section and their supervisor shall be personally experienced in sprinkler work and shall have been regularly performing such work for a minimum of 5 years while in the employ of a company or companies engaged in the installation of sprinkler systems.
1. Upon request, furnish to the Director the names and addresses of five similar projects which the foregoing people have worked on during the past 3 years.
- B. Regulatory Requirements:
1. Materials for the Work of this Section shall be Underwriter's Laboratories listed, and/or Factory Mutual approved.
- C. Certification: NFPA Contractor's Material and Test Certificate.

1.06 MAINTENANCE

- A. Spare Parts: Furnish the following items and deliver to the Director's Representative for storage in spare sprinkler head cabinets:
1. Spare sprinkler heads of required temperature range as follows:

QUANTITY	TYPE
	sidewall horizontal
	flush ceiling

2. One sprinkler head wrench to fit each type sprinkler head listed above.

PART 2 PRODUCTS

2.01 VALVES AND ACCESSORIES

- A. Gate Valves (175 psig non-shock working pressure):
1. 3/4 inch to 2 inch: Bronze body, OS & Y indicating type; double or wedge disc with threaded ends.
- B. Valve Locking Devices:
1. Chain: 3/16 inch galvanized steel, welded link.
 2. Padlock: Series 800 by Yale, Eaton Corp., Charlotte, NC: Key all locks alike. Furnish 2 keys for each lock.
 3. Key Tags: 1-1/2 inch dia., brass, stamped with valve number and service.
 4. "S" Hooks: Brass, for securing keys to key tags.
- D. Check Valves: IBBM, single clapper swing check with metal to metal or rubber faced checks, suitable for horizontal and vertical installation; end connections as required to suit the piping system; 175 psig non-shock working pressure.
1. Ball Drip (where shown on Drawings): Brass, automatic; threaded on both ends.

2.02 SPRINKLER HEADS AND APPURTENANCES

- A. Sprinkler Heads: Brass or bronze, with standard 1/2 inch orifice, and deflector:
1. Flush Pendent Type: All or part of sprinkler body including shank thread mounts above lower plane of finished ceiling.
 2. Sidewall Type: Horizontal or vertical sprinklers with special deflectors designed to discharge most of the water away from nearby wall in a pattern resembling 1/4 of a sphere with a small portion of discharge directed at wall behind sprinkler.
 3. Markings: Stamp sprinkler type on deflector in addition to NFPA's color code requirements covering temperature classification.

- B. Escutcheons:
 - 1. Material:
 - 2. Finish:
- C. Sprinkler Guards For Exposed Piping: Welded steel wire cage with cast or pressed steel base plate and suitable retaining clamps.
 - 1. Finish: Paint to match sprinkler piping.

2.03 DOUBLE CHECK VALVE

Double check valve with intermediate atmospheric vent, conforming to ASSE 1012.

- 1. Performance: 175 psig and 210 degrees F maximum working conditions.
- 2. Assembly: Internal strainer, and union connections.

2.04 WATER FLOW ALARM DEVICE

- A. Vane Type Waterflow Switch: Autocall Div., Federal Signal Corp.'s 4160, Potter Electric Signal Co.'s VSR-F, or Reliable's Model A., having:
 - 1. Corrosion-resistant vane.
 - 2. Splash/dust resistant enclosure with anti-tamper switch.
 - 3. Adjustable pneumatic retard.
 - 4. Screw type wiring terminals.
 - 5. Switch rated minimum 7.0 amps at 125 V ac and 0.25 amps at 125 V dc.

2.05 WATER MOTOR ALARM

N/A

2.06 ELECTRIC ALARM GONG

N/A

2.07 VALVE SUPERVISORY SWITCHES

- A. Mechanically actuated, designed to close contacts and sound an alarm when supervised valve is closed and when switch cover removed.
 - 1. For Gate Valves: Potter Electric Signal Co.'s OSYSU-A, or Grinnell's F640.
 - 2. For Post Indicator Valves: Potter Electric Signal Co.'s PIVSU-A2, or Potter-Roemer, Inc.'s 6223.

2.08 AIR PRESSURE SUPERVISORY SWITCH

N/A

2.09 AIR COMPRESSOR

N/A

2.10 ENCLOSURE

N/A

2.11 SIGNS

N/A

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Testing Existing System: Prior to installing the new system, test the existing system, as prescribed for new systems in accordance with NFPA 13, to ascertain its operating condition.
 - 1. Prepare a written report for the Owner Representative indicating the repairs required, if any, to make the existing system function properly.
 - 2. Repairs to the existing system are not included in the Work unless requested by Order on Contract.

3.02 PREPARATION

- A. Existing water System Shutdown:
 - 1. Before shutting down the water system to perform the Work, notify the Owner Representative in writing, and the local fire department that the system is to be shut down temporarily. Give schedule which states date and time of proposed shut down and the approximate length of time that the system will be out of service. Request instructions for precautions that should be taken during the shut down period.
 - 2. Do not shut down the system until schedule is approved by the Owner Representative.
 - 3. Return the existing system to pre-shutdown operation immediately after the Work has been completed. Give written notice to the Owner Representative that the system has been returned to pre-shutdown operation.

3.03 INSTALLATION

- A. Unless otherwise shown or specified, install the Work of this section in accordance with NFPA 13, and the item manufacturer's installation instructions.
- B. Locking Valves:
 - 1. Lock gate valves in open position with chain looped through handwheel and around adjacent sprinkler pipe. Secure with padlock.
 - 2. Lock test outlet valve in closed position with padlock.

- E. Spare Sprinkler Head Cabinet: Secure to building wall or other permanent structure in vicinity of main valve controlling sprinkler system, unless otherwise directed.
- F. Connection to Existing: A bolted mechanical branch connection may be used. Refer to Section 211300.

3.04 FIELD QUALITY CONTROL

- A. Tests: Unless otherwise shown or specified, perform tests in accordance with NFPA 13.
 - 1. Flushing: In addition to the requirements of the Standard, flush new piping before making final connection to existing systems and before performing hydrostatic test. Flush at rates of flow prescribed in the Contractor's Material and Test Certificate. After making final connections, flush entire system and assure that debris is removed from piping and there are no stoppages or obstructions in the system.
 - 2. System Tests:
 - a. Test all new Work.
 - b. Notify the Director's Representative when the Work of this Section is ready for testing.
 - c. Perform the tests when directed, and in the Director's Representatives presence.

END OF SECTION

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

1.01 SCOPE AND INTERPRETATION

- A. These Specifications and accompanying Drawings provide for the furnishing, setting and connection of the installation of drainage and water supply systems.
- B. The specifications and Drawings require the Contractor to provide all labor, materials, equipment and appliances to perform of all Work pertaining or incidental thereto, which is needed to complete the Work shown on the Drawings and called for in the Specifications.
- C. The complete systems and the Work shall be so installed as to give proper and continuous service under all conditions, and shall be in accordance with the requirements of all public authorities having jurisdiction and to the complete satisfaction of the Owner. Any Work shown on the Drawings and not particularly described in the specifications, or vice versa or any Work which may be deemed necessary to complete the Contract shall be provided by the Contractor as part of its Contract.
- D. For purposes of clearness and legibility, plumbing Drawings are essentially diagrammatic and size and location of equipment are drawn to scale wherever possible. The Drawings indicate size, connection points and routes of pipe. It is not intended, however, that all offsets, rises and drops are shown. Provide piping as required to fit structure, avoid obstruction, and retain clearances, headroom openings and passageways.
- E. Fixtures shown and described on the Drawings shall be connected with waste, vent and water supply piping in accordance with the requirements of New York State Building Code, despite the omission of indication of such piping on the plans. Any question involving the installation of such piping shall be referred to the Engineer for resolution.
- F. Scope of Work: The plumbing and drainage work of this contract shall include but shall not be limited to the following systems, equipment and services:
 - 2. Equipment furnished under other Sections of this Contract: Including fire protection equipment shall be piped.
 - 3. Piping, Equipment Supports, and seismic restraints: To comprise all restraints, hangers, pipe guides, rods, beam clamps, brackets, pipe anchors, other attachments, floor flanges, masonry anchors, bolts, nuts, washers, and other items as required to fully support all piping and equipment installed under this contract inclusive of spring hangers, seismic restraints, and vibration mounts where recommended by equipment manufacturers, where required to meet noise abatement regulations and as necessary to prevent piping and equipment vibrations being transmitted to structure.
 - 4. Provide unions and stop valves at all equipment connections and where required for service, repairs and draining.
 - 5. Piping - General: Piping, Piping installation or hook-up shall mean a complete installation in all respects including pipe, fittings, valves, unions, traps, strainers,

specialties and other miscellaneous items to make piping systems and equipment operational.

6. Painting and Identification: As specified in their respective sections of this Contract.
7. Miscellaneous Work: Included shall be all items of materials, piping, controls, wiring and other miscellaneous items not specifically shown on Contract Drawings or called for herein but which are normally furnished and required for a complete installation of this type.
8. Sealing of Openings: Openings left in walls, floors, ceilings or partitions shall be sealed. Finish shall match existing adjoining finish in all respects.
9. Coordination Drawings: The plumbing contractor shall cooperate with the Fire Protection Systems, and Electrical contractors in the development of the coordination drawings. The specified order in which the various trade contractors impose their work on the coordination drawings is not intended to grant priority to any one trade contractor in the allocation of space. At the completion of this phase, hold a coordination meeting to eliminate any interference among the trades that the drawings indicate and to avoid any conflicts in installing the Work.

1.02 CODES AND STANDARDS

- A. It shall be unlawful for any person to perform the work referred to under this Plumbing and Drainage Specifications and/or shown on the Plumbing and Drainage Contract Drawings unless such person is a licensed master plumber, partnership, corporation or other business association as permitted by the New York State Building Code and unless such work is performed under the direct and continuing supervision of a licensed master plumber.
- B. Where requirements for products, materials, systems, equipment, methods and other portion of the work specified herein exceed minimum requirements of regulatory agencies having jurisdiction over the construction work, contractor shall comply with such requirements specified herein, unless specifically approved otherwise by the Owner.

1.03 TORCH BURNING OPERATION

- A. The storing and use of oxygen and combustible gases in conjunction with torch burning apparatus is subject to the Rules and Regulations of the New York State Building and Fire Code. Fire watches shall be provided during all operations using torches for burning, cutting or welding.
- B. The cost of permits, certificates, fire watches, apparatus and other items required in the torch burning operation shall be borne by the Contractor at no additional cost to the Owner.

1.04 PROTECTION OF MATERIALS AND WORK

- A. Existing Building
 1. Open ends of piping shall be temporarily closed by a proper fitting, until piping is approved and ready for service.

2. Equipment and other items shall be protected during the progress of the Work. When the building is practically complete and ready for use the fixtures and other items shall be cleaned and all metal work polished and the entire installation put in perfect working order.

1.05 GUARANTEES AND WARRANTIES

- A. The Requirements of Section G01740 and this Article shall apply to Guarantees and Warranties.
- B. Contractor's Guarantees: The Contractor guarantees that all Work of this Contract is free from all defects, and is as specified, and that should any defects, which cannot be proven to have been caused by improper use, develop within the space of one year from the date of substantial completion of the Work, such defects shall be made good by the Contractor, free of cost to the Owner.

1.07 OPENINGS AND CHASES

- A. Openings through exterior foundation walls shall be made watertight by the Contractor after pipes, conduits and other items passing through the wall have been installed. This building is planned and detailed, and is the intent of these specifications to provide a structure that will prevent the penetration by rodents and vermin of any vacant space where they might find a harborage. The Contractor will be held responsible for securing this condition by the closing of all points of access to such spaces, including the passage of piping and conduits, through all walls, partitions, ceilings and furred out spaces, the closing of access to voids in hollow tile or cinder blocks. There shall be a special inspection of the building with regard to this matter before final acceptance.

1.08 INSTRUCTION OF STAFF

- A. After the plumbing, drainage systems have been tested, and fixtures, apparatus and all other items adjusted and operating properly to the satisfaction of the Owner, Contractor shall furnish a competent person to instruct the staff in the operation and maintenance of the systems. Contractor shall video record all the training sessions for various equipment and systems as specified in individual sections of these Specifications. Determination of the date and time of such instruction shall be under the direction of the Owner.

1.10 SUBMITTALS

- A. Formal submission for approval of manufacturer is required as per manufacturer/model number or series listed in the specification. Formal submissions are required for materials and appurtenances (ex. sheet metal, pipes, etc.) as defined in the specification. Submittals are always required to verify capacity. Schedules, installation instructions, startup manuals, operation and maintenance manuals, and shop drawings are always required to be submitted.

1.11 CLEANING AND REPAIR

- A. At the completion of the Work and before the final inspection is made the Contractor shall thoroughly clean all apparatus, appurtenances, piping, and leave these items free from all marks, scratches, stains, and other damage. All equipment shall be cleaned and left in

condition to operate, and the work, as a whole, left in perfect working order. Remove all tools, debris and excess materials from the premises.

- B. Contractor shall not leave sharp exposed metal edges (bottom of threaded rods, P&D equipment supports, etc.) that could otherwise present safety hazards to the building's occupants/work staff.

END OF SECTION

SECTION 220523

VALVES

PART 1 GENERAL

1.01 ABBREVIATIONS

- A. IBBM: Iron body, bronze mounted.
- B. OS&Y: Outside screw and yoke.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets and specifications for each valve type.

1.03 MAINTENANCE

- A. Special Tools:
 - 1. One wrench for each type and size wrench operated plug valve.

PART 2 PRODUCTS

2.01 VALVES - GENERAL

- A. Valve Standardization: Valves from one or more manufacturers may be used, however valves supplied for each specific valve type shall be the product of one manufacturer.
- B. Valves shall be first quality, free from all imperfections and defects, with body markings indicating manufacturer and rating.
- C. Valve parts of same manufacturer, size and type shall be interchangeable.
- D. Manually operated gate, globe and angle valves shall be of rising stem type, unless otherwise specified.
- E. Valves which use packing, shall be capable of being packed when wide open and under full working pressure.
- F. Size valves the same size as the piping in which they are installed, unless specified otherwise.

2.02 GATE VALVES

- A. 125 psig WSP, 200 psig WOG up to 12 inch size, and 150 psig WOG for 14 inch and 16 inch sizes; IBBM OS&Y, bolted bonnet, solid wedge disc, and threaded or flanged ends depending on size. Acceptable Valves: Crane 464-1/2, 465-1/2, Hammond IR1140, Milwaukee F2885, Nibco T6170 & F6170, and Stockham G620 & G623

2.03 GLOBE AND ANGLE VALVES

N/A

2.04 CHECK VALVES

- A. 125 psig WSP, 200 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 372, & 373, Hammond IR1124, Jenkins 623CJ & 624CJ, Milwaukee F2974, Nibco F918, and Stockham G927 & G931.

2.05 PLUG VALVES

N/A

2.06 BUTTERFLY VALVES

N/A

2.07 WATER PRESSURE REDUCING VALVES

N/A

2.08 SAFETY AND RELIEF VALVES

N/A

2.09 NEEDLE STOP VALVES

N/A

2.10 GAGE COCKS

N/A

2.11 BALL VALVES

- A. 150 psig WSP, 600 psig WOG, 2 piece bronze body, solid blow-out proof stem, teflon seats, chrome plated brass ball, teflon seals, corrosion resistant steel lever handles with vinyl grips, balancing stop, and threaded or solder ends.
Acceptable Manufacturers: Conbraco, Hammond, Milwaukee, Nibco, and Watts.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Install valves at locations noted on the drawings or specified.

END OF SECTION

SECTION 220529

PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Companion high density filler pieces for installation over the top 180 degree surface of pipe or tubing, at points of support where a combination clevis hanger, insulation shield and high density insulating saddle are installed.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. N/A

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.
 - 2. Details of pipe anchors.
 - 3. Details and method of installing sway braces for cast iron soil pipe.
- B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with the applicable requirements of the ASME B31 Piping Codes.
 - 2. Unless otherwise shown or specified, comply with the requirements of the Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) Standards SP-58, and SP-69.
 - 3. Materials for use in Sprinkler Systems and Standpipe and Hose Systems shall comply with the requirements of NFPA 13 and NFPA 14 as applicable.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.
 - 1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of

the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
Up to 2-1/2	4	16	6	10

- B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18

- C. Pipe Covering Protection Saddles: 3/16 inch thick steel, of sufficient depth for the insulation thickness specified, notched so that saddle contact with the pipe is approximately 50 percent of the total axial cross section. Saddles for pipe 12 inches in size and larger shall have a center support.
- D. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut.
1. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches in size and larger.
 2. Swivel ring type hangers will be allowed for sprinkler piping up to a maximum of 2 inches in size.
- E. Adjustable Floor Rests and Base Flanges: Steel.
- F. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.
- G. Riser Clamps: Malleable iron or steel.

2.02 ANCHORS AND ATTACHMENTS

- A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN, HN, or FS Series.
- B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS Series.
- C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips S Series.

- D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI Series, or Red Head/Phillips J Series.
- E. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS Series.
- F. Beam Clamps: Forged steel beam clamp, with weldless eye nut (right hand thread), steel tie rod, nuts, and washers, Grinnell's Fig No. 292 (size for load, beam flange width, and rod size required).
- G. Metal Deck Ceiling Bolts: B-Line Systems' Fig. B3019.
- H. Continuous Slotted Type Concrete Insert, Galvanized:
 - 1. Load Rating 800 lbs/ft: Kindorf's D-986.
 - 2. Load Rating 1500 lbs/ft: Kindorf's D-980.
 - 3. Load Rating 3000 lbs/ft: Hohmann & Barnard's Inc. Type CS-H.
 - 4. Load Rating 4500 lbs/ft: Hohmann & Barnard's Inc. Type CS-HD.
- I. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded to receive 3/4 inch diameter machine bolts.
- J. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept 3/4 inch diameter bolts having special wedge shaped heads.

2.03 FASTENERS

- A. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

2.04 SHOP PAINTING AND PLATING

- A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium plated, cadmium plated or galvanized shall be shop coated with metal primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper pipe or copper tubing.
- B. Hanger supports for chromium plated pipe shall be chromium plated brass.

PART 3 EXECUTION

3.01 PREPARATORY WORK

- A. Place inserts into construction form work expeditiously, so as not to delay the Work.

3.02 INSTALLATION

- A. Do not hang or support one pipe from another or from ductwork.
 - 1. Do not bend threaded rod.

- B. Support all insulated horizontal piping conveying fluids below ambient temperature, by means of hangers or supports with insulation shields installed outside of the insulation.
- C. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.
1. For Steel, and Threaded Brass Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10
2-1/2 and up	12

2. For Copper Pipe and Copper Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	6
2 and over	10

3. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.
4. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.
5. For Branch Piping Runs and Runouts Over 5 feet In Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.
6. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.
9. Support floor drain traps from the overhead construction, with hangers of type and design as required and approved. Overhead supports are not required for floor drain traps installed directly below earth supported concrete floors.
- D. Size hanger rods in accordance with the following:

PIPE OR TUBING SIZE (Inches)	SINGLE ROD HANGER SIZE (Inches)		DOUBLE ROD HANGER SIZE (Inches)	
	PIPE	TUBING	PIPE	TUBING
1/2 to 2	3/8	1/4	3/8	1/4
2-1/2 and 3	1/2	3/8	3/8	1/4

1. Size hanger rods, for piping over 12 inches in size and multiple line supports, based on a safety factor of five for the ultimate strength of the materials being used.
 2. Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger attachment. A total of four nuts are required for each rod, two at upper hanger attachment and two at hanger.
- E. Vertical Piping:
1. Support vertical risers of piping systems, by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 25 feet, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.
 2. Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps.
 3. Install intermediate supports between riser clamps on maximum 6 foot centers, for copper tubing risers 1-1/4" in size and smaller, installed in finished rooms or spaces other than mechanical equipment machine or steam service rooms, or penthouse mechanical equipment rooms.
 4. Support cast iron risers, by means of heavy duty hangers installed close to the base of the pipe risers, and 1/4 inch thick malleable iron or steel riser clamps with extension arms at each floor level, with the distance between clamps not to exceed 25 feet. Support cast iron risers in vertical shafts equivalent to the aforementioned.
 5. Support hubless cast iron risers, by means of heavy duty hangers installed close to the base of the pipe risers, and by malleable iron or steel riser clamps with the extension arms at each floor level, with the distance between clamps or intermediate supports not to exceed 12 feet. Support risers in vertical shafts equivalent to the aforementioned.
- F. Floor Supports: Install adjustable yoke rests with base flanges, for the support of piping, unless otherwise indicated on the Drawings. Install supports in a manner, which will not be detrimental to the building structure.

- G. Underground Cast Iron Pipe Supports: Firmly bed pipe laid underground, on solid ground along bottom of pipe. Install masonry piers for pipe laid in disturbed or excavated soil or where suitable bearing cannot be obtained. Support pipe, laid proximate to building walls in disturbed or excavated soil, or where suitable bearing cannot be obtained, by means of wall brackets or hold-fasts secured to walls in an approved manner.

3.03 UPPER HANGER ATTACHMENTS

- A. General:
 - 1. Secure upper hanger attachments to overhead structural steel, steel bar joists, or other suitable structural members.
 - 2. Do not attach hangers to steel decks that are not to receive concrete fill.
 - 3. Do not attach hangers to precast concrete plank decks less than 2-3/4 inches thick.
 - 4. Do not use flat bars or bent rods as upper hanger attachments.
- B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.
 - 1. Do not use drive-on beam clamps.
 - 2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.
 - 3. Do not drill holes in main structural steel members.
 - 4. Beam clamps, with tie rods as specified, may be used as upper hanger attachments for the support of piping, subject to clamp manufacturer's recommended limits.
- C. Attachment to Existing Cast-In-Place Concrete:
 - 1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.
 - 2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.

3.04 ANCHORS, RESTRAINTS, RIGID SUPPORTS, STAYS AND SWAY BRACES

- A. Install pipe anchors, restraints and sway braces, at locations noted on the Drawings. Design anchors so as to permit piping to expand and contract freely in opposite directions, away from anchor points. Install anchors independent of all hangers and supports, and in a manner that will not affect the structural integrity of the building.
- B. Cast Iron Soil Piping Systems:
 - 1. Where piping is suspended on centers in excess of 18 inches by means of non-rigid hangers, provide sway braces, of design, number and location in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.
 - 2. Additionally, brace piping 5 inches and larger to prevent horizontal movement and/or joint separation. Provide braces, blocks, rodding or

other suitable method at each branch opening, or change of direction in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.

3.05 PIPING IN TUNNELS

- A. Support piping in tunnels on adjustable stanchions, fabricated in accordance with the details on the Drawings, unless otherwise indicated. Install, secure and be responsible for the proper locations of all cast-in-place inserts and stanchion supports, in ample time so as not to delay construction Work. Secure tops of stanchions to overhead construction, as required and approved.

3.06 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

- A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for cold service. Furnish companion high density vapor barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.07 PIPE INSULATION SHIELDS

- A. Unless otherwise specified, install a pipe insulation shield, at all points of support. Center shields on all hangers and supports outside of high density insulation insert, and install in such a manner so as not to cut, or puncture jacket.

3.08 PIPE COVERING PROTECTION SADDLES

- A. Install pipe covering protection saddles at all points of support, for steel piping 6 inches in size and larger, insulated with hot service insulation. Weld saddles to piping to insure movement with pipe.

END OF SECTION

SECTION 220553

PIPE AND VALVE IDENTIFICATION

PART 1 GENERAL

1.01 REFERENCES

- A. ANSI A13.1 - Scheme for Identification of Piping Systems.

1.02 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions for each item specified.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. W.H. Brady Co., Milwaukee, WI.
- B. Emed Co., Buffalo, NY.
- C. Panduit Corp., Tinley Park, IL.
- D. Seton Nameplate Corp., New Haven, CT.

2.02 PIPE MARKERS AND ACCESSORIES

- A. Snap-on Marker: One piece wrap around type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, 3/4 inch adhesive strip on inside edge, and 360 degree visibility.
- B. Strap-On Marker: Strip type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, factory applied grommets, and pair of stainless steel spring fasteners.
- C. Stick-On Marker: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, and integral flow arrows for applications where flow arrow banding tape is not being used.
- D. Pipe Marker Legend and Color Field Sizes:

OUTSIDE DIAMETER OF PIPE OR INSULATION (Inches)	LETTER SIZE (Inches)	LENGTH OF COLOR FIELD (Inches)
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1-1/4	12

- E. Banding Tapes: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating.
1. Plain Tape: Unprinted type; color to match pipe marker background.
 2. Flow Arrow Tape: Printed type with integral flow arrows; color to match pipe marker background.
- F. Pipe Size Labels: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, vertical reading pipe size in inches, and legend size matching adjacent pipe marker.

2.03 PIPE SERVICE IDENTIFICATION TAGS

- A. Type: No. 19 B & S gage brass, with 1/4 inch high pipe service abbreviated legend on one line, over 1/2 inch high pipe size legend in inches, both deep stamped and black filled; and 3/16 inch top hole for fastener.
- B. Size: 2 inch square tag.
- C. Fasteners: Brass "S" hook or brass jack chain of size as required for pipe to which tag is attached.

2.04 VALVE SERVICE IDENTIFICATION TAGS

- A. Type: No. 19 B & S gage brass, with 1/4 inch high valve service abbreviated lettering on one line over 1/2 inch high valve service chart number, both deep stamped and black filled; and with 3/16 inch top hole for fastener.
- B. Sizes:
1. Plumbing Use: 1-1/2 inch hexagon.
- C. Fasteners: Brass "S" hook or brass jack chain of size as required for valve stem or handle to which tag is attached.

2.05 VALVE SERVICE IDENTIFICATION CHART FRAMES

- A. Type: Satin finished extruded aluminum frame with rigid clear plastic glazing, size to fit 8-1/2 x 11 inches valve chart.

PART 3 EXECUTION

3.01 PREPARATION

- A. Complete testing, insulation and finish painting work prior to completing the Work of this Section.
- B. Clean pipe surfaces with cleaning solvents prior to installing piping identification.
- C. Remove dust from insulation surfaces with clean cloths prior to installing piping identification.

3.02 INSTALLATION

- A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.
- B. Stick-On Pipe Markers:
 - 1. Install minimum of 2 markers at each specified location, 90 degrees apart on visible side of pipe.
 - 2. Encircle ends of pipe markers around pipe or insulation with banding tape with one inch lap. Use plain banding tape on markers with integral flow arrows, and flow arrow banding tape on markers without integral flow arrows.
- C. Pipe Size Labels: Install labels adjacent to each pipe marker and upstream from flow arrow. Install a minimum of 2 pipe size labels at each specified location, 90 degrees apart on visible side of pipe.
- D. Pipe Service Identification Tags: Attach tags to piping being identified with "S" hooks or jack chains.

3.03 PIPING IDENTIFICATION SCHEDULE

- A. Piping Identification Types:
 - 1. Piping or Insulation under 3/4 inch od: Pipe identification tags.
 - 2. Piping or Insulation 3/4 inch to 5-7/8 inch od: Snap-on marker or stick-on marker.
 - 3. Piping or Insulation 6 inch od and Larger: Strap-on marker or stick-on marker.
- B. Identify exposed piping, bare or insulated, as to content, size of pipe and direction of flow, with the following exceptions:
 - 1. Piping in non-walk-in tunnels or underground conduits between manholes.
 - 2. Piping in furred spaces or suspended ceilings, except at valve access panels where valves and piping shall be identified as specified for exposed piping systems.

3. Piping in finished spaces such as offices, class rooms, wards, toilet rooms, shower rooms and spaces as specified.
- C. Locate piping identification to be visible from exposed points of observation.
1. Locate piping identification at valve locations; at points where piping enters and leaves a partition, wall, floor or ceiling, and at intervals of 20 feet on straight runs.
 2. Where 2 or more pipes run in parallel, place printed legend and other markers in same relative location.

3.04 VALVE IDENTIFICATION SCHEDULE

- A. Valve Service Identification Tags:
1. Tag control valves, except valves at equipment, with a brass tag fastened to the valve handle or stem, marked to indicate service and numbered in sequence for the following applications:
 - a. Domestic water valves controlling mains, risers and branch runouts.
 - b. Gas valves controlling mains, risers, and branch runouts.
 - c. Valves in sprinkler and fire standpipe systems, except hose valves.
- B. Valve Service Identification Charts:
1. Provide 2 framed valve charts for each piping system specified to be provided with valve identification tags. Type charts on 8-1/2 x 11 inches heavy white bond paper, indicating valve number, service and location.
 2. Hang framed charts at locations as directed.

END OF SECTION

SECTION 220800

CLEANING AND TESTING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Testing Sprinkler System: NFPA-13.

1.02 SUBMITTALS

- A. Quality Control Submittals
 - 1. Test Reports (Field Tests): Submit data for each system tested, and/or disinfected; include date performed, description, and test results for each system.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Perform factory testing of factory fabricated equipment in complete accordance with the agencies having jurisdiction.
 - 2. Perform field testing of piping systems in complete accordance with the local utilities and other agencies having jurisdiction and as specified.

1.04 PROJECT CONDITIONS

- A. Protection: During test Work, protect controls, gages and accessories which are not designed to withstand test pressures. Do not utilize permanently installed gages for field testing of systems.

1.05 SEQUENCING AND SCHEDULING

- A. Transmit written notification of proposed date and time of operational tests to the Director's Representative at least 5 days in advance of such tests.
- B. Perform cleaning and testing Work in the presence of the Director's Representative.
- C. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction Work, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Test Equipment and Instruments: Type and kind as required for the particular system under test.
- B. Test Media (air, vacuum, water): As specified for the particular piping or system under test.
- C. Cleaning Agent (water): As specified for the particular piping, apparatus or system being cleaned.

PART 3 EXECUTION

3.01 PRELIMINARY WORK

- A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.

3.02 PRESSURE TESTS - PIPING

- A. Piping shall be tight under test and shall not show loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.
- B. Water Systems:
 - 1. Domestic water (potable cold, domestic hot and recirculation) inside buildings:
 - a. Before fixtures, faucets, trim and accessories are connected, perform hydrostatic test at 125 psig minimum for 4 hours.
 - b. After fixtures, faucets, trim and accessories are connected, perform hydrostatic retest at 75 psig for 4 hours.
- C. Gas Piping: Before backfilling or concealment perform air test of duration and pressure as required by the local gas company. However, for gas piping designed for pressures of from 4 inches to 6 inches water column, air test at 15 inches Hg for one hour, without drop in pressure. Test gas piping with air only. Check joints for leaks with soap suds.
- D. Air Piping:
 - 1. Compressed Air: Test with air at 150 psig for one hour.
 - 2. Check joints for leaks with soap suds.

- E. Drainage, Vent, Conductor and Roof Drain Piping (Inside Buildings): Perform tests before fixtures are installed. Test by filling the entire system with water, and allowing to stand for 3 hours, with no noticeable loss of water. Test joints under a minimum head of 10 feet of water, except the uppermost section. Test the uppermost section to overflowing.

3.03 TESTING OF EQUIPMENT, APPARATUS AND APPURTENANCES

- A. Relief Valves: Increase pressure in equipment or apparatus to relief valve setting, to test opening of valves at required relief pressures.

3.04 DISINFECTION OF POTABLE WATER SYSTEMS

- A. Disinfect potable water pipe and equipment installed in the Work of this Contract.
 - 1. Completely fill the piping, including water storage equipment if installed, with a water solution containing 50 mg/L available chlorine, and allow stand for 24 hours. Operate all valves during this period to assure their proper disinfection.
 - 2. After the retention period, discharge the solution to an approved waste and flush the system thoroughly with water until substantially all traces of chlorine are removed. Drain and flush water storage equipment if installed.
- B. Connect plumbing fixtures and equipment and place the system into service. Prevent recontamination of the piping during this phase of the Work.

END OF SECTION

SECTION 221100

PLUMBING PIPING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Through Penetration Firestops: Section 078400.
- B. Sealants: Section 079200.

1.02 REFERENCES

- A. NFPA 13 - Standard for the Installation of Sprinkler Systems.
- B. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Catalog sheets and specifications indicating manufacturer name, type, applicable reference standard, schedule, or class for specified pipe and fittings.
 - 2. Material Schedule: Itemize pipe and fitting materials for each specified application in Pipe and Fittings Schedule in Part 3 of this Section. Where optional materials are specified indicate option selected.
- B. Quality Control Submittals
 - 1. Copy of hydraulic press fitting manufacturer's printed field inspection procedures for hydraulic press joints in copper tubing.
 - 2. Brazer Qualification Data: Copies of certification; include names, home addresses and social security numbers of brazers.

1.04 QUALITY ASSURANCE

- A. Qualification of Brazers: Comply with the following:
 - 1. The persons performing the brazing and their supervisors shall be personally experienced in brazing procedures.

PART 2 PRODUCTS

2.01 STEEL PIPE AND FITTINGS

- A. Steel Pipe for Threading: Standard weight, Schedule 40, black; ASTM A 53 or ASTM A 135.
- B. Malleable Iron, Steam Pattern Threaded Fittings:

1. 150 lb Class: ASME B16.3.
- D. Cast Iron Fittings:
 1. Steam Pattern, Threaded: ASME B16.4.
 - a. Standard Weight: Class 125.
 - b. Extra Heavy Weight: Class 250.
 2. Flanged Fittings and Threaded Flanges: ASME B16.1.
 - a. Standard Weight: Class 125.
 - b. Extra Heavy: Class 250.
- E. Unions: Malleable iron, 250 lb class, brass to iron or brass to brass seats.
- F. Couplings: Same material and pressure rating as adjoining pipe, conforming to standards for fittings in such pipe. Use taper tapped threaded type in screwed pipe systems operating in excess of 15 psig.
- G. Nipples: Same material and strength as adjoining pipe, except nipples having a length of less than one inch between threads shall be extra heavy.

2.02 COPPER AND BRASS PIPE, TUBING AND FITTINGS

- A. Copper Tube, Types K, L, and M: ASTM B 88.
- B. Wrot Copper Tube Fittings, Solder Joint: ASME B16.22.
- D. Drainage Tube, Type DWV: ASTM B 306.
- F. Wrot Copper Drainage Tube Fittings, Solder Joint: ASME B16.29.
- G. Cast Copper Alloy Drainage Fittings, Solder Joint: ASME B16.23.
- H. Unions: Cast bronze, 150 lb Class, bronze to bronze seats, threaded or solder joint.
- K. Flared Tube Fittings:
 1. Water Tube Type: ASME B16.26.
 2. Refrigerant Tube Type: SAE J513.

2.03 CAST IRON PIPE AND FITTINGS

N/A

2.04 DUCTILE IRON PIPE AND FITTINGS

N/A

2.05 COUPLINGS AND FITTINGS FOR GROOVED END PIPE

N/A

2.06 BOLTED MECHANICAL BRANCH CONNECTION

N/A

2.07 JOINING AND SEALANT MATERIALS

- A. Thread Sealant:
 - 1. LA-CO Industries', Slic-Tite Paste with Teflon.
 - 2. Loctite Corp.'s No. 565 Thread Sealant.
 - 3. Thread sealants for potable water shall be NSF approved.
- B. Solder: Solid wire type conforming to the following:
 - 1. Type 3: Lead-free tin-silver solder (ASTM B 32 Alloy Grade E, AC, or HB); Engelhard Corp.'s Silvabrite 100, Federated Fry Metals' Aqua Clean, or J.W. Harris Co. Inc.'s Stay-Safe Bridgit.
- C. Soldering Flux for Soldered Joints: All-State Welding Products Inc.'s Duzall, Engelhard Corp.'s General Purpose Liquid or Paste, Federated Fry Metals' Water Flow 2000, or J.W. Harris Co. Inc.'s Stay-Clean.

2.08 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

N/A

2.09 DIELECTRIC CONNECTORS

N/A

2.10 PIPE SLEEVES

- A. No. 16 gage galvanized sheet steel.

2.11 FLOOR, WALL AND CEILING PLATES

- A. Cast Brass: Solid type with polished chrome plated finish, and set screw.
 - 1. Series Z89 by Zurn, 929 Riverside Drive, Grosvonordale, CT 06255, (800) 243-1830.
 - 2. Model 127XXXX by Maguire Mfg., Cheshire CT 06410, (203) 699-1801.
- B. Stamped Steel: Split type, polished chrome plated finish, with set screw.
 - a. Figures 2 and 13 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.

- C. Cast Iron or Malleable Iron : Solid type, galvanized finish, with set screw:
 - 1. Model 395 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.
 - 2. Model 900-016XX by Landsdale International, Westville, NJ 08093, (800) 908-0523.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install piping at approximate locations indicated, and at maximum height.
- B. Install piping clear of door swings, and above sash heads.
- C. Make allowances for expansion and contraction.
- D. Allow for a minimum of one inch free air space around pipe or pipe covering, unless otherwise specified.
- E. Install horizontal piping with a constant pitch, and without sags or humps.
 - 1. Water Piping: Pitch 1/4 inch per 10 feet upward in direction of flow, unless otherwise noted. If it is not possible to maintain constant pitch, establish a new low point and continue. At the low point, provide a 1/2 inch drip leg and gate valve with a hose bibb end. Provide an air vent at the high point.
 - 2. Drainage Piping: Pitch 1/4 inch per foot downward, in direction of flow, unless otherwise noted.
- F. Install vertical piping plumb.
- G. Use fittings for offsets and direction changes, except for Type K soft annealed copper temper water tube.
- H. Cut pipe and tubing ends square; ream before joining.
- I. Threading: Use American Standard Taper Pipe Thread Dies.
 - 1. Thread brass pipe with special brass threading dies.

3.02 DRAINAGE SYSTEMS

- A. Fittings:
 - 1. Use long turn drainage pattern fittings, unless space conditions prohibit their use; in such cases, short turn pattern fittings may be used.
 - 2. Vertical Offsets: Make vertical offsets with 45 degree elbows, or 1/8 bends.
 - 3. Tucker Fittings: Tucker fittings may only be installed in vertical piping.
- B. Cleanouts:
 - 1. Install cleanouts with sufficient side and end clearance to allow for the removal of the cleanout plug, and the use of cleaning tools.

2. Lubricate cleanout plugs with anti-seize lubricant.

3.03 DOMESTIC WATER PIPING SYSTEM

N/A

3.04 NATURAL GAS PIPING SYSTEM

N/A

3.05 COMPRESSED AIR PIPING SYSTEM

N/A

3.09 PIPE JOINT MAKE-UP

N/A

3.10 PIPING PENETRATIONS

N/A

3.11 FLOOR, WALL AND CEILING PLATES

- A. Install plates for exposed uninsulated piping passing thru floors, walls, ceilings, and exterior concrete slabs as follows:
 1. In Finished Spaces:
 - a. Piping 4 Inch Size and Smaller: Solid or split, chrome plated cast brass.
 - b. Piping Over 4 Inch Size: Split, chrome plated cast brass.
 2. Unfinished Spaces (Including Exterior Concrete Slabs): Solid, unplated cast iron.
 3. Fasten plates with set screws.
 4. Plates are not required in pipe shafts or furred spaces.

3.12 PIPE AND FITTING SCHEDULE

- A. SEE DWG'S

END OF SECTION

**SECTION 230500
COMMON WORK RESULTS FOR HVAC**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

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

1.03 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Refer to the Instructions to Bidders and the Division 1 Sections for requirements in selecting products and requesting substitutions.

1.04 SCOPE OF WORK

- A. The following is a general listing of work items to be provided under this Contract. Work indicated is not necessarily all inclusive, nor shall it limit the extent of the work or exclude any work shown or specified and not listed.
- B. Work as indicated in the contract documents and as specified, including but not limited to the complete removal of material and equipment from the site.
- C. Furnish and install all materials, equipment, and labor to make the following complete installations:
 - 1. All work as shown and indicated on the Contract Documents.

1.05 PRODUCT LISTING

- A. Prepare a listing of major equipment and materials for the project. Submit this listing for approval.
- B. When two or more items of same material or equipment are required (pumps, valves, etc.) they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and 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.
- C. Provide products which are compatible within systems and other connected items.

1.06 NAMEPLATE DATA

- A. Provide permanent operational data nameplate on each item of power operated equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

1.07 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.
- C. Coordinate deliveries of 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.

1.08 DIMENSIONAL INFORMATION

- A. Dimensional information used for layout and locations shall be taken from architectural or structural drawings used by the construction trades.
- B. HVAC drawings are diagrammatic and have no dimensional significance. Do not scale. Locations of equipment and piping are to be as:
 - 1. Shown on Architectural drawings;
 - 2. Directed in the field;
 - 3. Required for proper connection of equipment to be served;
 - 4. Required for proper symmetry in the space involved;
 - 5. With deviations made only with specific approval of Architect.
- C. Review the drawings of other trades and contractors, exchange shop drawings with them, cooperate in the preparation or prepare space layouts as required, to avoid conflicts and interferences with the installation of other trades in advanced stages of construction.
- D. Contractor shall field verify all existing conditions and coordinate with other trades prior to installation of equipment and material. It is recommended that the contractor verify all existing conditions prior to submitting a bid. Lack of field verification does not constitute a basis for additional monies during construction. Contractor assumes full responsibility for completeness of installation including coordination of work with other trades.

1.09 SUBMITTALS

- A. Submit manufacturer's technical product data and installation instructions for materials and products.
- B. Record Drawings: At project closeout, submit record drawings of the installed work; in accordance with requirements of Division 1.

1.10 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance manuals for all equipment and materials specified herein.
- B. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
- C. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions.
- D. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
- E. Servicing instructions and lubrication charts and schedules.

1.11 WARRANTIES

- A. Refer to Division 1 for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.
- B. Compile and assemble the warranties 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 of 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.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 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.

3.02 INSTALLATIONS

- A. Coordinate equipment and materials installation with other building components.
- B. Verify all dimensions by field measurements.
- C. Arrange for chases and openings in other building components to allow for installations.
- D. 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.

- E. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- F. Coordinate the cutting and patching of building components to accommodate the installation of equipment and materials.
- G. Where mounting heights are not detailed or dimensioned, install overhead and materials to provide the maximum headroom possible.
- H. Install 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.
- I. Coordinate the installation of materials and equipment above ceilings with suspension system, light fixtures, and other installations.
- J. Coordinate connection of systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, and controlling agencies. Provide required connection for each service.

3.03 CUTTING AND PATCHING

- A. This Article specifies the cutting and patching of equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.
- B. Refer to the Division I Sections for general requirements for 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 the 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 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 Owner, uncover and restore work to provide for the Owner's observation of concealed work.
- G. Cut, remove and legally dispose of selected equipment, components, and materials as indicated, including, but not limited to removal of piping, valves, trim, and other 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 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 transit services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

END OF SECTION 230500

SECTION 230529 - PIPE HANGERS AND SUPPORTS

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Shop Drawings:
1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.
 2. Details of pipe anchors.
- B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.
1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
UP to 2-1/2	4	16	6	10

- B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18

- C. Pipe covering Protection Saddles: 3/16 inch thick steel, of sufficient depth for the

insulation thickness specified, notched so that saddle contact with the pipe is approximately 50 percent of the total axial cross section. Saddles for pipe 12 inches in size and larger shall have a center support.

PIPE SIZE (Inches)	SADDLE LENGTH (Inches)	SADDLE GAGE
8" and up	12"	7 (3/16")

- D. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches IPS and larger.
 - 1. Swivel ring type hangers will be allowed for sprinkler piping up to a maximum of 2 inches in size.
- E. Adjustable Floor Rests and Base Flanges: Steel
- F. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.
- G. Riser Clamps: Malleable iron or steel.
- H. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, 2-1/2 to 20 inches, from single rod if horizontal movement caused by expansion and contraction might occur.
- I. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, 2 to 30 inches, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction
- J. Restraints, Anchors, and Supports for Grooved End Piping Systems: As recommended by the grooved end fitting manufacturer.
- K. Foam Insulated Pipe Hanger: Single-piece thermally insulated pipe hanger with self-adhesive closure. CFC-free PET load-bearing segments embedded in closed cell insulation with outer shell of 30-mil thick painted aluminum.

2.02 FASTENERS

- A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN1405, HN-1614, FS-1411 Series. -
- B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS-3822.
- C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips Series S-14.
- D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI

Series, or Red Head/Phillips J Series.

- E. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS-38 Series.
- F. Continuous Slotted Type Concrete Insert, Galvanized:
 - 1. Load Rating 800 lbs/ft: Kindorf's D-986.
 - 2. Load Rating 1500 lbs/ft: Kindorf's D-980.
 - 3. Load Rating 3000 lbs/ft: Hohmann & Barnard's Inc. Type CS-H.
 - 4. Load Rating 4500 lbs/ft: Hohmann & Barnard's Inc. Type CS-HD.
- G. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded to receive 3/4 inch dia machine bolts.
- H. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept 3/4 inch dia bolts having special wedge shaped heads.
- I. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

2.03 SHOP PAINTING AND PLATING

- A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium plated, cadmium plated or galvanized shall be shop coated with zinc chromate primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper pipe or copper tubing.
- B. Hanger supports for chromium plated pipe shall be chromium plated brass.

PART 3 - EXECUTION

3.01 PREPARATORY WORK

- A. Place inserts into construction form work expeditiously, so as not to delay the work.

3.02 INSTALLATION

- A. Do not hang or support one pipe from another or from ductwork.
- B. Support all insulated horizontal piping by means of hangers or supports with insulation shields installed outside of the insulation.
- C. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.
 - 1. For Copper Pipe and Copper Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
3/4 and under	5

2. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.
3. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.
4. For Branch Piping Runs and Runouts over 5 Feet in Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.
5. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.

D. Size hanger rods in accordance with the following:

PIPE OR TUBING SIZE (Inches)	SINGLE ROD HANGER SIZE (Inches)		DOUBLE ROD HANGER SIZE (Inches)	
	Pipe	Tubing	Pipe	Tubing
1/2 to 2	3/8	1/4	3/8	1/4

1. Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger attachment. A total of four nuts are required for each rod, two at upper hanger attachment and two at hanger.

E. Vertical Piping:

1. Support vertical risers of piping systems, by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 10 feet on copper pipe and 15 feet on steel pipe, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.
2. Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps.

F. Floor Supports: Install adjustable yoke rests with base flanges, for the support of piping, unless otherwise indicated on the Drawings. Install supports in a manner, which will not

be detrimental to the building structure.

3.03 UPPER HANGER ATTACHMENTS

A. General:

1. Do not use drive-on beam clamps.
2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.
3. Do not drill holes in main structural steel members.
4. "C" clamp type of upper hanger attachments with restraining straps may be used as upper hanger attachments for the support of piping up to a maximum of 3 inches in size and a temperature from 50 degrees F to 200 degrees F.

B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.

1. Do not use drive-on beam clamps.
2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.
3. Do not drill holes in main structural steel members.
4. "C" clamp type of upper hanger attachments with restraining straps may be used as upper hanger attachments for the support of piping up to a maximum of 3 inches in size and a temperature from 50 degrees F to 200 degrees F.

C. Attachment to Concrete Filled Steel Decks (Total thickness, 2-1/2 inches or more): Where necessary, attach hangers to the deck with welding studs (except at roof decks), thru-bolts with fish plates or tee hangers. Do not support a load, in excess of 250 lbs from any single welded stud.

D. Attachment to Existing Cast-In-Place Concrete:

1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.
2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.

E. Attachment to Cored Precast Concrete Decks (Flexicore, Dox Plank, Spancrete, etc.): Secure attachments to structural steel wherever possible. When fill is applied over decks, thru-bolts and fish plates may be used to support piping up to a maximum of 4 inches in size; mechanically expanded rod hangers or toggle bolts may be installed in cells for the support of piping up to a maximum of 2-1/2 inches in size.

G. Attachment to Hollow Block or Tile Filled Concrete Decks: Secure hangers to structural steel wherever possible. Inserts may also be used by omitting a block and pouring a solid concrete block, with a cast-in-place insert where required.

H. Attachment to Waffle Type Concrete Decks: Provide cast-in-place inserts where required. When fill is applied over deck, thru-bolts and fish plates may be used.

I. Attachment to Precast Concrete Tee Construction:

1. Secure hangers to tees by any of the following methods:
 - a. Tee hanger inserts between adjacent flanges.
 - b. Thru-bolts and fish plates, except at roof deck without concrete fill.
 - c. Dual unit expansion shields in webs of tees. Install shields as high as possible in the webs.
2. Exercise extreme care in the field drilling of holes to avoid damage to reinforcing.
3. Do not use powder driven fasteners.

3.04 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

- A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for cold and hot service insulated piping. Direct hanger contact of pipe for hot or cold piping is not allowed. Furnish companion high density vapor barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.05 PIPE SUPPORT FOR SYSTEMS INSULATED WITH FLEXIBLE ELASTOMERIC FOAM

- A. Install a single-piece thermally insulated pipe hanger with self-adhesive closure at all points of support for piping or tubing to be insulated for cold and hot service insulated piping. Direct hanger or clamp contact of pipe for hot or cold piping is not allowed.

3.06 PIPE INSULATION SHIELDS

- A. Install a pipe insulation shield (unless provided with a combination clevis hanger as described above) at all points of support, for cold and hot service insulated piping. Direct hanger contact of pipe for hot or cold piping is not allowed. Center shields on all hangers and supports, and install in such a manner so as not to cut, puncture or compress insulation.

END OF SECTION

**SECTION 230554
EQUIPMENT IDENTIFICATION**

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions for each item specified

1.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver paint to the Site in original, new unopened containers, bearing manufacturers' printed labels.
- B. Store materials at the site where directed. Keep storage space clean and accessible to the Engineer at all times.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Paint: Semi-gloss enamel (latex base) complying with the requirements of FS TT-P-001511.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Do not execute the Work of this Section until all testing, insulation and finish painting Work have been completed.
- B. Place drop cloths or other suitable protection as required to avoid damage and paint spatters on adjacent surfaces.

3.02 EQUIPMENT IDENTIFICATION

- A. Identify mechanical equipment, bare or insulated, installed in the following spaces or rooms, by means of painted stenciled legends:
 - 1. Elevator Machine Room
 - 2. Outdoors – Provide engraved aluminum nameplate
- B. Paint stenciled legends black, a minimum of 1-1/2 inches (6 inches in Mechanical Equipment Rooms) in height, located to be readily visible from a reasonable point of view. Place identification along center line of equipment, if possible.
- C. Engraved Plastic-Laminate Signs (Interior use where paint stencil is not appropriate.):

1. ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white (letter color) melamine subcore, except when other colors are indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
2. Engraved with engraver's standard letter style, of sizes and with terms to match equipment identification.
3. Thickness: 1/16 inch, for units up to 20 square inches or 8 inches length; 1/8 inch for larger units
4. Fasteners: Self-tapping stainless steel screws or aluminum pop rivet

D. Engraved Aluminum Nameplate:

1. Black surface, with white (letter color). Fabricate in sizes required for message. Provide two side holes for mechanical fastening.
2. Engraved with engraver's standard letter style, of sizes and with terms to match equipment identification.
3. Thickness: 0.020 inch.
4. Fasteners: Self-tapping stainless steel screws or aluminum pop rivet

E. Samples of Equipment Identification:

1. Air Conditioning Unit AC-1, ACC-1

3.03 ACCESS DOOR IDENTIFICATION

- A. Access doors adjacent to fire damper, smoke damper or smoke detector shall be identified with letters no less than 1/2" high in accordance with NYS IMC.

3.04 APPLICATION OF PAINT

- A. Stencil Painting: Apply with a brush or aerosol type spray can.

3.05 CLEANING

- A. Clean adjacent surfaces of paint spatters resulting from the Work of this Section.

END OF SECTION

**SECTION 230593
CLEANING AND TESTING**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Quality Control Submittals
 - 1. Test Reports (Field Tests):
 - a. Refrigeration Systems: Submit results of Refrigeration Systems Pressure - Dehydration Tests.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Perform factory testing of factory fabricated equipment in complete accordance with the agencies having jurisdiction.
 - 2. Perform field testing of piping systems in complete accordance with the local utilities and other agencies having jurisdiction and as specified.

1.03 PROJECT CONDITIONS

- A. Protection: During test Work, protect controls, gages and accessories which are not designed to withstand test pressures. Do not utilize permanently installed gages for field testing of systems.

1.04 SEQUENCING AND SCHEDULING

- A. Transmit written notification of proposed date and time of operational tests to the Owner at least 5 days in advance of such tests.
- B. Perform cleaning and testing Work in the presence of the Owner.
- C. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction Work, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Test Equipment and Instruments: Type and kind as required for the particular system under test.
- B. Test Media (air, gas, refrigerant, vacuum, water): As specified for the particular piping or system under test.

PART 3 EXECUTION

3.01 PRELIMINARY WORK

- A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.
- B. Connections or extension of existing piped systems: Prior to connecting to any existing system(s), the Mechanical Contractor shall take sample of fluid and provide test reports of the existing fluids chemical, residuals and or glycol concentration to the Engineer for acceptance. If the test results have not been provided prior to connection, the Mechanical Contractor shall be held responsible in bringing the entire hydronic system within acceptable specifications. The Mechanical Contractor shall top off the new or existing glycol feed tank, at project closeout.
- C. Thoroughly clean compressed air, control air, refrigerant pipe and similar systems prior to pressure or vacuum testing.

3.02 PRESSURE TESTS - PIPING

- A. Piping shall be tight under test and shall not show loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.
- B. Water Systems:
 - 1. Circulating water systems, including condensate drains, unless otherwise specified:
 - a. Before final connections are made perform hydrostatic test at 1-1/2 times the maximum working pressure, but not less than 125 psig, for 4 hours.

3.03 REFRIGERATION SYSTEMS - TESTING, DEHYDRATION AND CHARGING

- A. Leak Test Procedure:
 - 1. Refrigerant Piping Systems:
 - a. Pressurize with dry nitrogen to 50 psig and test for leaks using a bubble type solution.
 - b. Release this partial test pressure and correct deficiencies.
 - c. Charge system with a trace of refrigerant to 15 psig, then add dry nitrogen until system test pressures are reached and retest for leaks with an electronic leak detector.
 - d. Release pressure, repair leaks and retest as necessary until no leaks occur.
 - e. Recover refrigerant used for leak testing.
 - 2. System Test Pressures:
 - a. Charge system with dry nitrogen and trace of refrigerant (HFC 134A, HFC 245, HFC 404, HFC 407C, HFC 410A or HFC 507) to 350 psig and retest for leaks with an electronic leak detector. The system must stay at 350 psig pressure for 24 hours to pass the system test pressure test.

- b. Release pressure, repair leaks and retest as necessary until no leaks occur.
 - c. Recover refrigerant used for leak testing.
- B. Dehydration:
 - 1. Air Conditioning Systems:
 - a. Following pressure tests, dehydrate each system with a vacuum pump.
 - b. Draw and hold an initial vacuum of 500 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.
 - c. Draw and hold a second vacuum of 500 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.
 - d. Verify vacuum obtained with an electronic vacuum gage.
- C. Refrigerant Charging: Follow equipment manufacturer's printed charging directions unless otherwise specified.
 - 1. Introduce refrigerant of type and quantity required through a filter/drier installed in the temporary charging line.
 - a. Purge small amount of liquid out of the system side of the charging hose.
 - b. Prevent moisture and other contaminants from entering the system.
 - 2. Charge liquid refrigerant through a charging valve provided in the high pressure side of the system.
 - a. Small amounts of gaseous refrigerant may be charged through the compressor suction service valve port.
 - 3. No bubbles shall appear at the moisture-liquid indicator when the system is fully charged and operational. Do not overcharge.
 - 4. Record the weight in pounds of refrigerant charged into each system and submit this record to the Owner.
- D. Compressor Oil Charge: Pump oil into the compressor after the last vacuum has been preformed. Follow all Manufactures Recommended for oil type and amount to be installed.
- E. Adjustments and Operational Testing:
 - 1. Adjustments: Place the system in operation with automatic controls functioning. Adjust controls and apparatus for proper operation. Test thermometers and gages for accuracy over the entire range. Remove and replace items found defective.
 - a. Check belts, fan blades, fittings, TXV bulbs, and electrical connections for tightness before start up.
 - b. Check TXV bulb for proper location should be between 8 and 10 o'clock or 2 & 4 o'clock.
 - c. Seal off all holes in the condition space as specified.
 - d. Provide a point to point control check of the system to ensure that the specified inputs and outputs are receiving the signal from the proper sensors or controlling the proper device.
 - e. Set pressure controls and safety controls.
 - f. Close or de-energize all solenoids, and start up the system.
 - g. Check that all controls and safety switches are operating properly.
 - h. Adjust TXV for proper super heat back to the compressors.
 - i. Clean TXV strainers as many times as required.

- j. After one week of run time, change the liquid cores if they are the replaceable type.
 - k. After one month of run time, replace the liquid cores and compressor suction socks. Replace the liquid cores as required. Clean the TXV's as required.
2. Operational Test:
- a. Place system in operation, with final connections to equipment and with automatic controls operating, and operate for a minimum of 120 consecutive hours.
 - b. Operational test shall prove to the satisfaction of the Owner that the system can produce the cooling effect required by the drawings and the specifications.

END OF SECTION

SECTION 230700

PIPING INSULATION

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Through Penetration Firestops: Section 078400.

1.02 ABBREVIATIONS

- A. FS: Federal Specification.
- B. K: Thermal Conductivity, i.e., maximum Btu per inch thickness per hour per square foot.
- C. pcf: Pounds per cubic foot.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for the following:
 - 1. Insulation Materials.

1.04 QUALITY ASSURANCE

- A. Qualifications: The persons installing the Work of this Section and their Supervisor shall be personally experienced in mechanical insulation work and shall have been regularly employed by a company installing mechanical insulation for a minimum of 5 years.

PART 2 PRODUCTS

2.01 PIPING INSULATION

- A. Insulation shall be a flexible, closed-cell elastomeric pipe insulation: AP Armaflex, AC Accoflex. Adhesive shall be Armaflex 520, 520 Black or 520 BLV Adhesive. The insulation must conform to ASTM C534 Grade 1, Type I.

2.02 MISCELLANEOUS MATERIALS

- A. Pressure Sensitive Tape for Sealing Laminated Jackets:

1. Acceptable Manufacturers: Alpha Associates, Childers, Ideal Tape, Morgan Adhesive.
 2. Type: Same construction as jacket.
- B. Wire, Bands, and Wire Mesh:
1. Binding and Lacing Wire: Nickel copper alloy or copper clad steel, gage as specified.
 2. Bands: Galvanized steel, 1/2 inch wide x 0.015 inch thick, with 0.032 inch thick galvanized wing seals.
 3. Wire Mesh: Woven 20 gage steel wire with 1 inch hexagonal openings, galvanized after weaving.

PART 3 EXECUTION

3.01 PREPARATION

- A. Perform the following before starting insulation Work:
1. Install hangers, supports and appurtenances in their permanent locations.
 2. Complete testing of piping.
 3. Clean and dry surfaces to be insulated.

3.02 INSTALLATION, GENERAL

- A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions unless otherwise specified.
- B. Provide continuous piping insulation and jacketing when passing thru interior wall, floor, and ceiling construction.
1. At Through Penetration Firestops: Coordinate insulation densities with the requirements of approved firestop system being installed. See Section 078400.
 - a. Insulation densities required by approved firestop system may vary with the densities specified in this Section. When this occurs use the higher density insulation.
- C. Do not intermix different insulation materials on individual runs of piping.

3.03 INSTALLATION AT HANGERS AND SUPPORTS

- A. Reset and realign hangers and supports if they are displaced while installing insulation.

3.09 PIPING INSULATION SCHEDULE

- A. General: Provide insulation as scheduled below, insulate all HVAC systems provided in this project in compliance with NYS Energy Code. Where the

insulation scheduled or noted in the construction documents exceeds the Energy Code, the greater requirement shall be provided. HVAC Systems provided require insulation per the Energy Code, but not indicated in the schedule below, shall be insulated as part of this project.

APPLICATION	PIPE SIZE	TYPE	MINIMUM THICKNESS	ADD'L
Condensate Drain	1-1/4" or less	A or B	1/2"	
	1-1/2" and above	A or B	1"	
Refrigerant	1-1/4" or less	B	1 1/2"	
	1-1/2" and above	B	2"	
Cold Services: Equipment, vessels and appurtenances for conveying, storing or processing materials, at or below ambient temperature	All	A or B	1 1/2"	
Hot Services: Equipment, vessels and appurtenances for conveying, storing or processing materials, at or above ambient temperature	All	A or B	1 1/2"	

Insulate all cold and hot service equipment in accordance with the schedule, except the items listed below:

- A. Air vents, pressure reducing valves, pilot lines, safety valves, relief valves; back pressure valves.
 - B. Flexible connectors.
 - C. Piping buried in the ground, unless otherwise specified herein.
 - D. Items installed by others, unless otherwise specified herein.
- B. Install all cold and hot service insulation intact through pipe sleeves, and openings in building construction, maintaining the vapor barrier integrity of the system.
- C. Insulate valve bodies up to but not including the packing nuts.

END OF SECTION

**SECTION 232000
HVAC PIPING**

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's name and the schedule, type of class of all pipe and fittings.
 - 1. Where optional materials are specified in the "Pipe and Fitting Schedule", provide a pipe schedule to indicate the options selected; including piped systems, pipe material and break down of pipe sizes.
- B. Quality Control Submittals
 - 1. Installers Qualification Data
 - a. Brazer Qualification Data for Refrigerant Piping: State refrigerant piping brazing experience; including names and list of previous project experience of brazers.

1.02 QUALITY ASSURANCE

- A. Qualifications of Brazers: Comply with the following:
 - 1. Section IX ASME Boiler and Pressure Vessel Code, Part QB Brazing.
 - 2. Certification of brazing operator by recognized authorities which require a qualification test.
 - 3. Refrigerant Piping: The persons performing the brazing and their supervisors shall be personally experienced in refrigerant piping brazing procedures.
- B. Codes and Standards
 - 1. Brazing: Certify brazing procedures, brazers, and operations in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Part QB Brazing for shop and job-site brazing of piping work or in accordance with AWS B2.2 standard for Brazing Procedure and Performance Qualification.
 - 4. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)
Compliance: Comply with:
MSS SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69 Pipe Hangers and Supports - Selection and Application
MSS SP-89 Pipe Hangers and Supports - Fabrication and Installation Practices
Piping shall be supported at distances not exceeding the spacing specified in MC Table 305.4 or in accordance with the above MSS standards.
 - 5. Comply with ANSI B31.1A, ASME Code for pressure Piping, and ASHRAE Equipment Guide.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

City of Yonkers
Will Library Elevator Upgrade

A. Refrigerant Piping

Operating Pressure	700 psig
Operating Temperature	40° - 120°F
Design Code (ANSI)	B31.5

PART 2 – PRODUCTS

2.01 COPPER TUBING AND FITTINGS

- A. Water Tube, Types L and M: ASTM B 88
- B. Wrot Copper Water Tube Fittings, Solder Joint: ASME B16.22
- C. Refrigerant Tube, Dry Sealed, Soft Annealed: ASTM B 280
- D. Flared Tube Fittings:
 - 1. Refrigerant Tube Type: SAE J513
- E. Flanges: Conform to the Standards for fittings used in systems.
 - 1. Brazing Flanges: ASME B16.24, hubs modified for brazing ends.
- F. Hydronic press fittings (press fit - pressure-sealed joints) by Viega ProPress, Elkhart Xpress, NIBCO Press System, Grinnell G-Press (or approved equal) up to and including 4" in diameter. O-rings: EPDM; Special Tools recommended and approved by the Manufacturer.
- G. Soldered or press fittings are not acceptable for refrigerant piping.

2.02 JOINING AND SEALANT MATERIALS

- A. Thread Sealant
 - 1. Lake Chemical Co.'s, Slic-Tite.
 - 2. Loctite Corp's pipe sealant with Teflon.
- B. Solder: Solid wire type conforming to the following:
 - 1. Lead-free tin-Silver solder (ASTM B 32 Alloy Grade Sn 96): All-State Welding Products Inc.'s 430, J. W. Harris Co. Inc.'s Stay-Brite or Engelhard Corp's Silvabrite.
- C. Soldering Flux for Soldered Joints
 - 1. Solder: All-State Welding Products Inc.'s Duzall; J. W. Harris Co. Inc.'s Stay-Clean; Engelhard Corp's General Purpose Liquid or Paste.
- D. Brazing Alloys

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1. AWS A5.8, Class BCuP-5, for brazing copper to brass, bronze, or copper; Englehard's Silvaloy 15; J. W. Harris Co.Inc.'s Stay-Silv 56; and Handy & Harman's Braze 560.
 2. AWS A5.8, Class BAg-7, for brazing copper to steel or stainless steel; Englehard's Silvaloy 56-T; J. W. Harris Co.Inc.'s Safety-Silv 56; and Handy & Harman's Braze 560.
- E. Brazing Flux: FS O-F-499, Type B; Handy & Harman's Handy Flux or J. W. Harris Co. Inc.'s Stay-Silv.

2.03 PIPE SLEEVES

- A. Type A: Schedule 40 steel pipe.
- B. Type B: No. 16 gauge galvanized sheet steel.
- C. Type C: Schedule 40 steel pipe and 1/4 inch steel collar continuously welded to pipe sleeve. Size steel collar as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.
- D. Type D: No. 16 gauge galvanized sheet steel with 16 gauge sheet steel metal collar rigidly secured to sleeve. Size metal collar as required to span a minimum of one cell or corrugation on all sides of the rough opening thru the metal deck.

2.04 FLOOR, WALL AND CEILING PLATES

- A. Cast Brass: Polished chrome plated finish, with set screw.
 1. Solid Type: Models 5 and 5T by Pegasus Manufacturing Inc., Cheshire, CT; and Models 951 – 960 (inclusive) by Bridgeport Plumbing Products, Moultrie, GA.
 2. Split Type: Models 3 and 3T by Pegasus Manufacturing Inc., Cheshire, CT.
- B. Cast Iron: Solid type, unplated, with set screw. Model 395 by Grinnell Corp., Cranston, RI.

2.05 DRIP PANS

- A. Fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 2 1/2". Reinforce top, either by structural angles or by rolling top over 1/4" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.

PART 3 - EXECUTION

3.01 INSTALLATION – GENERAL

- A. The drawings show the general arrangement of pipe equipment but do not show all required fittings and offsets that may be required. Provide all necessary fittings, offsets and pipe runs based on field measurements.
- B. Install vertical piping plumb and piping generally parallel to walls and column center

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lines, unless shown otherwise on the drawings. Space piping, including insulation, to provide one inch minimum clearance between adjacent piping or other surface. Unless shown otherwise, slope steam, condensate and drain piping down in the direction of flow not less than 25 mm (one inch) in 12 m (40 feet). Provide eccentric reducers to keep bottom of sloped piping flat.

- C. Install piping clear of door swings and above sash heads.
- D. Make allowances for expansion and contraction.
- E. Use fittings for offsets and direction changes, except for Type K soft temper water tube.
- F. Cut pipe and tubing ends square: ream before joining.
- G. Make final connections to equipment with unions, flanges, or mechanical type joint couplings.
- H. Provide taps and install wells in piping for EMS/control system sensors and flow measurement devices.
- I. Install pipes in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Align piping accurately at connections, within 1/16" misalignment tolerance. Comply with ANSI B31 Code for Pressure Piping.
- J. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations. Run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to 1/2" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation. All piping in finished and occupied spaces shall be concealed from view by locating piping in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated on the Drawings.
- K. Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures. Install drip pan under piping that must be run above electrical equipment. Do not run piping in stairwells or elevator equipment rooms except for systems serving those spaces.
- L. In the outlet from each cooling coil condensate drain pan, provide a tee with a brass plug at one end to facilitate cleaning of drain. Additionally, provide a single "P" trap for proper operation of the unit.
- M. Riser Casings: Unless otherwise indicated on the drawings, all exposed risers, including the drop risers, shall be enclosed in casings extending from floor to a height of 7'-6" above floor. Riser casings shall be installed after the pipe insulation work is completed, inspected and approved. Casings shall be made of 24-gage galvanized sheet steel, with the upper end wired with 1/8" half hard wire. Each casing shall be fastened to the wall at

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the upper end with a metal band and round head screws. Seams shall be located at the rear of the casing.

- N. Casing for pipe at or near floors: Where pipes at or near floors are indicated on the Drawings to be encased, pipes shall be supported, insulated, and then enclosed in a casing of No. 20-gage galvanized sheet steel.
- O. Protection of Refrigerant Piping Located Inside Buildings: Refrigerant piping and fittings installed at a height less than 7'-3" above the floor shall be concealed or otherwise protected from mechanical damage except at the point of connection to terminal equipment.
- P. Refrigerant piping that crosses an open space that affords passageway in any building shall be not less than 7'-3" above the floor unless the piping is located against the ceiling of such space. Refrigerant piping shall not be placed in any elevator, dumbwaiter or other shaft containing a moving object or in any shaft that has openings to means of egress. Refrigerant piping shall not be installed in an enclosed public stairway, stair landing or an exit.
- Q. Refrigerant piping shall not be installed in public corridors unless it complies with all of the following conditions:
 - 1. The refrigeration system to which the piping is associated utilizes a Group A-1 refrigerant and contains not more than 10 pounds of refrigerant per system, and there is not more than one system's refrigerant piping per tenant per public corridor; and
 - 2. A complete discharge of any one refrigerant system's charge into the volume of the public corridor would be insufficient to achieve 50% of the allowable refrigerant RCL set forth in ASHRAE Standard 34; and
 - 3. Refrigerant piping and fittings within a public corridor are installed with brazed joints or the refrigerant equipment manufacturer provided pre-charged tubing systems installed in accordance with the refrigerant equipment manufacturers instructions. Refrigerant piping and fittings shall be concealed or otherwise protected from mechanical damage.
- T. Refrigerant piping shall not penetrate floors, ceilings or roofs except the following:
 - 1. Penetrations connecting the basement and the first floor
 - 2. Penetrations connecting the top floor and a machinery penthouse or roof installation
 - 3. Penetrations connecting adjacent floors served by the refrigeration system.
 - 4. Penetrations by piping in a direct system where the refrigerant quantity does not exceed the RCL set forth in ASHRAE Standard 34 for the smallest occupied space through which the piping passes.
 - 5. Penetrations by piping enclosed by gas-tight, fire resistive duct or shaft as shown on the Drawings.

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- U. For steel piping runouts not detailed on the Drawings, use three elbow connections between runouts and mains.
- V. Connections to Equipment: provide three elbow runouts to all rotating equipment such as pumps and chillers. Provide swing connections for boilers. Provide two elbow connections to fuel oil tanks.
- W. Connections to Building Structure: connect to trusses and joints at panel points. Provide supplementary steel framing at panel points to transfer loads to framing.
- X. Connection to domestic water system shall be protected by reduced pressure principal backflow preventer.
- Y. Condensate drain piping from cooling coil drain pans shall be pitched at not less than one-eighth unit vertical in 12 units horizontal (1-percent slope) in the direction of discharge.

3.02 PIPE JOINT MAKE-UP

- A. Soldered: Thoroughly clean tube end and inside of fitting with sandpaper or wire brush. Apply flux to the pre-cleaned surfaces. Install fitting, heat to soldering temperature, and join the metals with type solder specified. Remove residue.
- B. Brazed Joint: Thoroughly clean tube end and inside of fitting with sandpaper or wire brush. Apply flux to the pre-cleaned surfaces. Install fitting, heat to brazing temperature, and join the metals with brazing alloy. Remove residue.
- C. Press-Fit (Pressure Seal) Fittings: Connections shall be made in accordance with the manufacturer's installation instructions. Copper tubing shall be cut at right angles using displacement type cutter or fine-toothed saw. Burrs shall be removed from inside and outside of tubing to prevent cutting sealing element. Mark insertion depth according to manufacturer's insertion depth chart. Seals and grip ring shall be checked for correct fit. Only the manufacturer's sealing elements shall be used. Press fitting shall be slid onto tubing while turning slightly to the marked depth. Oils or lubricants shall not be used. Fitting connections shall be made with the tool provided by manufacturer. The manufacturer's assembly tool shall be used to perform the pressing process. For locations where there is insufficient access to accommodate the pressing tool, this type of joint is not allowed. Sufficient clearance must be left around each joint to allow room for the pressing tool and jaw to be attached without interference when repairing the system in the future.

3.03 PIPING PENETRATIONS

- A. Sleeve Schedule: Unless otherwise shown, comply with the following schedule for the type of sleeve to be used where piping penetrates wall, floor, or roof construction.

<u>CONSTRUCTION</u>		<u>SLEEVE TYPE</u>
1.	Frame construction	None Required
2.	Foundation walls	A*
3.	Non-waterproof interior walls	B*

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4.	Non-waterproof interior floors on metal decks	D*
5.	Non-waterproof interior floors not on metal decks	B*
6.	Floors not on grade having a floor drain	A*
7.	Floors over mechanical equipment, steam service, machine and boiler rooms.	A
8.	Floors finished or to be finished with latex composition or terrazzo, and on metal decks.	D*
9.	Floors finished or to be finished with latex composition or terrazzo and not on metal decks.	A
10.	Earth supported concrete floors	None Required
11.	Exterior concrete slabs on grade	A
12.	Fixtures with floor outlet waste piping	None Required
13.	Metal roof decks	C
14.	Non-metal roof decks	A
15.	Waterproof floor on metal decks	D
16.	Waterproof floors not on metal decks	A
17.	Waterproof walls	A

* - core drilling is permissible in lieu of sleeves where marked with asterisks.

B. Diameter of Sleeves and Core Drilled Holes

1. Unless otherwise specified, size holes thru floors and walls in accordance with the through penetration fire stopping system being used.
2. Size holes thru exterior masonry walls or waterproofed walls above inside earth or finished floors, and exterior concrete slabs in accordance with the following:
 - b. Un-insulated (Bare) Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of pipe, unless otherwise specified.
 - c. Insulated Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of insulation, unless otherwise specified.
 - d. Mechanical Modular Seals: Size holes in accordance with the manufacturer's recommendations.

C. Length of Sleeves (except as shown otherwise on Drawings)

1. Walls and Partitions: Equal in length to total finished thickness of wall or partition.
2. Floors, Finished: Equal in length to total finished thickness of floor and extending 1/2 inch above the finished floor level, except as follows:
 - a. In furred spaces at exterior walls, extend sleeve one inch above the finished floor level.
3. Exterior Concrete Slabs: Equal in length to total thickness of slab and extending 1/2 inch above the concrete slab.
4. Roofs: Equal in length to the total thickness of roof construction, including insulation and roofing materials, and extending one inch above the finished roof level.

D. Packing of Sleeves and Core Drilled Holes

1. Use through-penetration firestop devices, forming materials, and fill, void or cavity materials to form through-penetration firestops to prevent the passage of flame, smoke, fumes, and hot gasses as detailed in the UL Fire Resistance

Directory, Warnock Hersey Certification Listings Book, or the Omega Point Laboratories Listings Directory. Where applicable design is not detailed in the Directories use forming materials and fill, void or cavity material to form appropriate through-penetration firestop in accordance with printed details and installation instructions from the Company producing the acceptable forming materials and fill, void or cavity materials.

2. Firestop through-penetration of floors, walls, partitions, ceilings, and roof in accordance with the fire resistance rating assigned to the walls, partitions, floors, ceilings, and roofs on the Construction Work Drawings.
3. Pack sleeves in exterior masonry walls or waterproofed walls above inside earth or finished floors with oakum to within 1/2 inch of each wall face, and finish both sides with one-part, non-sag polysulfide base sealant: Pecora's Synthacalk GC-9, Products Research and Chemicals PRC Rubber Calk 7000, or Sonneborn's One Part Polysulfide Sealant. Optional use of Mechanical Modular Seals is recommended.

3.04 FLOOR, WALL AND CEILING PLATES

- A. Install plates for exposed un-insulated piping passing thru floors, walls, and exterior concrete slabs as follows:
 1. In Finished Spaces
 - a. Piping 4 Inch Size and Smaller: Solid or split, chrome plated cast brass.
 2. Unfinished Spaces (including exterior concrete slabs): Solid, unplated cast iron.
 3. Fasten plates with set screws.
 4. Plates are not required in pipe shafts or furred spaces.

3.05 DRIP PANS

- A. Provide drip pans under piping passing over or within 3 feet of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to side of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line to the drain connection and run to a conspicuous location 6" above the floor, the nearest plumbing drain, or elsewhere as indicated on drawings.

3.06 CLEANING, FLUSHING, AND INSPECTING

- A. Clean exterior surfaces of superfluous materials and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items. Inspect pressure piping in accordance with procedures of ASME B31.
- B. Upon completion of the installation, remove all protecting materials, all scale and grease and leave in a clean condition for painting.
- C. Hanger Adjustments: adjust hangers so as to distribute loads equally on attachments.
- D. Support Adjustment: provide grout under supports so as to bring piping and equipment to proper level and elevation.

3.07 PIPING AND FITTING SCHEDULE

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- A. Abbreviations: The following abbreviations are applicable to the Pipe and Fitting Schedule.
- BS – black steel
 - CI – cast iron
 - GE – grooved end
 - GMI – galvanized malleable iron
 - GS – galvanized steel
 - MI – malleable iron
 - SE – screwed end
 - ST – steel
 - SW – standard weight
 - WE – weld weight
 - XH – extra heavy weight
- B. Where options are given, choose only one option for each piping service. Deviations from selected option will be allowed if reviewed with Engineer prior to installation.
- C. Schedule of Pipe and Fittings for the different piping services is as follows:
1. Refrigerants (RS, RL, HG & RD) 500 psig and less: Refrigerant lines shall be ACR tube per ASTM B280. Joints in refrigerant piping shall be brazed. Flared compression fittings may be used only at the terminal equipment connections for A1 refrigerants only. Soldered joints and mechanical press fittings for refrigerant lines are not permitted.
 2. Condensate Drain Piping: Type M hard temper copper tubing with wrought copper solder fittings, and solder or type L hard temper copper tubing with press fittings.

END OF SECTION 232000

SECTION 233300
DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 REFERENCES

ACGIH: American Conference of Governmental Industrial Hygienists.
NFPA: National Fire Protection Association.
SMACNA: Sheet Metal and Air Conditioning Contractors National Association, Inc.
UL: Underwriters Laboratories, Inc.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, diagrams, standard schematic drawings, and installation instructions for each manufactured product. Submit SMACNA Figure Numbers for each shop fabricated item.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Unless otherwise shown or specified, comply with the applicable requirements of the following:
 - 1. SMACNA: Gages of materials, fabrication, sealing, and installation shall be in accordance with the HVAC Duct Construction Standards Manual.
 - 2. NFPA: Standards No.'s 90A, 90B, 91, 96, and 101.
 - 3. UL: Standards No. UL181, UL555, and UL555S. Use UL181 for flexible duct; UL555 for fire dampers; UL555S for combination fire/smoke damper
 - 4. ACGIH: Follow the Hood Design Data, and Construction Guidelines for Local Exhaust Systems from the Industrial Ventilation Manual.

PART 2 - PRODUCTS

2.01 DAMPERS

- A. Smoke Dampers
 - 1. Construction Features
 - a. Fabricate in accordance with National Fire Protection Association.
 - b. Labeled and inspected by Underwriters Laboratories, Inc.
 - c. Leakage rated damper for use in smoke control systems, with a Class II/250 degree F per UL Standard 555S.
 - d. Blades-16 gauge channel.
 - e. 20 gauge galvanized steel sleeve (20" long).
 - f. Axles-1/2" square, plated solid steel stub.
 - g. Bearings-oil impregnated bronze.
 - h. Linkage-fixed type in air stream.
 - i. Stops-18 gauge galvanized steel.
 - j. Blade Edge Seals-silicone rubber.
 - k. 120 VAC Electric Actuator. Coordinate with existing fire alarm system.

- l. Dual position indication switches.
 - m. Damper shall be normally open.
 - n. Dampers shall be re-openable
- 2. Installation
 - a. Install at all locations shown on drawings.

PART 3 – EXECUTION

3.01 INSTALLATION - GENERAL

- 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.

3.02 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.

3.03 ADJUSTING AND CLEANING

- A. Adjusting: Adjust ductwork accessories for proper settings and adjust for proper action.
- B. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 237413

AIR CONDITIONERS – SPLIT SYSTEM

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Submit drawings for each size of factory fabricated roof curb.
- B. Product Data: Manufacturer's catalog sheets, brochures, performance charts, standard schematic drawings, specifications and installation instructions for each size unit
 - 1. Name, address, and telephone number of nearest fully equipped service organization.
- C. Contract Closeout Submittals:
 - 1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director's Representative.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Unit shall be factory tested and the design, construction and installation shall be in accordance with the following: ARI Standard 210, NFPA, UL, ASHRAE 15, Safety Code for Mechanical Refrigeration, and all State and Local codes or regulations having jurisdiction.
 - 2. Rate cooling capacities in accordance with ARI Standard 210.
 - 3. Electrical components shall be UL listed.

1.03 PRODUCT DELIVERY

- A. Deliver each unit as an integral factory packaged assembly.

1.04 MAINTENANCE

- A. Maintenance Service: A fully equipped authorized service organization capable of guaranteeing response within 8 hours to service calls shall be available 24 hours a day, 7 days a week to service the completed Work.
- B. Extra Materials: Provide with each unit, one spare set of air filters. Suitable box and label spare filters as to their usage.

PART 2 PRODUCTS

2.01 SINGLE EVAPORATOR DUCTLESS SPLIT SYSTEM

- A. Provide an air-to-air condenser/ heat pump (outdoor unit) in combination with a direct expansion fan-coil heat pump (indoor unit) in the location shown on the Drawings. The units shall be designed and tested for use with Refrigerant R-410A and be equipped with refrigerant line fittings which permit mechanical or sweat connection and shall be in accordance with NYSMC. The electrical requirements, the size, the cooling and heating capacities shall be as indicated on the Drawings.
- B. Unit shall be factory assembled, piped, and internally wired. Units shall be UL listed and carry a UL label. Unit shall be factory run-tested to check cooling and heating operation, defrost operation, fan and blower rotation and control sequence. Unit shall be designed to operate at ambient temperature between 115°F and 55°F in cooling mode (as shipped) and between 75°F and -20°F in heating mode.
- C. Coil shall be constructed with aluminum plate fins mechanically bonded to copper tubing with all joints brazed.
- D. The outdoor unit shall contain a semi-hermetic compressor with crankcase heater, automatically reversible oil pump, internal and external motor protection. Outdoor fan shall be propeller type, with vertical discharge and direct driven by a factory-lubricated motor.
- E. Indoor unit shall operate properly on horizontal position (with or without) ductwork. Unit shall have electric resistance heaters as specified for back-up of heat pump heating capacity) and shall contain refrigerant metering device and indoor fan relay. Fan shall be centrifugal type, belt driven.
- F. Controls and protective devices shall include a high pressure stat, loss-of-charge pressure stat, crankcase heater, suction line accumulator and pressure relief device. Motor compressor shall have both thermal and current sensitive overload devices. The outdoor unit shall provide short cycle protection or safety lockout compressor protection.
- G. Defrost control shall sense need to defrost every 90 minutes based on liquid temperature. On system using multiple units, a defrost interlock control shall be provided. A 24-volt transformer shall be factory installed and wired on outdoor units for external control circuit.
- H. System accessories shall include indoor thermostat, outdoor thermostat, head pressure control, heat pump piping package, return air grille, filters, electric resistant heaters, discharge air grille and plenum, suspension package, indoor coil defrost thermostat, sub-base, fan and drives, outdoor fan cycling thermostat, emergency heat control package, compressor short cycle protection and sequencer control.

- I. Each unit shall have the cooling and heating capacity, phase, voltage and amperage shown on the Drawings. Provide a metal name plate securely attached to the side of the unit (outdoor and indoor), readily visible. The name plate shall have inscribed on it, the following information in clear and legible lettering, manufacturer's name, Model No., month and year of installation, BTUH Rating, voltage and current rating for each unit.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Air Conditioners:
 1. Install air conditioners on roof curbs in complete accordance with the manufacturers' printed instructions, and as indicated.
 2. Provide all piping, electrical and ductwork connections to air conditioners through roof curb openings under units.

3.02 FIELD QUALITY CONTROL

- A. Preliminary Requirements: Employ the services of a Company Field Advisor of the rooftop air conditioner manufacturer for the following:
 1. Inspect air conditioner installations prior to start-up.
 2. Supervise initial start-up of machine.
 3. Instruction of State Personnel.
 4. Service.
- B. Pre-Start-Up, Start-Up and Instruction: Upon completion of the installation of the air conditioner, to the satisfaction of the Company Field Advisor, start-up and preliminary testing shall be accomplished under the Company Field Advisor's supervision. When all necessary adjustments have been made and air conditioner is properly operating, the Company Field Advisor shall instruct State Personnel in the operation and maintenance of the air conditioner and accessories. Provide a minimum of 8 hours for instruction purposes exclusive of all pre-start-up and start-up time.

END OF SECTION

SECTION 260010

GENERAL PROVISIONS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide labor, materials, tools, machinery, equipment, and services necessary to complete the Electrical Work under this Contract. All systems and equipment shall be complete in every aspect and all items of material, equipment and labor shall be provided for a fully operational system and ready for use. Coordinate the work with the work of the other trades in order to resolve all conflicts without impeding the job progress.
- B. When an item of equipment is indicated on a floor plan and not shown on associated riser diagram or vice-versa, the Contractor shall provide said item and all required conduit and wiring connections for a complete system as part of the Contract.
- C. All penetrations made into other trades work (e.g. wires, electrical boxes penetrating ductwork, etc) are to be sealed to air tight/watertight condition. Penetrations through insulated systems, such as refrigerated rooms/equipment, etc, shall be insulated and sealed on both sides of penetration. Sealant on interior side of such insulated spaces/equipment shall be silicone recommended by manufacturer.

1.03 EXAMINATION OF SITE

- A. The Contractor shall be held to have examined the site and to have compared it with the Drawings and Specifications, and deemed to have been satisfied as to the conditions existing at the site, as relating to the actual conditions of the site at the time estimating the Work, the storage and handling of materials, and all other matters as may be incidental to the Work under the Contract, before bidding, and no allowance will subsequently be made to the Contractor by reason of any error due to the Contractor's neglect to comply with the requirements of this clause.

1.04 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract.

1.05 ELECTRICAL EQUIPMENT

- A. All electrical equipment shall be the latest of the current year in design, material and workmanship, and shall be the type or model called for in these Specifications.
- B. If the type or model specified has been superseded by a later type or model, the latest shall be submitted for approval and shall be provided as part of the Contract.

1.06 SUBMITTALS

Provide as outlined in each individual section of these Specifications, including but not limited to:

- A. Product Data: Submit manufacturer's product data for equipment including capacity, performance charts, test data, materials, dimensions, weights, and installation instructions.
- B. Shop Drawings: Submit manufacture's shop drawings indicating dimensions, weight loading, required clearances, location, and method of assembly of components. Submittals are mandatory as noted in the respective specifications. Schedules, installation instructions, startup manuals, operation and maintenance manuals, and shop drawings are always required to be submitted.
- C. Samples
- D. Special Warranty
- E. Quality Assurance submittals
- F. Operation and Maintenance Manuals
- G. Test results and certificates
- H. Manuals.

1.07 COORDINATION DRAWINGS

- A. Coordination Drawings: The Electrical contractor shall cooperate with the HVAC, P&D, and Fire Protection Systems contractors in the development of the coordination drawings. The drawings, indicating ductwork, steam, hydronic & fuel piping, etc. shall be generated by the HVAC contractor, who in turn is to provide them to the Electrical contractor for the inclusion of electrical work in this coordination set. This is after the P&D and Fire Protection Systems contractors have entered their information in the set. The specified order in which the trade contractors impose their work on the coordination drawings is not intended to grant priority to any one trade contractor in the allocation of space. At the completion of this phase, hold a coordination meeting to eliminate any interference among the trades that the drawings indicate and to avoid any conflicts in installing the Work.

1.08 BUREAU OF ELECTRICAL CONTROL – NOT USED

1.09 WORK IN EXISTING BUILDINGS

- A. Removals, Replacements, Adjustments
 - 1. The Contractor shall remove, relocate, replace, adjust or adapt, all existing conduit, wiring and other electric equipment or apparatus, as required, to provide a complete installation.

2. The Work shall include, providing all materials, all necessary extensions, connections, cuttings, repairing, adapting and other Work incidental thereto, together with such temporary connections as may be required to maintain service pending the completion of the permanent Work. All Work shall be left in good working order and in a condition equal to the adjacent new or existing Work.

B. Care in Removing Existing Conductors

1. The Contractor shall use due care and diligence in removing existing conductors from existing conduits in order to prevent conductors from breaking and becoming an irretrievable obstruction within the conduits.

C. Cutting and Repairing

1. Whenever the cutting, or drilling, or removal of any part of the structure (ceilings, walls, floors, shelving, bookcases, partitions, etc.), is required in order to remove, relocate, alter or install any article of electrical equipment (including conduits, boxes, fittings, etc.), the Contractor shall perform all cutting, drilling, etc., and remove the section of structure required. After removal and installation of the electric equipment, the Contractor shall repair the section of structure, as directed by the Authority's Representative, with new materials, equal to that of adjacent structure of the same type.

Note that in general, all holes through existing structures for conduit installation shall be core drilled, unless prior written approval is provided by the Authority.

Contractor shall use extreme care when core drilling to avoid damaging the existing infrastructure.

Whenever holes are cut in fire-rated walls or floor slabs in order to permit the installation of conduit or electrical equipment, these holes shall be repaired with material that will restore the fire rating of the wall or floor slab to its original condition. This material shall be approved by MEA for this use.

2. The Contractor shall paint all repaired areas of the building. The paint shall match the paint of adjacent surface areas, or extend to the nearest architectural break-line, as directed.
3. Wherever any part of the structure is marred or damaged, the Contractor shall repair the damaged or marred areas of the structure.
4. Where a piece of electrical equipment is removed, the Contractor shall finish that part of the surface to match surroundings.

D. Disturbance of Asbestos-Containing Material

1. In the Work of this Contract, the Contractor may find it necessary to support conduit, outlet boxes, or electric equipment from wall or ceiling surfaces which

contain asbestos that has been encapsulated. The Contractor may also find it necessary to cut or drill through these surfaces.

Where this occurs, the Contractor must take all precautions required by law when disturbing asbestos-containing material.

- E. **Damaged Apparatus:** Should any damage, due to the execution of this Contract, occur to the furniture, fixtures, or any equipment or apparatus, such damage shall be properly repaired and/or replaced by the Contractor without charge.
- F. **Non-Interruption of Services**
 - 1. It is imperative that all existing services (electric, light, power, fire alarm, telecommunications, etc.) be kept in operation at all times, unless prior written approval is received from the Authority.
 - 2. Provide fire watch services, as necessary, during disruption of fire alarm system.
- G. In all cases where power to any equipment needs to be shut down, this must be done with the permission and in coordination with the Owner. In all such cases, the power source must be properly locked, as required by NEC, and the keys handed over to the Owner until such time that the power needs to be turned back on.

1.10 TESTS

- A. The Contractor shall make all tests, including insulation resistance test using a megger, required by the Owner's Representative to provide complete data which in the Owner's Representative's opinion is necessary and sufficient to prove that equipment, or any component part thereof (including wiring), meets the requirements of the Specifications, and the New York State Building Code.
- B. Such tests shall be made before, during and/or after installation of the equipment, at any time convenient and suitable to the Owner's Representative.
- C. The Contractor shall provide all apparatus, meters, conductors, equipment and labor required by the Owner's Representative for such tests; shall make any and all connections necessary; shall dismantle any piece of equipment where necessary for making tests; and in other ways render all assistance necessary. After satisfactory test results have been obtained the Contractor shall remove the testing equipment and restore the site and equipment to proper operating conditions.
- D. All defects found as a result of such tests shall be immediately corrected. Defective parts, or parts found not to be in accordance with the Specifications shall be immediately replaced with proper parts, all to the satisfaction of the Owner's Representative.

1.11 CLEANING AND REPAIR

- A. On completion of installation, inspect interior and exterior of installed equipment. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.
- C. Contractor shall not leave sharp exposed metal edges (bottom of threaded rods, electrical equipment supports, etc.) that could otherwise present safety hazards to the building's occupants/work staff.

1.12 ORDINANCES, PERMITS, FEES, ETC.

- A. The Contractor is required, at its own cost and expense, to obtain all necessary permits from all municipal or public authorities. The Contractor shall give all notices required by law, municipal ordinances, the rules and regulations of the various Municipal Bureaus and Departments and, as a part of the Contract, comply with all Municipal Ordinances or Regulations that may be applicable to this Work, together with all orders of the following:
 - 1. Fire Department.
- B. Should it be necessary to open the street pavement in the performance of this Contract, the Contractor shall pay the costs of the municipal agencies involved, to supervise the Work of excavating, backfilling and relaying pavements, etc., at such rate as required by Municipal Agency. The Contractor shall comply with the requirements of Article 10 of the New York State Labor Law, Rule 23, Industrial Code, State of New York, Department of Labor, latest edition, and all amendments thereto, insofar as the provision of such law is applicable to the Work.
- C. Attention is called to provisions of the Building Code regarding support of walls adjoining excavations, sidewalk sheds, scaffolding, roofs of adjoining buildings, floors to be filled in or covered, protection of floors, openings, overloading, etc., which provisions shall be complied with.
- D. Certificates:
 - 1. The Contractor shall provide and deliver to the Owner's representative all permits and certificates of approval issued by the various Departments in connection with this work, before the certificate for final payment is issued.

SECTION 260521

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None.

1.02 DESCRIPTION OF WORK

- A. Install all conductors as indicated on the Drawings, as specified, or as required for the proper operation of the various systems specified. All connections shall be made complete, and all systems shall be energized and tested for proper operation.
- B. The Drawings generally indicate the wiring required for the installation and proper operation of the systems specified. If the Contractor chooses to install a system requiring different wiring, any alternate material and labor required to furnish and install the wiring for the new alternate system shall be furnished by the Contractor as part of this Contract without extra cost to the Owner.
- C. All safety devices, such as pressure controls, fire controls, relays, etc., shall have their electric switching mechanism connected to the ungrounded conductor or conductors.
- D. Control Wiring for Safety devices for equipment where failure of operation will cause a hazard to life and property shall comply the New York State Electrical Code.
- E. When an item of equipment is indicated on a floor plan and not shown on associated riser diagram or vice-versa, the Contractor shall provide said item and all required conduit and wiring connections for a complete system as part of the Contract.
- F. Note is made that grounding conductors required by Code for installation of Greenfield, Sealtite and surface metal raceway are not indicated on the Drawings, but shall nevertheless be provided under this Contract, as required by Code.

1.03 RELATED SECTIONS

- A. Section 260533: "Raceway and Boxes".

1.04 QUALITY ASSURANCE

- A. Wire manufactured over one year prior to delivery to the site, will not be accepted.
- B. Tapes for splices or termination shall be dated by the tape manufacturer to indicate that they have been manufactured no longer than six months prior to use in the Work of this Section.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Conductors shall be of an approved manufacturer and shall be delivered at the building in original packages or on reels, and shall have the tag of the manufacturer attached thereto indicating:
 - 1. Contractor's name.
 - 2. Project title and number.
 - 3. Date of manufacture (month & year).
 - 4. Manufacturer's name.
 - 5. Data, which explains the meaning of, coded identification (UL assigned electrical reference numbers, UL assigned combination of color marker threads, etc.).
- B. Store material in a clean, dry space and protect from weather.

1.06 SUBMITTALS

- A. Submit the following:
 - 1. Splice kit materials and installation procedures.
 - 2. Manufacturer's certification that its product meets the Owner's Standards and Specifications.
- B. Certificates

Provide affidavit stating that all items used are UL listed and meet the specifications.
- B. Submit field test results for wires and cables, including "Megger" readings with the method used.
- C. Corrected (as built) Riser Diagrams for all systems including Power System, etc., shall be provided by the Contractor. Riser diagrams shall be on mylar and shall be installed behind glass faces in approved wooden frames. Riser diagrams shall be installed where and as directed by the Owner.

1.07 COLOR CODE ELECTRIC LIGHT AND POWER WIRE

- A. Color code for branch circuits and feeders are as follows:
 - 120/208 Volt Circuits Conductors
 - Black - Phase "A"
 - Red - Phase "B"
 - Blue - Phase "C"
 - White - Neutral
 - Green - Ground
- B. 277/480 Volt Circuit Conductors

Brown - Phase "A"
Yellow - Phase "B"
Orange - Phase "C"
White - Neutral
Green - Ground

Where color coded cable is not available, the contractor shall certify same in writing and request permission for overlap - color taping of conductors (min. length 6" in.) in all visible and accessible locations, pull boxes, junction boxes, outlet boxes, etc.

- C. Color code for wiring other than electric light and power, in accordance with ICEA & NEMA WC-30 "Color Coding of Wires."

PART 2 – PRODUCTS

2.01 WIRES AND CABLES

A. General

1. Acceptable Companies

- a. American Insulated Wire Corp., Belden Wire & Cable, Cable Corp., Cerro Wire & Cable Corp., Collyer Insulated Wire Co., Ettco Wire and Cable Corp., General Electric Co., Hi-Tech Cable Corp., Philadelphia Insulated Wire Co., Pirelli Cable Corp., Rome Cable Corp., Royal Electric, Southwire Co., or Triangle PWC, Inc.
- b. Conductors shall conform to A.S.T.M. and I.P.C.E.A. standards, and be UL listed and labeled.
- c. Conductors shall have 600 volts insulation and shall be of soft-annealed-uncoated copper of 98% conductivity. Copper clad conductors are not acceptable. Conductors No. 10 and smaller for lighting and power shall be solid; conductors No. 8 and larger shall be stranded. Control & communication wiring shall be stranded.
- d. All conductors shall have identifiable lettering on the insulator jacket as to voltage rating, wire type, A.W.G. size, insulation, and manufacturer I.D.

2. Conductors in conduit in contact with the earth, in slab contiguous to the earth, outside the building, and service feeders to Main Distribution Boards from Current Transformers shall be type THWN.

3. Conductors shall meet the requirements of the New York State Electrical code.

4. Conductors, for low voltage HVAC controls, such as thermostats, aquastats, indicators etc., shall be type "TF" with not less than 1/32" thermoplastic insulation, colored and labeled as required.

Conductors for low voltage communications systems, such as telephone, Intercom, etc., shall be as specified in those respective sections.

B. Description

1. Type THHN/THWN-75°C, THHN-90°C shall have a thermo-plastic polyvinyl chloride insulation with nylon jacket for 600 volts, and shall comply with ASTM, IPCEA S-61-402 (latest edition) and NEMA WC5 (latest edition).
2. Type USE -600V-75° C. Cable shall be capable of operating continuously at a temperature of 75°C, in both wet and dry locations, with RHW insulation.
3. Type TF shall be capable of operating continuously at a temperature of 60°C. shall meet the requirements of ICEA S-61-402 (latest edition), NEMA WC 5, and ASTM].
4. Type TFFN (stranded) shall be thermoplastic insulated, jacketed by abrasion and oil resistant nylon, rated at 105°C.
5. Metal clad cable of the armored type (commonly known as BX) shall be Type AC. It shall be industry standard, factory fabricated assembly of cross linked polyethylene insulated nylon jacketed 98% conductivity soft drawn copper conductors, and a flexible metallic covering of interlocked galvanized steel or aluminum. A continuous ground conductor in intimate contact with the armor for the entire cable length shall be included in the assembly. The assembly shall be UL listed rated at 600 volts and 90°C.
6. Armored cable shall be manufactured by AFC/Monogram, General Cable, Triangle, or National Electric Armored cable.

2.02 SPLICES AND TAPES

A. General

1. All splices shall be UL approved and per New York State Electric Code and with accepted practice and good workmanship. The conductivity and physical strength of splices shall be equal to that of the unspliced conductor.
2. All splicing and terminating materials shall be compatible so that no one material will adversely affect the physical or electrical properties of any other, or of the wire or cable itself.
3. All materials for making splices and terminations shall be specifically designed for use with the type of wire or cable, insulation and installation and operating conditions of the specific application. Splices for fire alarm system wiring shall be soldered or mechanically connected, as approved by Code and Fire Department regulations.
4. Grounding conductors and bonding jumpers shall be connected by exothermic welding, listed pressure connectors, listed clamps, or other listed means.

2.03 TAGS

- ### **A. Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inches high.**
1. Phenolic: Two color laminated engraver's stock, 1/16" minimum thickness, machine engraved to expose inner core color (white).

2. Aluminum: Standard aluminum alloy plate stock, minimum .032" thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Prior to pulling wires and cable, clean raceway systems of all foreign matter and perform all operations necessary so as not to cause damage to wires and cables while pulling. Install all conductors in raceways after raceway system is completed.
- B. Use approved lubrication when installing cables in conduits and raceways. Any pulling compounds shall be compatible with the finish of the wires and cables furnished.
- C. Prior to pulling wires and cables into underground conduit systems, place a feeding tube at the entrance end of such systems.
- D. Shared neutrals shall be permitted except in lighting multiples.

3.02 INSTALLATION

- A. General
 1. At least 6 inches of free conductor, measured from the point in the box where it emerges from its raceway or cable sheath, shall be left at each outlet, junction and switch point for splices or the connection of luminaries or devices. Where the opening of an outlet, junction or switch point is less than 8 inches in any dimension, each conductor shall be long enough to extend at least 3 inches outside the opening
 2. Keep wires and cable clean & dry at all times.
 3. Seal wire and cable ends with watertight end seals.
 4. Before splicing or terminating wires and cables, make a thorough inspection to determine that water has not entered the wires and cables or that the wires and cables have not been damaged.
 5. Use adequate lubrication when installing cables in conduits and raceways. Any pulling compounds shall be compatible with the finish of the wires and cables furnished. No grease, oil, or lubricant other than wire-pulling compounds specified may be used to facilitate the installation of conductors.
- B. Splices
 1. Dry Locations:

- a. For Conductors No. 8 AWG or Smaller: Use spring type pressure connectors or indent type pressure connectors with insulating jackets (except where special type splices are required).
 - b. For Conductors No. 6 AWG or Larger: Use uninsulated indent type pressure connectors. Fill indentions with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with heat shrinkable splices.
 - c. Gutter Taps in Panelboards: Install gutter tap, fill indentions with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with gutter tap cover.
2. Damp Locations: As specified for dry locations, except apply moisture-sealing tape over the entire insulated connection (moisture sealing tape not required if heat shrinkable splices are used).
 3. Wet Locations: Use uninsulated indent type pressure connectors and insulate with resin splice kits or heat shrinkable splices. Exception: Splices above ground which are totally enclosed and protected in NEMA 3R, 4, 4 x enclosures may be spliced as specified for damp locations.
 4. Fire Detection and Alarm System: Soldered connections or mechanical connections approved for the intended use.

C. Identifications of Wires and Cables

1. Each wire and cable shall be identified by its circuit in all cabinets, boxes, manholes, hand holes, wireways and other enclosures and access locations, and at all terminal points.
2. The circuit designations shall be as shown on the Contract Drawing or as approved on shop drawings. Tags shall be attached to wires and cables in such a manner as to be readily visible.
3. The tape ties shall be wrapped around all conductors comprising the circuit or feeder to be identified.
4. Wires and cables, which are arc proofed, shall also be identified outside the applied arc proofing.

D. Terminations

1. For Conductors No. 10 AWG or Smaller: Use terminals for:
Connecting wiring to equipment designed for use with terminals.
2. For Conductors No. 8 AWG or Larger: use compression or mechanical type lugs for:
 - a. Connecting cables to flat bus bars.
 - b. Connecting cables to equipment designed for use with lugs.

3. For Conductor Sizes Larger Than Terminal Capacity On Equipment: Reduce the larger conductor to the maximum conductor size that terminal can accommodate (reduce section no longer than 1 ft.). Use compression or mechanical type connectors suitable for reducing connection. Insulate with filler tape and electrical tape specified above. Cutting of cable strands to fit terminal is not acceptable.
4. The temperature rating of all splicing hardware including lugs must match the temperature rating of the conductor. If not properly selected, the conductors ampacity must be derated.

3.03 FIELD TESTS

- A. Test all feeder cables installed under this Contract with a 1000-volt Megohmmeter. Furnish the Owner's Representative with a copy of the "Megger" readings together with an outline of the method used. Any cable not attaining 100 meg shall be replaced.

Feeder cables shall be defined as cables feeding service switchgear, distribution panels, power panels, lighting panels, control panels and disconnect switches rated 60 amps. or larger.

3.04 EQUIPMENT GROUNDING CONDUCTOR

- A. Note that equipment-grounding conductors are not shown on the Contract Drawings but it shall be provided when and as required by code.

3.05 INSULATED CONDUCTOR SCHEDULE - TYPES AND USE

- A. Type THHN/THWN wire
 1. Feeder and Branch Circuits
 2. Remote-Control Signaling and Power-Limited Circuits: - Circuit Classes 1, 2 or 3, unless otherwise indicated.
- B. Type MC Cable - Use in concealed installation of hung ceiling and gypsum board for:
 1. Lighting Branch circuit.
 2. Power branch circuit.

3.06 FEEDERS

- A. Where the Drawings indicate, a feeder shall be connected to two or more panelboards; insulated gutter taps shall be employed.
- B. Cable supports shall be installed in vertical runs as required. Cable support boxes shall be as specified for pull boxes. Approved cable supports shall be of proper type and size to prevent damage to insulation. Cable supports shall be the equal of OZ/Gedney Manufacturing Co.

3.07 BRANCH CIRCUITS

- A. Install branch circuits required to supply electric current from the panelboards to the various lighting fixtures, receptacles or other electrical equipment indicated on the Drawings or described in the Specifications.
- B. Branch circuits shall consist of two single conductors of size No. 12 include GND or unless otherwise indicated on Drawings or Specifications.
- C. Circuit conductors shall be connected at the panelboards so that numbers adjacent to "home runs" on the Drawings, correspond to numbered circuit breakers.
- D. From each recessed fixture install a flexible conduit (between 4 to 6 ft. Greenfield) with approved type of fixture wire, to a suitable junction box rigidly installed in hung ceiling within approximately 1 ft. of opening with access from opening only. Box shall be set on end so cover will face opening. Where this method is used, branch circuit wire shall be used to and between junction boxes, switches and panels, etc.
- E. One-half inch flexible conduit will be permitted between fixture and junction box for incandescent units individually mounted 4 ft. and 8 ft. fluorescent units.

3.05 ELEVATOR WIRING

- A. The Contractor shall provide power wiring terminating in the shunt trip breaker in the elevator machine room. The Contractor shall also extend power wiring from the shunt trip breaker to terminals at the elevator controller. In addition, the Contractor shall furnish and install the following:
 - 1. A disconnect switch feed via a 120 volt circuit to trailer cable for car light.
 - 2. A communication cable from the motor room to the elevator trailer cable for the elevator intercom.
 - 3. A dedicated light with a GFI receptacle, controlled by a switch located in the elevator pit.
 - 4. Wiring for elevator recall.
 - 5. A dedicated GFI receptacle in the elevator motor room.
 - 6. Power for the sump pump in the elevator pit.7.

END OF SECTION

SECTION 260533

RACEWAY AND BOXES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None.

1.02 SCOPE

- A. Provide raceways, fittings, boxes and accessories indicated on the Drawings, herein specified or required for the complete and proper operation of the systems specified or indicated on the Drawings.
- B. All power wiring shall be installed in rigid galvanized conduit,
- C. Low voltage systems shall be installed in RGC, EMT, surface metal raceway or in a dedicated cable tray as indicated on the drawings.

The following exceptions shall be observed however:

1. Fire alarm system wiring shall be installed in RGC throughout, as required by code.
- D. Where the Contractor selects and installs an item of equipment which requires either additional conduit, boxes, fittings, etc., or a modification of the conduit system indicated on the Drawings, such additional conduit, boxes, fittings, etc., shall be provided and such modifications shall be performed by the Contractor as part of this Contract and without extra compensation from the Owner.
- E. The Contractor shall coordinate the work with all trades so that the completed installation, particularly partitions and walls, will present a finished appearance. There shall be no structural malformation caused by improper installation of electrical equipment and no observable spaces between electrical equipment and the structure.

PART 2 – PRODUCTS

2.01 RACEWAYS

- A. Rigid Galvanized Conduit (RGC)
 1. Rigid conduit shall be in standard lengths with manufacturers name, nominal diameter and Underwriters label (U.L.) stamped on each length.

Material shall be galvanized steel. RGC shall meet the requirements of Article 344 of the National Electrical Code.
- B. Electric Metallic Tubing (EMT)

Industry standard conduit with Underwriters Laboratories label stamped on each length.
- C. Flexible Metal Conduit

Galvanized steel strip shaped into interlocking convolutions, UL categorized as Flexible Metal Conduit (identified on UL Listing Mark as Flexible Steel Conduit or Flexible Steel Conduit Type RW), as manufactured by American Flexible Conduit Co., Cerro Conduit Co., Ettco Wire and Cable Corp., or International Metal Hose Co.

D. Armored Cable (BX)

Metal clad cable of the armored type (commonly known as BX) shall be type AC. It shall be industry standard, factory fabricated assembly of cross linked polyethylene insulated nylon jacketed 98% conductivity soft drawn copper conductors, and a flexible metallic covering of interlocked galvanized steel or aluminum. A continuous ground conductor in intimate contact with the armor for the entire cable length shall be included in the assembly. The assembly shall be UL listed and rated 600 volts, 90°C.

Armored cable shall be manufactured by AFC/Monogram, General Cable, Triangle, or National Electric.

E. Liquidtight Flexible Metal Conduit

Anaconda Metal Hose Anamet Inc.'s Sealtite Type UA, Electri-Flex Co.'s Type LA Liqueatite, Flexible Technology Corp.'s Type UA, or Universal Metal Hose Co.'s Universal Sealflex U.

F. Rigid Nonmetallic Conduit, Fittings, and Accessories – Not Used.

G. Surface Metal Raceway, Fittings and Accessories

As manufactured by Walker Div. of Butler Mfg. Co. or Wiremold Co.

1. Raceways shall be complete with backing. Approved fittings shall be used at all bends and terminals.

H. Plastic Coated Rigid Metal Conduit, Fittings, and Accessories:

Rigid galvanized metal conduit, fittings, and accessories coated with 40 mils thick polyvinylchloride coating; Occidental Coating Co.'s Ocal 40, Protective Coatings Developments Inc.'s Kor-Kap, or Robroy Industries' Plastibond System.

2.02 FITTINGS AND ACCESSORIES

All fittings and accessories must be U.L. approved and compatible with selected raceways. Compression fittings shall be provided with the installation of EMT.

A. Insulated Bushings

B. Plastic Bushings for 1/2" and 3/4" Conduit

C. Insulated Grounding Bushings

D. Connectors, Couplings and Locknuts

E. Conduit Bodies (Threaded)

Malleable Iron/Zinc Electroplate: Zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers.

F. Expansion Fittings

Zinc Electroplate Finish with external bonding jumper.

G. Connectors and Couplings

Waterproof Hub connectors shall be used on all exterior installations. T&B # 370.

H. Deflection Fittings

I. Sealing Fittings

J. Expanding Silicone Foam

K. Vertical Conductor Supports

L. Drag Line

1/8" polypropylene monofilament utility rope.

2.03 CONDUIT SIZES

- A. The sizes of conduits and raceways indicated on the Drawings are the minimum acceptable by the Owner's Representative for the number of conductors to be installed. Where neither Drawings nor the Specifications indicate a size, conduits shall be not less than 3/4 inch size (nominal diameter) or of such larger size as required by the New York State Electric Code for the number of conductors specified or indicated on the Drawings.

Where the Drawings or the Specifications indicate existing conduit is to be extended, the new conduit extension shall be the same size as the conduit extended, unless otherwise specified in the Drawings or the Specification.

2.04 INSULATED BUSHINGS

- A. All conduits having a nominal diameter of 1-inch or larger shall be equipped with insulated bushings meeting either of the following requirements:

1. Metal bushings, cadmium plated and insulated with Bakelite.
2. Bushings of heat treated aluminum alloy with phenolic treated fiber insulation.

2.05 HANGERS AND STRAPS

A. Hangers

Separate hangers shall be installed for supporting conduits. Wherever possible hangers shall be supported from concrete slab by inserts. Prefabricated adjustable metal channel framing and associated fittings the equal of Kindorf, Unistrut, Power-Strut or Binkley will be acceptable in lieu of hangers if of equal mechanical strength.

Hangers and fittings shall be rust resistant treated and where installed concealed in hung ceilings need not be painted. Where installed exposed, apply finish coat of aluminum paint or color to match, as approved. Conduits on hangers shall be firmly attached to each hanger by using approved "U" bolts or straps.

Hangers and piping installed by other trades shall not be used for supporting electric conduits.

B. Straps and backs

Straps shall be properly formed to rigidly support conduits, and to properly space conduits from each other and from the ceiling or wall; minimum acceptable thickness shall be 1/16". Straps shall be galvanized or cadmium plated after they have been formed and drilled.

Maximum spacing of straps shall be five (5) feet for conduits not mounted on hangers.

Straps for use on the exterior of the building or in pipe tunnels shall be hot dipped galvanized.

C. Vertical Supports

At each floor provide rust resistant iron conduit clamps or other approved support at floor slabs on all vertical feeder conduits. Supports shall be as manufactured by Kindorf, Steel City, OZ/Gedney and Kellem.

2.06 SLEEVES FOR CONDUIT

A. Provide sleeves for all electrical conduits passing through foundation, floors, roofs, beams, and at other areas where indicated on Drawings. Provide as detailed on Drawings and as specified herein.

1. Interior floors' roofs: Provide galvanized sheet steel sleeve, 20 gauge. Provide 1" flange at bottom end for securing purposes. Sleeve ends flush with ceiling surfaces, and top of finished floors or roof.
2. Sleeves passing through fire-rated walls, floors, roofs, ceilings, and other areas where indicated: the space between sleeve and pipe/conduit shall be fire stopped to comply with fire rating of assembly through which it passes.

PART 3 – EXECUTION

3.01 RACEWAY INSTALLATION - GENERAL

A. General Requirements for Raceway

1. Make all cuts square.
2. Ream out all burrs from ends.
3. Couple sections together utilizing fittings specifically designed for use with the raceway.
4. Make up raceway to cabinets and boxes utilizing steel or malleable iron fittings with insulated throats, and specifically designed for the purpose.
5. Equip all conduit runs, which cross building expansion or control joints with expansion fittings having flexible grounding bonds by passing sliding parts. Arrange expansion fittings so that sliding action is not impeded.

6. During installation, cap all runs left unfinished or unattended. Also cap terminations of finished runs until wires and cables are to be pulled in. For capping, utilize fittings manufactured specifically for the purpose. Exclude paper or wood plugs.
 7. Where embedded in concrete, utilize concrete compression type couplings, connectors and fittings of a type, which assures ground continuity.
 8. Coat all threads with conductive, oxide inhibiting compound.
- B. Provide EMT for feeders and branch circuits for power, lighting and low voltage systems.
- C. Number of Raceways
- Do not change number of raceways to less than the number indicated on the Drawings unless prior approval is received. Existing raceways may be reused if the Contractor meets the following conditions:
1. The existing raceway must be of adequate size for the new conductors to be installed therein. More circuits may be enclosed by existing raceways than the circuiting shown on the Drawings provided conductor sizes are increased to compensate for derating.
 2. Remove existing conductors.
 3. Demonstrate to the Owner that the existing raceway is clear of obstructions and in good condition.
 4. Check ground continuity. When ground continuity of existing raceway is inadequate, install insulated grounding bushings, grounding wedges, bonding straps, grounding jumpers or equipment grounding conductors to establish effective path to ground.
 5. Install insulated bushings to replace damaged or missing bushings. Replace non-insulated bushings with insulated bushings on raceway sizes 1" and larger.
 6. Install vertical conductor supports to replace existing or missing vertical conductor supports.
 7. Install extension collars on existing boxes when the number of new conductors installed therein exceeds code.
- D. Raceways for Future Use (Spare and Empty Raceways)
- Draw fish tape through raceways in the presence of the Owner's Representative to show that the raceway is clear of obstructions.
1. Install a dragline in each raceway.
- E. Conduit Installed Concealed in Existing Construction

In existing buildings new conduit systems shall be installed, in the following manner:

1. Where new partition walls and new hung or furred ceilings are being erected the conduits and related equipment shall be installed concealed in walls and in hung or furred ceilings.
2. Rigid Conduits must be used for conductors of the fire alarm system stairway lights, and exposed feeders.

F. Conduit Installed Concealed in New Construction

1. Ceilings, Walls, Partitions: Install conduit concealed in the ceilings, walls, and partitions of the building unless otherwise indicated on the Drawings.
 - a. Run conduits in partitions vertically.
2. The Contractor shall not cut any hole larger than six (6) inches except where otherwise directed in the Contract, and where the opening if larger than six inches it shall be reinforced by other trades.

G. Conduit Installed Exposed

1. Work shall be done in neat and workmanlike manner at right angles and parallel to building walls and structure.
2. Install vertical runs perpendicular to floor.
3. Install runs on the ceiling perpendicular or parallel to the walls.
4. Install horizontal runs parallel to the floor.
5. Do not run conduits near heating pipes.
6. Installation of conduit directly on the floor will not be permitted.

H. Conduit Size: Not smaller than 3/4" electrical trade size.

I. Conduit Bends

For 3/4" conduits, bends may be made with manual benders. For all conduit sizes larger than 3/4" manufactured or field fabricated offsets or bends may be used. Make field fabricated offsets or bends with an approved mechanical/hydraulic bender.

3.02 RACEWAY SCHEDULE

A. Rigid Galvanized Steel Conduit (RGC)

1. Install in all locations, unless otherwise specified or indicated on the Drawings, including but not limited to the following:
 - a. Conduits installed exposed up to 7'-0" AFF. Exposed risers shall be RGC for the entire vertical run.
 - b. Rigid conduit shall be used for exposed work in Mechanical Spaces and in unfinished sections of the building.

- c RGC shall be used for the Fire Detection and Alarm System including the Smoke Purge System, Elevator Recall System, and Visual Annunciator System.

B. Electrical Metallic Tubing (EMT)

Provide EMT for feeders and branch circuits for power, lighting and low voltage systems.

C. Flexible Metal Conduit

Install for all connections to vibrating equipment, or as otherwise specified and as detailed as follows:

1. Use for final conduit connection to recessed lighting fixtures in suspended ceilings. Use 4 to 6 ft. of flexible metal conduit (minimum size 1/2") between junction box and fixture. Locate junction box at least 1 ft. from fixture and accessible if the fixture is removed.
2. Use 1 to 3 ft. of flexible metal conduit for final conduit connection to:
 - a. Emergency lighting battery units.
 - b. Motors with open, drip-proof or splash-proof housings.
 - c. Equipment subject to vibration (dry locations).
 - d. Equipment requiring flexible connection for adjustment or alignment (dry locations).
3. Use for concealed branch circuit conduits above existing non-removable suspended ceilings where conduit cannot be installed due to inaccessibility of space above ceiling.
4. May be installed concealed as branch circuit conduits in drywall construction with sheet metal studs, except where studs are less than 3-1/2" deep.
5. Flexible steel conduit shall be attached to boxes or to rigid conduits by means of connectors having twin screw fastenings, or other approved type, each of which will separately and securely hold the flexible conduit in place.
6. In all cases install equipment-grounding conductor in the flexible raceway and bond at each box or equipment to which flex is connected. The Contractor is advised that grounding conductors are not shown on the Drawings.

D. Liquidtight Flexible Metal Conduit

1. Use 1 to 3 ft. of liquidtight flexible metal conduit for final conduit connection to:
 - a. Motors with weather-protected or totally enclosed housings.
 - b. Equipment requiring flexible connection for adjustment or alignment (damp and wet locations).

E. Surface Metal Raceway

Use surface metal raceway in finished spaces at locations indicated on the Drawings only.

1. Use surface metal raceway system of size required for number of wires to be installed therein.
2. Do not run raceway through walls or floors. Install a pipe sleeve, or a short length of conduit with junction boxes or adapter fittings for raceway runs through such areas. Run raceway along top of baseboards, care being taken to avoid telephone and other signal wiring. Where raceway crosses chair railing or picture molding, cut the chair railing or picture molding to permit the raceway to lie flat against the wall. Run raceway around doorframes and other openings. Run raceway on ceiling or walls perpendicular to or parallel with walls and floors.
3. Secure one-piece raceway every 36" alternately with one-hole straps, and support clips (strap, support clip, strap, etc.). Secure 2-piece raceway every 36" alternately with straps and fasteners through back of raceway (strap, fastener through back, strap, etc.).
4. Install separate grounding conductor-grounding equipment. The raceway alone will not be considered suitable for use as an effective path to ground. The Contractor is hereby advised that the required grounding conductors for surface raceways are not shown on the Drawings.
5. Outlet box covers for pendant mounted fluorescent fixtures may be omitted if the fixture canopy is notched to receive the raceway and the canopy fits snugly against the ceiling.
6. Where equipment is mounted on an outlet box and the equipment base is larger than the outlet box, provide finishing collar around equipment base and outlet box or provide finishing collar/outlet box:
 - a. Finishing Collar: Same finish and peripheral dimensions as the equipment base, including provisions for mounting, slots to fit over raceway and of depth to cover outlet box and extend back to ceiling or wall.
 - b. Combination Finishing Collar/Outlet Box: Same finish and peripheral dimensions as the equipment base to be mounted thereon, gauge or thickness of metal as required by National Electrical Code, including provision for mounting and knockouts for entrance of raceway.

F. General Requirements for Raceway

1. Make all cuts square.
2. Ream out all burrs from ends.
3. Couple sections together utilizing fittings specifically designed for use with the raceway.
4. Make up raceway to cabinets and boxes utilizing steel or malleable iron fittings with insulated throats, and specifically designed for the purpose.
5. Equip all conduit runs, which cross building expansion or control joints with expansion fittings having flexible grounding bonds by passing sliding parts. Arrange expansion fittings so that sliding action is not impeded.

6. During installation, cap all runs left unfinished or unattended. Also cap terminations of finished runs until wires and cables are to be pulled in. For capping, utilize fittings manufactured specifically for the purpose. Exclude paper or wood plugs.
7. Where embedded in concrete, utilize concrete compression type couplings, connectors and fittings of a type, which assures ground continuity.
8. Coat all threads with conductive, oxide inhibiting compound.

3.03 FITTINGS AND ACCESSORIES SCHEDULE

- A. All fittings and accessories must be UL listed and compatible with selected raceways and suitable for use location. Compression fittings shall be provided with the installation of EMT.

3.04 FLOOR AND WALL PENETRATIONS

- A. Plug all penetrations through fire rated floors and walls with a three hour rated, fire stop penetration kit as manufactured by Hevi-Duty/Nelson or approved equal, consisting of:
 1. Type CMP Firestop Compound or an approved equal.
 2. 7" x 7" panel (large penetrations).
 3. Type CLK Firestop Caulk.
 4. Panel support material and ceramic fiber as required, to be utilized for large penetrations.

3.05 EXISTING RACEWAYS

- A. Remove all existing unused exposed conduits and other related equipment in the areas to be refurbished. All existing concealed conduits not indicated to be reused shall be abandoned. Any existing conduits to be reused shall be cleaned to remove scale and burrs.

3.06 ROUTING OF CONDUITS

- A. The routing of conduits, as shown on the Drawings, is approximate, only unless dimensions are indicated. Conduit runs as shown on risers and Drawings are generally diagrammatic. The Contractor shall follow the general routing shown on the risers or Drawings (e.g. whether overhead or underneath) and furnish and install all necessary offsets, fittings, wiring and miscellaneous hardware, to run from one point to another. The actual routing shall be subject to the approval of the Owner's Representative.
- B. Conduits shall not be run above or in close proximity to boilers or hot pipes; nor shall conduits be run directly beneath water pipes.
- C. Exposed conduits shall be rigidly fastened to structure, or to rigid hangers or angle irons connected to structure at intervals not exceeding eight ft. Exposed conduits crossing

expansion joints, conduits shall have approved expansion fittings in line or at the pull box.

- D. Where the conduits or surface metal raceways are installed exposed they shall follow the architectural lines of the enclosure and shall be run as to be as inconspicuous as possible. Conduits or surface metal raceways shall not be installed diagonally on ceilings, walls or columns.

3.07 CONCEALED CONDUITS

- A. Conduits from distribution points such as panelboards, fire signal control board, sound control cabinet, inter-connecting boxes, and the like, to outlets for switches, receptacles, lighting fixtures, fire signal stations, bells, buzzers, horns, telephones, clocks, loudspeakers, etc., and between these outlets shall be installed concealed where possible and installed in accordance with approved Shop Drawings.
1. Conduits in Hung and Furred Ceiling:
- a. In hung ceilings the conduits must be run so as not to interfere with pipes or ducts. Groups of conduits shall be suspended above the hung ceiling upon separate hangers installed by the Contractor. Hangers will not be required for conduits to and between outlets of lighting fixtures located on or in hung ceilings or to wall switch.
- b. Single conduits may be laid on and fastened to angle supports of the hung and furred ceilings.

3.08 CONDUITS FOR MOTORS

- A. Prior to installing conduits for motors, the Contractor shall verify locations of motor connections with trades furnishing motors and shall run conduits accordingly.

3.09 PAINTING

- A. All exposed conduits and raceways in unfinished portions of the building, such as the cellar, etc., including boxes of all kinds, except those of motor control equipment, (manufacturers motor control housings) shall not be painted. All exposed conduits and raceways including boxes in finished parts of the building shall be painted. Painting shall consist of a prime coat and a finished coat, color as selected. Factory painting will be accepted as a prime coat.

3.10 LOCATION OF OUTLETS

- A. Locations of outlets, and conduits indicated on the Drawings are diagrammatic. The Contractor shall refer to the Architectural Drawings for exact locations of all outlets, carefully lay out the work to achieve the intent of design and provide shop drawings detailing same for approval. The right is reserved to change the location of any outlet

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before same is permanently installed. Such changes shall be at the option of the Owner and shall be done without extra charge by the Contractor.

END OF SECTION

SECTION 250534

OUTLET, JUNCTION, AND PULL BOXES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None.

1.02 DESCRIPTION OF WORK

- A. The Contractor shall provide outlet boxes appropriate for the purpose at all locations where the Drawings require the installation of electrical devices or electrical equipment, which may or may not embody in its construction a means of conduit, raceway or cable connection.
- B. Where the Contractor selects and installs an item of equipment which requires either, additional boxes, fittings, etc., or a modification of the conduit system indicated on the Drawings, such additional boxes, fittings, etc. shall be furnished and installed and such modifications shall be performed by the Contractor as part of this Contract, without extra compensation from the Owner.
- C. All outlet and enclosing boxes, and all steel or iron covers, doors, trims, etc. attached to the boxes shall be galvanized or rust proofed.
- D. All boxes shall be fastened in an approved manner, independent of the attached conduit.
- E. All boxes set in plastered walls shall be provided with approved plaster rings or extension covers appropriate for the equipment.
- F. All pull boxes, junction boxes, splice boxes, outlet boxes, etc., which are not covered by electrical equipment shall be provided with blank steel face plates, painted by the Contractor.
- G. All special boxes, such as enclosing boxes for telephones and fire signal equipment, mounting boxes for special clocks, clocks, panels, etc., shall be supplied by the manufacturer of the enclosed equipment.

1.03 REFERENCES

- A. NEMA and UL.

1.04 SUBMITTALS

- A. Catalogue sheets and samples as requested by the Owner's Representative only.

PART 2 – PRODUCTS

2.01 OUTLET, JUNCTION AND PULL BOXES

- A. Galvanized Steel Outlet Boxes

Standard galvanized steel boxes and device covers as manufactured by Appleton Electric Co., Electrical Products Div. Midland-Ross (Steel City), or Raco Inc.

B. Galvanized Steel Junction and Pull Boxes

Code gage, galvanized steel screw cover boxes as manufactured by Gray Metal Products Inc., Hoffman Engineering Co., Keystone Columbia Inc., or Queen Products Co. Inc.

C. Threaded Type Boxes

1. Outlet Boxes:

- a. Zinc Electroplate: Zinc electroplate malleable iron or cast iron alloy boxes as produced by Appleton Electric Co., Crouse-Hinds Co., or OZ/Gedney Co., with zinc electroplate steel covers to suit application.
- b. Hot Dipped Galvanized: Hot dipped galvanized malleable iron or cast iron alloy boxes as produced by Crouse-Hinds Co., or OZ/Gedney Co., with stainless steel cover screws, and hot dipped malleable iron covers gasketed or ungasketed to suit application.

D. Metal Raceway (for office partition receptacles)

Partition receptacles shall be mounted in a specially fabricated extruded aluminum raceway with custom cover and ends. Raceway shall be square cross section of 1/8" aluminum of the length indicated on the Drawings. Cover plates shall be continuous of the length indicated and shall overlap the body by a minimum of 1/2" on either sides. Openings for receptacles shall be punched into the cover for a clean fit and finish. End caps and cover shall be connected to the body with screws at 12" intervals on both sides.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Before proceeding with the installation of junction and pull boxes, check the locations with the Architectural Drawings and have same approved, with the Owner's Representative.

3.02 INSTALLATION

- A. Mounting Position of Wall Outlets For Wiring Devices: Unless otherwise indicated, install boxes so that the long axis of each wiring device will be vertical.

B. Height of Wall Outlets

Unless otherwise indicated, locate outlet boxes with their centerlines at the following elevations above finished floor:

Alarm Indicating Devices	8'-0" to center where ceiling height allows a minimum of 2" clearance between ceiling and top otherwise mount so that it's top is 2" below finished ceiling.
Indicators	8'-0" AFF.
Strobe Lights	8'-0" A.F.F. or 6" below the ceiling whichever is lower
Manual Fire Alarm Boxes	4'-0"
Single & Duplex Receptacles	1'-6"*

Switches	4'-0"
Telephone	1'-6"

*In areas containing heating convectors, install outlets above convectors at height indicated on Drawings.

C. Supplementary Junction and Pull Boxes

In addition to junction and pull boxes indicated on the Drawings and required by the Code, provide supplementary junction and pull boxes as follows:

1. When required to facilitate installation of wiring.
2. At every third 90° turn in conjunction with raceway sizes over 1".
3. At intervals not exceeding 100 ft. in conjunction with raceway sizes over 1".

3.03 OUTLET, JUNCTION, AND PULL BOX SCHEDULE

A. Boxes For Concealed Conduit System:

1. Depth: To suit job conditions and also comply with Code.
2. For Lighting Fixtures: Use 4" octagonal galvanized steel outlet boxes.
3. For Junction and Pull Boxes: Use galvanized steel boxes with flush covers.
4. For Switches, Receptacles, Etc.:
 - a. Plaster or Cast-In-Place Concrete Walls: Use 4" or 4-11/16" galvanized steel boxes with device covers.
 - b. Walls Other Than Plaster or Cast-In-Place Concrete: Use type of galvanized steel box which will allow wall plate to cover the opening made for the installation of the box.

B. Boxes For Exposed Conduit System:

1. General:
 - a. Cast metal alloy outlet, junction, and pull boxes in conjunction with ferrous raceways in dry and damp locations unless otherwise specified or indicated on the Drawings.
 - b. Use hot dipped galvanized malleable iron or cast iron alloy outlet boxes in conjunction with raceway in dry locations unless otherwise specified or indicated on the Drawings.
 - c. Use cast outlet boxes for switch, receptacle, and device outlets in all locations below 7'-0" mounting height with number of threaded conduit bosses equal to the raceway.
 - d. Use hot dipped galvanized cast iron junction and pull boxes in conjunction with ferrous raceways in wet locations unless otherwise specified or indicated on the Drawings.
2. Conduit Sizes 1/2", 3/4" and 1": Use threaded type boxes.

3. Conduit Sizes Over 1" (Wet Locations and Hazardous Locations): Use threaded type boxes.
4. Conduit Sizes Over 1" (Dry Locations and Damp Locations): Use galvanized steel boxes.
5. Finishing Collar or Combination Finishing Collar/Outlet Box (Surface Mounted Equipment Used With Exposed Raceway):
 - a. Use finishing collar where surface mounted equipment is installed on an exposed raceway outlet box and the equipment base is larger than the outlet box.
 - b. Use combination finishing collar/outlet box where surface mounted equipment is not indicated to be installed on an exposed raceway outlet box, but raceway cannot be run directly into equipment body due to equipment design.

3.04 PAINING

- A. All pull boxes, junction boxes, splice boxes, outlet boxes, etc., which are not covered by electrical devices with finished cover plates shall be provided with blank steel face plates, painted by the Contractor. Boxes for fire alarm system wiring shall be painted RED in accordance with code compliance.

3.05 EXISTING OUTLET BOXES

- A. Existing outlet boxes may be used for support of fluorescent and heavy incandescent fixtures only with prior written permission. Studs and other weight bearing parts of existing outlet boxes from which new lighting fixtures or other electrical equipment are to be suspended, shall be carefully inspected and weight tested (in accordance with directions of the Owner) by this Contractor to be certain that new equipment can be safely supported.
- B. Suspension load test for supporting a 4' fluorescent fixture from an existing hung or furred ceiling shall consist of installing a fixture support and attach a convenient length of stem to the stud of the supporting bar. The bottom of the stem shall be fitted with a chain ring or harness supporting the weight of two (2) 94 lb. bags of cement for 48 hours.

3.06 SPECIAL CONDITIONS

- A. In brick faced walls, and walls of enameled or glazed brick, light weight concrete block, wood, marble, tile or slate, install a standard box behind the facing or wainscot to receive conduit, and attach thereto a square corner extension cover similar to Arrow Conduit and Fittings 4-SC-51 series but of proper size to contain the number of switches indicated on the Drawings, and to bring switches flush with facing. Submit sample for approval before installation.
- B. Switch Boxes shall be mounted in the following manner:

1. Each switch box adjacent to a door shall be rigidly attached to a steel door buck support, the approved equal of the type manufactured by the Arrow Conduit and Fittings Co.
2. At other locations, switch boxes shall be equipped with approved galvanized steel straps attached to the top or side of the box and embedded securely in the mortar between bricks, hollow tile or block, etc. or attached to furring strips. Steel strap may be omitted where boxes can be rigidly grouted in place by mortar or by an equally approved method.

END OF SECTION

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SECTION 262726

WIRING DEVICES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None.

1.02 DESCRIPTION OF WORK

- A. Provide all receptacles and switches.

1.03 SUBMITTALS

- A. Product Data
Catalogue sheets and specifications.

PART 2 – PRODUCTS

2.01 SWITCHES

- A. Local Switches, Single Pole:
 1. 20A, 120/277 VAC; General Electric's GE 5921-1G, Hubbell's 1221, Leviton's CS120-2 Pass & Seymour's 20AC1, or Slater's 740-BR.
 2. 30A, 120/277 VAC; General Electric's GE 5991-1G, Hubbell's 3031, Leviton's 3031-2, or Pass & Seymour's 30AC1.
 3. 20A, 120/277 VAC 2 pole; General Electric's.
- B. Local Switches, Three-Way:
 1. 20A, 120/277 VAC; General Electric's GE5923-1G, Hubbell's 1223, Leviton's CS320-2, Pass & Seymour's 20AC3, or Slater's 743-BR.
 2. 30A, 120/277 VAC; Bryant's 3003, Crouse-Hinds/AH's 3993, General Electric's GE5993-1G, Hubbell's 3033, Leviton's 3033-2, or Pass & Seymour's 30AC3.
- C. Local Switches, Key-Operated
Similar to toggle type lock switches, except operated by removable key instead of lever.
Furnish one key with each switch.
- D. Momentary Contact Switches

Components shall consist of momentary contact switches Leviton N0. 1256, 15A, 12VAC/10A.277V.AC, Arrow-Hart (A-H), and switch plates and mountings the product of Mulberry Metal Products (MMP), or approved equals.

E. Horsepower Rated Switches

Maximum HP single or 3 phase.

Two Pole A-H #6808F

Three Pole A-H #7810F

F. Dimmer Switches

Not Used.

2.02 RECEPTACLES

A. Straight-blade-type; Commercial Specification Grade minimum; compliance with NEMA WD 1; DSCC WC 596, AND UL 498 and UL 943 2006 Codes.

1. Single receptacle, NEMA 5-20R (20A, 125V, 2P, 3W);
Leviton 5891 or Pass & Seymour/Legrand PS5351
2. Duplex receptacle, NEMA 5-20R (20A, 125V, 2P, 3W);
Hubbell Inc. HBL5362, Leviton BR20, Pass & Seymour/Legrand PS5362
3. Ground-Fault Circuit Interrupter GFCI; duplex (20A, 125V, 2P, 3W)
Hubbell Inc GF5352SL, Leviton 6899, Pass & Seymour/Legrand PS2095
4. Transient Voltage Surge Suppression Receptacle TVSS; duplex (20A, 125V, 2P, 3W);
Hubbell Inc HBL5360SA, Leviton 5380, Pass & Seymour/Legrand PS5362-ISP
5. Twisted Lock receptacles Commercial Grade For use in the Telecommunication Rooms
 - a. Single receptacle (30A, 125V, 2P 3W) (NEMA L530R):
Leviton part# 2660 or Hubbell Part # HBLL530R
 - b. Single receptacle (20A, 220V, 2P 3W) (NEMA L620R):
Leviton Part# 2320 or Hubbell Part # HBLL530R
 - c. For the Mobile Hot Food Server:
Hubbell Receptacle Part # HBL9430A 30A, 3 Pole, 4 Wire Grounding
6. Weatherproof Receptacle enclosure

For use in wet location equal to Pass & Seymour/Legrand WIUC10-G.

2.03 MOMENTARY CONTACT SWITCHES

- A. The Contractor shall provide two (2) position selector switches at locations shown on the Drawings. Selector switch shall consist of a legend plate, operator and contact block.
- Legend plate shall be aluminum field with "OFF-ON" marking. Legend plate shall be Square 'D', Catalog #KN-744 or approved equal. Operator shall be non-illuminated, spring return and key operated. Operator shall be Square D, Catalog #KS--34K1 or approved equal.

Contact block shall be normally closed. Contact block shall be Square "D" Catalog #KA-3 or approved equal.

2.04 FACE PLATES

- A. Provide faceplates for switches, receptacles, and miscellaneous devices. Faceplates shall be stainless steel Type 302 (18% chrome, 8% nickel), non-magnetic with satin finish, not less than .035" thick, and shall be appropriately inscribed to indicate equipment controlled as indicated.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install wiring devices in outlet boxes.
- B. Local Switches
 - 1. Install local switches rated 15A, & 20A, 120/277 vac for lighting control unless otherwise shown on the Drawings or specified.
 - 2. Where more than one switch occurs at the same location, arrange switches in gangs and cover with a single faceplate.
 - 3. Install single and double pole switches so that switch handle is up when switch is in the "On" position.
- C. Receptacles
 - 1. Install Specification Grade receptacles, NEMA 5-15R, 15A, 125V, 2P, 3W, for duplex receptacles and single receptacles unless otherwise shown on the Drawings or specified.
 - 2. Install receptacles with ground pole in down position.
- D. Wall Plates
 - 1. Install wall plates on all wiring devices of a type and finish to suit the specific location.
 - 2. Install blank wall plates on outlet boxes, which are for future equipment except telephone outlets.
 - 3. Install wall plates on telephone and data outlets, with integral electronic jack, suitable for the specified system.
- E. Weatherproof Covers

Install weatherproof covers on wiring devices in damp and wet locations.
- F. Mats

Where flush plates are required over outlet boxes that cannot be set deep enough for the plates to fit closely over the finished wall surfaces, provide mats to fill the space between the finished wall surface and the plate.

3.02 FIELD TESTS

- A. Prior to energizing circuitry, test wiring for electrical continuity voltage drop, and short circuits. Ensure that proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements of these Specifications. All circuits evidencing a fault or an excessive voltage drop shall be replaced.

END OF SECTION

SECTION 262815

**OVERCURRENT PROTECTIVE DEVICES,
CIRCUIT BREAKERS AND FUSES**

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1. None

1.02 DESCRIPTION OF WORK

- A. This Section describes the type of circuit breakers and fuses to be provided in safety switches, switchboards, and panelboards.

1.03 NOT USED

1.04 SPARES

- A. Provide and deliver the following spare fuses:
 1. Three (3) fuses of each type and size for all other fuses.

PART 2 – PRODUCTS

2.01 CIRCUIT BREAKERS

- A. General

Circuit breakers shall be thermal-magnetic type, conforming to the following Specifications:

1. Connection to bus shall be by "bolt-on" (or as existing). Plug-in type circuit breakers are not acceptable.
2. Breakers shall be equipped with arc chutes or other approved suitable means of quenching arcs.
3. Breakers shall have a quick-break operating mechanism on automatic operation.
4. Handles of breakers shall be "trip free".
5. Handles of breakers shall plainly indicate whether breaker is in "ON", "OFF" or tripped position.
6. Breakers shall be designed to carry 100% of trip rating continuously; to have inverse time delay tripping above 125% of trip rating; and to trip instantaneously at 1000% of trip rating.
7. Multi-pole breakers shall have barriers between poles.

8. Multi-pole breakers shall have a separate tripping element for each pole. Each tripping element shall open all poles. Multi-pole breakers shall have one handle controlling all poles.
9. Breakers of 225-ampere trip rating or less shall have non-tamperable, permanently set trip elements enclosed and sealed in molded composition housing.
10. Single pole breakers shall be rated for not less than 120 volts, A.C.; multi-pole breakers shall be rated for not less than 250 volts A.C.
11. All breakers shall be manufactured in accordance with standards of the National Electrical Manufacturers Association and shall bear Underwriters Laboratories label.
12. Circuit breakers shall have not less than 15-ampere trip ratings for lighting or appliance circuits, unless otherwise indicated on Drawing or required for the circuit protected.
13. Circuit breakers protecting three phase circuits shall be of the three-pole type.
14. Where spaces for future breakers are required, copper connections for mounting of future breakers shall be provided.
15. For single phase 120-volt or 277 volt loads provide Westinghouse Electric Corp, "Quicklag" by General Electric, Challenger Electric, Siemens or Square D. or as existing.
16. For 208 volt or 480 volt circuits to single phase equipment, provide two (2) pole breakers as manufactured by Westinghouse Electric Corp., Challenger, General Electric, Siemens, or Square D Company with time curve 1.
17. For 3-phase, 208 volt or 480 volt circuits to three phase equipment provide three-pole breakers with time curve 1 as manufactured by Westinghouse Electric Corp., General Electric, Challenger Electric, Siemens or Square D.
18. For lighting circuits that are controlled at panel, provide devices rated for switching duty.
19. Circuit breakers shall be mounted in standard panelboards as indicated on the drawings. Frame and sizes of circuit breakers shall conform to the following:

Trip Ratings-Amps	No. of Poles	Frame Size
15-70	1	<u>100 AMP – Frame</u> 240V: Square D, Type QOB-VH (22,000 I.C.) 480/277V: EHB (14,000 I.C.)
15-100	2&3	<u>100 AMP – Frame</u> Same as for 15-70 AMPS trip rating.

101-225	2&3	<u>225 AMP - Frame</u> 240V: Square D, type KA (42,000 I.C.) 480V: Type KA (25,000 I.C.)
226-400	3	<u>400 AMP - Frame</u> 240V: Square D, type LA (42,000 I.C.) 480V: Type LA (30,000 I.C.)

2.02 **FUSES**

- A. Fuse holders for distribution equipment and panelboards (except as otherwise specified for service switches) shall be equipped with H.R.C. type cartridge fuses of type and voltage required. All fuses including spares shall have a minimum interrupting rating of 200,000 R.M.S. amperes the equal of Bussman or Gould Shawmut.

1. All Circuits 600A and Below:
 - a. Dual element, time delay, current limiting 600 amp maximum rating at required voltage, and 200,000 amp interrupting rating.
 - b. Similar to type low peak LPN-RK (rating)- SP, 250 volt, 15-600A or low peak LPS-RK (rating) - SP, 600 volt, 15-600A (U.L. Class RK1 with dual element time delay).
2. All circuits above 600A:
 - a. Time delay, current limiting type with 200,000 amp interrupting rating similar to low-peak KRPC (rating)-SP, 600 volt, 601-6000A (U.L. Class L).
3. All fuses shall be the product of the same manufacturer.
4. Spare Fuses

Furnish and deliver the following spare fuses:

- a. Three fuses of each type and size for all other fuses.
- b. A minimum 2:1 ratio must be maintained between the ampere rating of a main fuse and that of the feeder fuse, and between the feeder fuse and the branch circuit fuse to obtain selective coordination and allow for minimum fusible switch size.

2.03 **SPARE FUSE CABINET**

- A. Cabinet: Wall-mounted, 0.05-inch- (1.27-mm-) thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
 2. Finish: Gray, baked enamel.

3. Identification: "SPARE FUSES" in 1-1/2-inch- (40-mm-) high letters on exterior of door.
4. Fuse Pullers: For each size fuse.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

END OF SECTION